DX Dual Camera Module and Equal-i 2S Image Processor Installation Guide

Rev. 1.20 – September 2016
Contents

1. About This Manual ................................................................................................................. 4
   1.1 Prerequisites ..................................................................................................................... 4
      1.1.1 Documentation Conventions .................................................................................... 4
      1.1.2 General Precautions .............................................................................................. 4
   1.2 Support ............................................................................................................................ 4

2. Product Overview .................................................................................................................. 5
   2.1 Equal-i 2S Image Processor Specifications (Model # AE2S-P01) ...................................... 6
   2.2 Equal-i 2S Image Processor Parts List ............................................................................. 7
   2.3 Equal-i 2S Image Processor Front View ......................................................................... 7
   2.4 Equal-i 2S Image Processor Rear View .......................................................................... 7
   2.5 DX Dual Camera Module Specifications (Model # AEDX-P10 / AEDX-P11) ............... 8
   2.6 DX Dual Camera Module Parts List .............................................................................. 9
   2.7 DX Dual Camera Module Front View ........................................................................... 9
   2.8 DX Dual Camera Module Rear View ............................................................................ 9

3. Recommended Room Setup ................................................................................................... 10

4. System Requirements .......................................................................................................... 10

5. Recommended Codecs .......................................................................................................... 11

6. Initial Setup .......................................................................................................................... 12
   6.1 Equal-i 2S Image Processor ......................................................................................... 12
   6.2 Windows Equal-i Control App ..................................................................................... 12
      6.2.1 Windows Equal-i Control App Download ............................................................... 13
      6.2.2 Connecting to the Equal-i Image Processor .......................................................... 13
      6.2.3 Settings Menu ....................................................................................................... 13
      6.2.4 Manual Network Configuration ............................................................................ 14
   6.3 DX Dual Camera Module .............................................................................................. 16

7. Final Configuration ............................................................................................................... 18

8. Equal-i Control App .............................................................................................................. 19
   8.1 Android ......................................................................................................................... 19
   8.2 Crestron ......................................................................................................................... 19
   8.3 iOS ............................................................................................................................... 19
   8.4 Windows ....................................................................................................................... 19

9. Equal-i Control App for Android .......................................................................................... 19
   9.1 Initial use Configuration ............................................................................................... 19
   9.2 User Interface ............................................................................................................... 20
   9.3 Settings ........................................................................................................................ 20
      9.3.1 LAN Settings ......................................................................................................... 20
      9.3.2 Camera Settings .................................................................................................... 21
      9.3.3 Admin Settings ..................................................................................................... 21
10. Troubleshooting ........................................................................................................................................ 22
  10.1 No Picture ........................................................................................................................................... 22
  10.2 White Picture ...................................................................................................................................... 22
  10.3 Garbled or Scrolling Image .................................................................................................................. 22
  10.4 Equal-i Control Application Issues ..................................................................................................... 22
  10.5 Equal-i Control Application Does Not Detect Image Processor ......................................................... 23
  10.6 No audio through HDMI/Display ......................................................................................................... 23
  10.7 Unable to control codec using my codec remote .................................................................................. 23
  10.8 Framing does not look correct ............................................................................................................. 23
11. Regulatory Notices and Safety Guidelines .............................................................................................. 23
12. Manufacturer Contact Information .......................................................................................................... 24
13. Appendix A – Recommended Framing Modes .......................................................................................... 25
  13.1 Remote Site: Multipoint, Bridge, VMR .................................................................................................. 25
  13.2 Remote Site: Single display with single camera or multipoint bridge .................................................. 25
  13.3 Remote Site: Dual display with single camera ....................................................................................... 25
  13.4 Remote Site: Equal-i equipped dual display with dual camera ............................................................ 25
14. Appendix B – Telnet Commands ............................................................................................................... 27
  14.1 Overview ............................................................................................................................................. 27
  14.2 Command Processing ........................................................................................................................... 27
  14.3 Protocol Rules ..................................................................................................................................... 27
  14.4 Read/Write Commands ........................................................................................................................ 28
    14.4.1 HORPAN – Horizontal Pan ............................................................................................................. 28
    14.4.2 VERTPAN – Vertical Pan ............................................................................................................... 28
    14.4.3 GAMMA – Gamma ......................................................................................................................... 28
    14.4.4 BALBOXES – White Balance Boxes .............................................................................................. 28
    14.4.5 BALBOXPOS – Balance Box Position ......................................................................................... 29
    14.4.6 INTTIME – Integration Time ......................................................................................................... 29
    14.4.7 COLGAIN – Color Gain ............................................................................................................... 29
    14.4.8 OPMODEFE – Front-end Operating Mode ..................................................................................... 29
    14.4.9 OPMODEBE – Back-End Operating Mode .................................................................................... 30
    14.4.10 SENSgain – Sensor Gain ............................................................................................................. 30
    14.4.11 SLEEP – System Sleep ............................................................................................................... 30
    14.4.12 LANIPADDR – LAN IP Address ................................................................................................. 31
    14.4.13 LANIPMASK – LAN IP Mask ....................................................................................................... 31
    14.4.14 LANIPGATE – LAN IP Gateway ................................................................................................. 31
    14.4.15 LANDHCP – LAN DHCP Useage ............................................................................................... 31
    14.4.16 DEVNAME – Set Unit name ........................................................................................................ 32
    14.4.17 PASSWORD – Set Password ....................................................................................................... 32
    14.4.18 FRAMERATE – Change between 25Hz / 30Hz ............................................................................ 32
14.5 Read-Only Commands .......................................................................................................................... 32
14.5.1 FWVER – System Firmware Version .................................................. 32
14.5.2 FPGAVER – FPGA Firmware Version ................................................. 33
14.5.3 LANMAC – Ethernet MAC address ................................................... 33
14.6 Action Commands ............................................................................. 33
14.6.1 BALL – White Balance of left-side image ........................................ 33
14.6.2 BALMATCH – White balance for right-side image ................................ 33
14.6.3 WHITEBAL – One-shot white balance ............................................. 33
14.6.4 LOADFAC – Load Factory Settings ................................................ 33
14.6.5 SAVEPARAM – Save System Settings ............................................. 34
14.6.6 RESET – Reset System ................................................................... 34
14.6.7 SAVELAN – Save LAN configuration ............................................ 34
14.6.8 LOADFLAN – Load Factory LAN .................................................. 34
15. Appendix C – Recommended Room Configurations ................................ 35
16. Appendix D – Installation Certification Site Survey ................................. 58
17. Appendix E – Cabling Diagrams ............................................................. 59
1. About This Manual
Thank you for choosing the Equal-i system as your video conference solution. The Equal-i system consists of the following image processor and camera module:

- Equal-i 2S Image Processor (Model # AE2S-P01)
- DX Dual Camera Module (Model # AEDX-P10 or AEDX-P11)

This guide describes how to install the Equal-i 2S Image Processor and DX Dual Camera Module. It is intended for Pro AV and system integration technicians who have some previous training with Equal-i products.

1.1 Prerequisites
Before you perform the tasks in this guide, complete these prerequisites:

- You should be familiar with Pro-AV systems and concepts
- You should have completed product training from Array Telepresence or one of its resellers
- Familiarize yourself with the documentation conventions because they highlight important information.
- Review all general precautions to prevent injury or damage to the equipment.

1.1.1 Documentation Conventions
This guide uses warnings, notes and tips to highlight important or helpful information about a topic or task.

**Warning:** Warnings alert you to potential injury to people or damage equipment.

**Note:** Notes highlight important information about a topic.

**Tip:** Tips provide helpful hints for tasks.

1.1.2 General Precautions
Follow these general precautions to ensure a safe and successful installation:

- Read and understand all operating, installation and safety instructions before using this equipment.
- Do not use accessories, attachments, tools or materials that are not recommended by the equipment manufacturer. Doing so may compromise operating performance, create an unsafe condition, damage equipment, or violate the terms of usage or warranty.
- Always follow all instructions and warnings marked on the equipment or as detailed in the product documentation.

1.2 Support
For questions and support of your Equal-i system, please contact your reseller or Array Telepresence.

**Website:** [http://www.arraytelepresence.com/](http://www.arraytelepresence.com/)
**Phone:** 800-779-7480 (Option 1 – Sales, Option 2 – Support)
**Email:** info@www.arraytelepresence.com
The following table describes the support plans for the Equal-i system.

**Table 1: Array Telepresence Support Plans**

<table>
<thead>
<tr>
<th>Support Plan</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Year Premier</td>
<td>AESP-S01P</td>
<td>The 1-year Premier Plan provides telephonic and email support Monday thru Friday from 8:00am to 6:00pm EST. Maintenance firmware updates (point releases). RMA support in place where once defective piece is received a replacement will be sent. 24x7 access to online support portal.</td>
</tr>
<tr>
<td>1-Year Premier Plus</td>
<td>AESP-S01PP</td>
<td>The 1-year Premier Plus Plan provides telephonic and email support 24x7. Maintenance and Major firmware updates. RMA support in place with advanced part and equipment replacement. 24x7 access to online support portal.</td>
</tr>
<tr>
<td>3-Year Premier</td>
<td>AESP-S03P</td>
<td>The 3-Year Premier Plan provides telephonic and email support Monday thru Friday from 8:00am to 6:00pm EST. Maintenance firmware updates (point releases). RMA support in place where once defective piece is received a replacement will be sent. 24x7 access to online support portal.</td>
</tr>
<tr>
<td>3-Year Premier Plus</td>
<td>AESP-S03PP</td>
<td>The 3-Year Premier Plus Plan provides telephonic and email support 24x7. Maintenance and Major firmware updates. RMA support in place with advanced part and equipment replacement. 24x7 access to online support portal.</td>
</tr>
</tbody>
</table>

All Support Plans include Installation Certification. See *Appendix D* for the Installation Certification Site Survey, and Section 4 for instructions on its use.

### 2. Product Overview

The DX Camera Module is mounted between dual displays at eye level with only a 4mm separation.

The Equal-i 2S Image Processor is installed between the DX Camera Module and a videoconferencing codec, running Array’s proprietary image enhancement algorithms on custom hardware to dramatically improve the scene. The Image Processor works with both hardware and software based codecs with no perceptible delay.

**Creates an Equalization of Images**

The biggest challenge of group videoconferencing systems – the elongated table – is remedied by Equal-i’s ability to bring the furthest participants up close and personal. The two million rooms that deal with this “bowling alley effect” and poor meeting format now have a solution. With Equal-i technology, executives at the head of the table are brought forward at life-size, with excellent eye-line and resolution, in a format that feels as though the meeting were just across the table rather than at the far end of another room.

**Operates on a Single Codec**

Equal-i provides dual screen HD video capability operating over a single codec (without using the codec data channel), creating a wide-format immersive view.
Dramatically Improves User Experience in all Videoconferencing Rooms

Equal-i creates an amazing telepresence environment with the feel of an “across the table” meeting when deployed at both ends of the call. When connecting with a traditional videoconferencing system, Equal-i still affords significant benefits by enhancing the image that is sent to their room. It is able to accomplish this by equalizing the received image from the remote location across the two screens for a more compelling experience on both ends of the videoconferencing call.

2.1 Equal-i 2S Image Processor Specifications (Model # AE2S-P01)

<table>
<thead>
<tr>
<th>Table 2: Equal-i 2S Image Processor Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
</tr>
<tr>
<td>Video Input</td>
</tr>
</tbody>
</table>
| Transmit Module | HDMI Output #1 to Codec Video Input:  
- 1080p, 25/30 fps  
HDMI Output #2 to Codec Content Input:  
- 1080p, 25/30 fps  
Image framing modes:  
- Immersive Mode  
- Immersive Everywhere  
- Video+Content |
| Receive Module | HDMI Input #1 from Codec Video Output Channel:  
- 1080p, 25/30/50/60 fps  
- 720p, 25/30/50/60 fps  
HDMI Input #2 from Codec Content Output Channel:  
- 1080p, 25/30/50/60 fps  
- 720p, 25/30/50/60 fps  
HDMI Output to Display #1:  
- 1080p, 25/30/50/60 fps  
HDMI Output to Display #2:  
- 1080p, 25/30/50/60 fps  
Image framing modes:  
- Immersive  
- Immersive PTZ  
- Passthrough |
| Processing Latency | < 10ms |
| USB | v2.0: x2 – Factory use only |
| Network | LAN: 802.3 – 10-BaseT Ethernet – Remote operation, management, and diagnostics |
| User Interface | Android OS, Windows OS (Desktop), Telnet |
| Electrical | 12Vdc 5A remote power supply – UL and CE rated |
| Mechanical | Equal-i can be shelf, rack, or wall mounted |
| Environmental | Operating temperature: 0° – 35° C  
Operating humidity: 15 to 80%  
Maximum altitude: 2000 m |
| Physical Characteristics | Unit: 1.2"H x 13.8"W x 7"D  
Unit Weight: 4.3 lbs.  
Shipping: 4.5"H x 19.3"W x 9.5"D  
Shipping Weight: 6.4 lbs. |
| Certifications | FCC, CE |
| Warranty | One (1) year warranty – parts and labor |
2.2 **Equal-i 2S Image Processor Parts List**
The following table describes the Equal-i 2S Image Processor package

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE2S-P01</td>
<td>Equal-i 2S Image Processor</td>
</tr>
<tr>
<td>AEXX-PPA1</td>
<td>Equal-i Power Adapter</td>
</tr>
<tr>
<td>AEXX-PCTx</td>
<td>Equal-i Power Cord*</td>
</tr>
<tr>
<td></td>
<td>*Note: Specific to country standard. Designated at time of order.</td>
</tr>
<tr>
<td>AEXX-PWK1</td>
<td>Equal-i 2S Universal Mount Bracket</td>
</tr>
</tbody>
</table>

2.3 **Equal-i 2S Image Processor Front View**
The following figure shows the image processor from the front

*Figure 1: Equal-i 2S Image Processor Front View*

2.4 **Equal-i 2S Image Processor Rear View**
The following figure shows the various ports located on the rear panel

*Figure 2: Equal-i 2S Image Processor Rear View*

Ports, listed from left to right:

**Receive Module:**
- **CODEC 2** Used as a data input from the codec, this connects to the Display 2 / Data Output port on the codec
- **DISPLAY 2** Connected to the Right Display, this will show the right half of Immersive Mode, or the data channel
- **CODEC 1** Used as a video input from the codec, this connects to the Display 1 port on the codec
- **DISPLAY 1** Connected to the Left Display, this will always show video – left half of Immersive, or People (for Video+Content)
**Transmit Module:**

**CODEC 1**
Used as the primary video output, connects to the main camera input on the codec.

**CODEC 2**
Used to output right half video in “Immersive Everywhere” mode, connects to the data channel on the codec.

**Other:**

**CAM 2**
Connects to CAM 2 on the camera assembly. Captures the right half of the room.

**CAM 1**
Connects to CAM 1 on the camera assembly. Captures the left half of the room.

**USB**
USB is for factory use only. Not intended for use by the end user.

**Ethernet**
10-BaseT Ethernet port. When connected to the internal network, allows for control of the Image Processor and its cameras.

**Power LED**
Indicates if power is connected to the Image Processor.

**Power**
For use with the included 12Vdc 5Amp power supply.

---

### 2.5 DX Dual Camera Module Specifications (Model # AEDX-P10 / AEDX-P11)

**Table 4: DX Dual Camera Module Specifications**

<table>
<thead>
<tr>
<th>Camera System Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera System</td>
<td>Output resolution of each camera head:</td>
</tr>
<tr>
<td></td>
<td>• 2304 x 1536 pixels (3.54 MPixel) x 2 (7.08 Mpixel)</td>
</tr>
<tr>
<td></td>
<td>Output Cable:</td>
</tr>
<tr>
<td></td>
<td>• Proprietary High Speed Interface Cable</td>
</tr>
<tr>
<td></td>
<td>Field of View:</td>
</tr>
<tr>
<td></td>
<td>• 37° horizontal field x 2 (74° total)</td>
</tr>
<tr>
<td></td>
<td>• 50° horizontal field x 2 (100° total)</td>
</tr>
<tr>
<td></td>
<td>Adjustment Capability:</td>
</tr>
<tr>
<td></td>
<td>• Micro positioning mechanics</td>
</tr>
<tr>
<td></td>
<td>• Digital X-Y positioning for final camera alignment</td>
</tr>
<tr>
<td>Electrical</td>
<td>4Vdc from Equal-i 2S Image Processor</td>
</tr>
<tr>
<td>Mechanical</td>
<td>Universal articulating arm mounted to the rear of the display. 2” space required behind display.</td>
</tr>
<tr>
<td>Environmental</td>
<td>Operating temperature: 0° – 35° C</td>
</tr>
<tr>
<td></td>
<td>Operating humidity: 15 to 80%</td>
</tr>
<tr>
<td></td>
<td>Maximum altitude: 2000 m</td>
</tr>
<tr>
<td>Physical Characteristics</td>
<td>Unit: 6”H x 1”W x 4.25”D</td>
</tr>
<tr>
<td></td>
<td>Unit Weight: 1.2 lbs.</td>
</tr>
<tr>
<td></td>
<td>Shipping: 4.5”H x 19.3”W x 9.5”D</td>
</tr>
<tr>
<td></td>
<td>Shipping Weight: 6.4 lbs</td>
</tr>
<tr>
<td>Certifications</td>
<td>FCC, CE</td>
</tr>
<tr>
<td>Warranty</td>
<td>One (1) year warranty – parts and labor</td>
</tr>
</tbody>
</table>
2.6 DX Dual Camera Module Parts List

The following table describes the DX Dual Camera Module package.

Table 5: DX Dual Camera Module Parts List

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEDX-P10 / AEDX-P11</td>
<td>DX Dual Camera Module w/ Mount</td>
</tr>
<tr>
<td>AEXX-HSI2</td>
<td>Two (2) High Speed Camera Cables</td>
</tr>
<tr>
<td>N/A</td>
<td>7” Mount Arm, 4” Mount Arm</td>
</tr>
<tr>
<td>N/A</td>
<td>Hex wrench for rough camera alignment</td>
</tr>
<tr>
<td></td>
<td>Hex wrench for fine camera alignment</td>
</tr>
</tbody>
</table>

2.7 DX Dual Camera Module Front View

The following figure shows the DX Dual Camera Module from the front, both with mounting arm attached with the cover off, and with the cover on.

Figure 3: DX Dual Camera Module Front View

2.8 DX Dual Camera Module Rear View

The following figure shows the ports and mounting ball located at the rear of the camera.

Figure 4: DX Camera Module Rear View
3. Recommended Room Setup
The Equal-i Image Processor has been designed to fit any room with any table. With that in mind, the manufacturer has several recommended designs for conference room configuration. Though recommended, they are not required.

Given the benefits that the Equal-i System offers to a typical conference room, with ability to bring the most distant participants to the front and improve eye-line amongst participants while still allowing stand-up capture, there are some things to keep in mind while setting up the room (including but not limited to):

- The center of the cameras should be near eye-line of the participants sitting at the table
- The shorter the distance from camera to rear of the room will lower the amount of stand-up capture.
- The narrower the table, the greater number of participants able to be captured

Equal-i technology borrows upon several of the inherent limitations with fixed multi-camera conference room systems. The position of the camera heads (one on top of the other) causes there to be a focal point within the room, and anything along this seam outside of the focal point will appear to be slightly disjointed. Due to this, there are two considerations that should be taken during implementation:

- It is not recommended to place any participants along the seam.
- It is not recommended to place any white boards, logos, or graphics along the back wall that pass through the seam.
- It is recommended to implement in rooms with either no windows, or windows with blackout blinds/drapes to limit the amount of maintain a consistent amount of light in the room.

See Appendix C for examples of room configurations.

4. System Requirements
Minimum connection hardware for non-soft codec environments will include:

- Two (2) displays capable of:
  - 1080p resolution
  - vertical HDMI frequencies (fps) between 25 – 50Hz or 30-60Hz (depending on requirements of the applicable country)
  - recommended display size of 65” and above

- A single codec, capable of
  - 1080p 25/30 fps input
  - 1080p video output
  - 1080p content output at a minimum 30fps framerate

Note: Polycom Group 300 and 500-series codecs require two additional parts to connect an HDMI device to the main camera HDCI port. Digital Brkout Adaptor (P/N: 3820-68473-001) and mini-HDCI to HDCI cable (available from Polycom in lengths of: 300mm, 18”, 1m, 3m, 10m).

Minimum connection hardware for soft codec environments will include:

- One (1) or Two (2) displays capable of:
  - 1080p resolution
  - vertical HDMI frequencies (fps) between 25 – 50Hz or 30-60Hz (depending on requirements of the applicable country)
  - recommended display size of 65” and above

- One HDMI to USB3 adapter
  - 1080p 25/30 fps input
1080p video output

When taking advantage of the “Immersive Everywhere” feature set, the Equal-i 2S Image Processor will transmit 1080p 25/30 fps video using both the video and data channel input of your codec. Vidyo codecs do not currently meet minimum system requirements to send or receive 30fps video over the content channel.

5. Recommended Codecs

The various operating/framing modes are capable of transmitting video over either the main video channel only, or over both the video and content channels of a codec. Due to the transmission of a video signal over the content channel, both require the ability to receive an input of and transmit at a minimum of 25/30fps. Listed below are codecs that have been tested by Array Telepresence to meet this requirement:

Cisco

*Note:* Due to the placement of the IR receiver in the Cisco camera, the Equal-i system will necessitate the deployment of an IR repeater or Touch Panel for codec control.

- TelePresence C40
  - Video1 Input – HDMI
  - Video2 Input – HDMI

- TelePresence C60
  - Video1 Input – HDMI
  - Video2 Input – HDMI

- TelePresence C90
  - Video1 Input – HDMI
  - Video2 Input – HDMI

- TelePresence SX20
  - Video1 Input – HDMI
  - Video2 Input – HDMI

- TelePresence SX80
  - Video1 Input – HDMI
  - Video2 Input – HDMI

Lifesize

- Icon 600
  - Video1 Input – HDMI
  - Video2 Input – DVI-I (Requires DVI → HDMI Conversion cable)

- Icon 800
  - Video1 Input – DVI-I (Requires DVI → HDMI Conversion cable)
  - Video2 Input – DVI-I (Requires DVI → HDMI Conversion cable)

Polycom

*Note:* Due to the placement of the IR receiver in the Polycom camera, the Equal-i system will necessitate the deployment of an IR repeater or Touch Panel for codec control.

- Group 310
  - Video1 Input – Digital HDCI (Requires Polycom DBA - P/N: 7200-68524-125)
  - Video2 Input – HDMI

- Group 500
  - Video1 Input – Digital HDCI (Requires Polycom DBA - P/N: 7200-68524-125)
  - Video2 Input – HDMI

- Group 700
  - Video1 Input – HDMI
  - Video2 Input – HDMI
Starleaf
- GTMini 3330
  - Video1 Input – HDMI (Requires HDMI scan converter to transform image to 720p)
  - Video2 Input – DVI-I (Requires DVI → HDMI Conversion cable and HDMI scan converter to transform image to 720p)

Vidyo
- VidyoRoom HD-230
  - Video1 Input – DVI-D (Requires DVI → HDMI Conversion cable)
  - Video2 Input – DVI-D (Requires DVI → HDMI Conversion cable)

6. Initial Setup
Initial setup is defined as the setup of the Image Processor, connecting the Image Processor to the network, installation of the Equal-i Control App, mounting and alignment of the camera. Follow the steps below, in order, to complete initial setup. Note that not all steps are permanent for final integration, however are necessary for alignment of the fixed cameras.

Before Initial Setup begins, please send an email to support@arraytelepresence.com with the following specifications to ensure that your room environment will be compatible:

- Completed Installation Certification Site Survey (found in Appendix D)
- Room dimensions
- Table dimensions
- Display size and height from floor
- Distance from the displays to the edge of the table
- Distance from the walls to the table

6.1 Equal-i 2S Image Processor

**WARNING:** Be sure that the Image Processor is unplugged when connecting/disconnecting camera cables

1. Place the Image Processor in a location that is close to both a power receptacle and within range of the displays such that the high speed camera cables are able to reach.
   **Note:** A Wall Mount Bracket (P/N: AEXX-PWK1) is included with the Equal-i Image Processor to allow for mounting directly to the wall behind or next to the displays.
2. Attach one end of an Ethernet cable to the Image Processor. The other end should be connected to a Windows PC.
3. Connect the power cord/adapter to the Image Processor
4. After approximately 15 seconds the Image Processor should be connected to your PC. The default settings are:

   Static IP: Enabled
   IP Address: 192.168.1.234
   Subnet Mask: 255.255.255.0
   Default Gateway: 192.168.1.1
   Device Name: ArrayEquali.

6.2 Windows Equal-i Control App
With the Equal-i Control Application, Professional A/V integrators are able to set up the Image Processor for use on company networks as well as configure the camera settings.

The network settings include:
• Static IP – allows for the network to assign IP, Subnet and Gateway addresses
• DHCP – allows for the manual assignment of IP, Subnet and Gateway addresses
• Beacon Name – When discovering the Image Processor via the Conference Room selector within the Control Application, this is the name by which it can be found.
• MAC Address – displays the mac address of the Ethernet chip

Each camera of the DX Dual Camera Module is controlled independently. These settings include:

• Color Saturation – allows for adjustment to the intensity of color displayed
• White Balance – adjusts the image for more natural colors
• Gain – works in tandem with Brightness Control to adjust the amount of light in the image
• Brightness – works in tandem with Gain to adjust the amount of light in the image
• Gamma – adjusts the gamma higher or lower based on the requirements of the room
• X/Y Axis Fine Adjustment – allows for slight horizontal and vertical adjustments to the image

The User Interface is simple, in that the end user will only need to access the ON/OFF button, the Remote and Local Framing Options, and the Conference Room Selector.

6.2.1 Windows Equal-i Control App Download
Take the following steps to download the Equal-i Control App to your Windows 7 (or higher) PC:

1. Make sure your PC is connected to your Wi-Fi network
3. Launch the Equal-i Control App
   Once the app is launched, you will be on the Home screen. From here you can access the Conference Room selector at the top, the Main Menu in the top left, or the Sending/Receiving framing options at the bottom.

6.2.2 Connecting to the Equal-i Image Processor
Take the following steps to connect to the Image Processor in the room

1. Once the Equal-i Control App has been launched, click on the Conference Room (的操作) icon in the top right. All available Image Processors on the network will be found and selectable through this menu.
2. Select the Image Processor to which you would like to connect. The factory default name of the Image Processor is ArrayEquali.
   Note: If you are unable to detect the Image Processor in the list, ensure that it is connected to the network switch and powered on. In order for the Image Processor to be automatically displayed in the list, it MUST exist on the same network to which the Equal-i Control App is connected. If it is not on same network/subnetwork as the Windows PC, you can manually add the IP Address of the Image Processor. Alternatively, see Section 4.2.4 for manual network configuration.
3. Once selection is made, you will be taken back to the app Home screen.

6.2.3 Settings Menu
Take the following steps to access the Settings Menu of the Equal-i Control App:

1. Click on the Menu (操作) icon at the top left of the app home screen
2. Select Settings
3. Access the Settings screen by entering the password: **ATEQi2S!**  
   **Note:** Do not share this password with the end user, as this is an administrator-level area of the app.

4. The default tab within the Settings Menu is **LAN**. From here you can configure the Ethernet settings of the Image Processor.

5. Click the **Save** button once the network settings have been configured. In order to make the settings go into effect, the Image Processor must be rebooted. You can do this by clicking on the **Back** button in the top left of the screen, then choosing **Menu > Reboot**.  
   **Note:** It will take approximately 10-15 seconds for the Image Processor to reboot.

6. If your network settings were adjusted, go into the **Conference Room** menu to re-select your Image Processor.

### 6.2.4 Manual Network Configuration

In the event that the **Equal-i Control App** is unable to connect to the Image Processor through the company network, you can connect directly to it with a laptop. Follow the below steps to connect with a Windows-based computer and alter the network settings:

1. Open the **Network and Sharing Center** from within Control Panel
2. Click on **Change Adapter Settings** in the top right of the Network and Sharing Center
3. Right-click on the Ethernet adapter and choose **Properties**
5. Configure with the following settings:
   
   | IP Address: | 192.168.1.10 |
   | Subnet Mask: | 255.255.255.0 |
   | Default Gateway: | 192.168.1.1 |
   | Note: | DNS information is not required |

6. Click **OK**

7. Launch a telnet client (i.e. Windows, PuTTY, TeraTerm, etc)

8. Configure the telnet client to connect with the following telnet IP & Port:
   
   **IP:** 192.168.1.234  
   **Port:** 2000

9. Once connected, you will be prompted for a password. The factory default password is: **ATEquali**  
   **Note:** For security purposes, the default password is able to be changed. Please refer to the Telnet Command Appendix for further information.

10. You can use the below commands to alter the network IP address of the Image Processor. When the session is complete, the telnet session can be closed – no further action is required.

   - `:LANIPADDR=<IP address value>`  
     This command sets the IP address of the wired Ethernet port on the Image Processor. The IP address must be an IPv4 address formatted in the xxx.xxx.xxx.xxx format. A valid IP address must be specified. The new IP address will not have any effect on the current session’s LAN configuration. In order for the change to take effect two things must occur: 1) the user LAN configuration must be saved with the `:SAVELAN!` command, and 2) the Image Processor must be rebooted manually or with the `:RESET!` command.

<table>
<thead>
<tr>
<th>IP Address Value</th>
<th>Must be specified in xxx.xxx.xxx.xxx format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td><code>:LANIPADDR? &lt;cr&gt;</code></td>
</tr>
</tbody>
</table>

**Table:**
Write value :LANIPADDR= <new value> <cr>

- **:LANIPMASK=<Subnet Mask Value>**
  This command sets the IP address mask of the wired Ethernet port on the Image Processor. The IP mask must be an IPv4 mask formatted in the xxx.xxx.xxx.xxx format. A valid IP mask must be specified. The new mask setting will not have any effect on the current session’s LAN configuration. In order for the change to take effect two things must occur: 1) the user LAN configuration must be saved with the :SAVELAN! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

<table>
<thead>
<tr>
<th>IP Address Mask Value</th>
<th>Must be specified in xxx.xxx.xxx.xxx format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:LANIPMASK? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:LANIPMASK= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

- **:LANIPGATE=<Gateway Value>**
  This command sets the IP gateway address of the wired Ethernet port on the Image Processor. The gateway address must be an IPv4 address formatted in the xxx.xxx.xxx.xxx format. A valid IP address must be specified. The new gateway address setting will not have any effect on the current session’s LAN configuration. In order for the change to take effect two things must occur: 1) the user LAN configuration must be saved with the :SAVELAN! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

<table>
<thead>
<tr>
<th>IP Gateway Address</th>
<th>Must be specified in xxx.xxx.xxx.xxx format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:LANIPGATE? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:LANIPGATE= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

- **:LANDHCP=<value>**
  This command enables or disables the use of DHCP for the Image Processor. When DHCP is enabled and the unit is connected to a network with a DHCP server, it will request an IP address from the DHCP server. When DHCP is disabled, the Image Processor unit will use its assigned static IP address. The DHCP setting will not have any effect on the current session’s LAN configuration. In order for the change to take effect two things must occur: 1) the user LAN configuration must be saved with the :SAVELAN! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

| DHCP value            | 0=DHCP Disabled  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1=DHCP Enabled</td>
</tr>
<tr>
<td>Read value</td>
<td>:LANDHCP &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:LANDHCP= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

- **:SAVELAN!**
  This command saves IP address, IP mask, gateway address, and DHCP status for the LAN port on the Image Processor. Current values are written to non-volatile memory. They will take effect the next time the Image Processor is booted.

- **:RESET!**
This command resets the Image Processor, which is similar to cycling power. All systems are re-initialized.

Once manual configuration is complete, connect the Image Processor to the company network and attempt to access it via the Conference Room selector. If the Windows PC and the Image Processor exist on separate subnets, you can manually add the IP address of the Image Processor within the Conference Room selector.

6.3 DX Dual Camera Module

Once the Equal-i Image Processor has been configured and accessible on the network, take the following steps to install the DX Dual Camera Module

WARNING: Be sure that the Image Processor is unplugged when connecting/disconnecting camera cables

1. Once the camera has been removed from the box, adjust the mounting arm so that each angle is roughly 30/150.
2. Tighten the lock screws so that the clamps will not pivot freely.
3. To maintain proper eye line with the remote party, the center of the camera should be 43% from the top of first pixel line of the display.
4. Place a piece of masking tape on the right-hand side of the left display to mark this location. Be sure to place the tape on the screen and not the bezel of the display.

5. If wall mounted, remove both displays from the wall so that the rear can be accessed. Brace the display so that it is safely vertical to the floor.
6. Hold the camera so that it is square to the display in a position such that the center of the two cameras are center to the tape on the display. Do not adhere the camera to the display.
7. Determine a flat location on the back of the display for the mounting plate.
   Note: The arm mount can be rotated up or down to find the best location. Included with the camera is an optional alternate 4” mount in the event that the 7” mount is too long. Should there be no location on the rear of the current (left) display, consider using the other (right) display to mount the camera.
8. Using a pencil, mark an outline onto the back of the display where the mounting plate will be adhered.
9. Remove the film from the tape located on the back of the camera.
Note: Adhere it to the same display onto which the mounting plate will be located. Note that only one side of the tape should be removed. Do not adhere the camera to the bezel of both right and left display.

10. With the blade flush against the side of the display bezel, place the camera adhesive firmly against the front of the display, holding it in place for 30 seconds.
11. Remove the film from the back of the tape located on the back of the mounting plate.
12. Place the mounting plate firmly against the rear of the display on the pencil mark noted in Step 8, holding it in place for 30 seconds.
13. Tighten both clamps.
14. Return the display with the attached camera back to its permanent location.

15. Place the Image Processor in a location that is close to both a power receptacle and within range of the displays such that the high speed camera cables are able to reach.
Note: The optional Wall Mount Bracket (P/N: AEXX-PWK1) is included with the Equal-i Image Processor to allow for mounting directly to the wall behind the display or to the display mount mechanicals.
16. **Connect the provided High Speed Camera Cables to the CAM1 and CAM2 ports on the camera assembly and Image Processor.**

17. **Connect the Image Processor in loopback, to be used only for the duration of the camera alignment process:**
   a. Connect an HDMI cable from the Transmit CODEC 1 port to the Receive CODEC 1 port on the Image Processor.
   b. Connect an HDMI cable from the Transmit CODEC 2 port to the Receive CODEC 2 port on the Image Processor.
   c. Connect and HDMI cable from the left display to the Display 1 port on the Image Processor.
   d. Connect and HDMI cable from the right display to the Display 2 port on the Image Processor.

18. **Power on the display and Image Processor**

19. Using the Equal-i Control App, choose **Equal-i Room**, then Video+Content ( ). This will ensure that the two cameras are matched onto a single screen to begin alignment.

20. Perform rough camera alignment of the camera by turning the knurled adjustment rod to move the attached ball joints closer or further away – thus rotating the camera horizontally from left to right. Continue this until the rear center of the table is centered in the displays.
   **Tip:** Place an object at the end of the table, in the center, to which you can align the display(s).

21. Gently return the remaining display to its permanent location.
   **Tip:** Be sure the display rests against the camera blade to maintain minimum display separation.

22. Connect an HDMI cable from the Transmit CODEC 2 port on the Image Processor to the right display (use Transmit CODEC 1 if the left display was used).

23. Perform fine camera alignment using the alignment screws on the camera with the supplied hex wrench. This is done individually for each camera.
   **Note:** For optimal vertical alignment, align the cameras to the center top edge of the back of the table, farthest from the camera.

24. Perform digital camera alignment using the Android app or telnet API commands for the Immersive Mode and Immersive Everywhere Modes.

25. Once camera alignment is complete, **SAVE** settings

26. Power off the Image Processor

27. Place the Camera Cover onto the camera unit

**Note:** Once the Image Processor has been connected to the codec and powered back on, use the Equal-i Control App to perform digital alignment (if necessary) from the Settings menu. Reference section 7.3.2 in this Guide for further instruction. Be aware that the Horizontal and Vertical pan settings within the app will only apply to the current framing mode. Be sure to cycle through the different framing modes to ensure that alignment is properly set for each framing mode.

### 7. Final Configuration

Once initial setup is complete, the HDMI cables must be moved to their permanent location. Reference Appendix E for cabling diagrams.

**WARNING:** Be sure that the Image Processor is unplugged when connecting/disconnecting any cables

1. Connect **Transmit CAM 1** to the Cam 1 port on the camera using supplied HDMI cables.
2. Connect **Transmit CAM 2** to the Cam 2 port on the camera using supplied HDMI cables.
3. Connect **Transmit CODEC 1** to the camera input on the codec.
4. Connect **Transmit CODEC 2** to the data input on the codec.
5. Connect **Receive CODEC 1** to the Monitor/Display Out on the codec.
6. Connect **Receive CODEC 2** to the Data Channel on the codec.
7. Connect **Receive DISPLAY 1** to the left display/monitor.
8. Connect **Receive DISPLAY 2** to the right display/monitor.

**8. Equal-i Control App**

The Equal-i Control App allows installers/integrators to setup/tune the camera and network settings. It also allows end users to be able to put the Equal-i System into and out of Sleep mode, alter the framing of the images that are sent to the remote site, and alter the framing of the images that are received from the remote site. In the event there is more than one Equal-i Image Processor on the network, it allows users to select which Image Processor they will control as they move from one room to the next.

The main benefit of utilizing a Control App is that it allows end users to seamlessly move from Immersive Mode on both screens, to a Video+Content mode within the same call.

**Tip:** Best practice is to use a Crestron or similar control system so that the framing modes can be pre-set for known sites in the directory. Should there be no control system on-site, we recommend dedicating a tablet that would be stationed in/on a charging stand at the head of the table with the codec remote. Many codec manufacturers have apps that allow for control of their equipment via the Android platform, so it may be possible to integrate all remote devices into one tablet.

**8.1 Android**

The Android compatible app is available now. Visit the Google Play Store or access it via the following URL: [https://play.google.com/store/apps/details?id=com.pickzy.equali](https://play.google.com/store/apps/details?id=com.pickzy.equali). Android device is not included.

**8.2 Crestron**

Crestron compatible apps are available now – compatible with Crestron XPanel, Crestron for Android, and Crestron Touch Screens. The Android app is still required to configure the Image Processor to the network and perform fine tuning to the image, the Crestron apps are an excellent interface for the end users. See the Array Telepresence website for further details on how to obtain the Crestron templates. See the Section 12 – Telnet Commands for further information on how to communicate with the Equal-i Image Processor. Crestron device is not included.

**8.3 iOS**

iOS compatible apps will be coming soon.

**8.4 Windows**

Windows compatible apps will be coming soon.

**9. Equal-i Control App for Android**

The Equal-i Control App for Android can be utilized to both use and configure your Equal-i 2S Image Processor.

**9.1 Initial use Configuration**

The Equal-i Image Processor should be connected to the same network and subnetwork as the Android device. The default LAN settings are:

- **IP Address:** 192.168.1.234
- **Subnet Mask:** 255.255.255.0
- **Gateway:** 192.168.1.1

1. Connect the tablet to your Wireless Local Area Network
2. Connect the Equal-i Image Processor to your Local Area Network
3. Launch the Equal-i Control Application
4. Clicking on the **Conference Room** icon at the top right of the app home screen.

5. Select the **ArrayEqualizer** device. This will return you to the app’s home screen.

6. Click on the **Menu** icon at the top left of the app home screen.

7. Select **Settings**.

8. Access the Settings screen by entering the password: **ATEQ12S!**
   
   **Note:** Do not share this password with the end user, as this is an administrator-level area of the app.

9. Configure the Image Processor to access the local network through the LAN tabs. Be sure to click Save when complete. Doing so writes the set values into memory.

10. Reset the Equal-i Image Processor to make network changes go into effect. To do so, click on the **Menu** icon at the top left of the app home screen and choose **Reboot**.

### 9.2 User Interface

- The main User Interface page has a Power button that either enables (green) or disables (red) the Equal-i system. When the icon is green, the system is on and the images are transmitting to the connected codec(s). When the icon is red, the system is off and the images are not transmitting to the codec(s).

![Power Button](image)

- The top of the application has two options.
  - The left side has a **Menu** icon that allows access to Settings, About, Help, Reboot and Exit. The Settings page is password authenticated to restrict access to the Professional A/V installer only.
  - The right side has a **Conference Room** icon that allows the user to select which conference room on the network will be controlled by the app. Both the tablet and the Image Processor must be on the same network for this to function properly.

- The bottom of the application has two options for framing modes. The left side, labeled **REMOTE ROOM**, displays the format of the image sent FROM the local conference room TO the remote site. The right side, labeled **LOCAL ROOM**, displays the format of the image sent from the remote site to be displayed in the local room. The LOCAL ROOM option cannot be selected unless there is first a REMOTE ROOM selected. This is due to the Image Processor first needing to know what type of room from which it will be receiving the image in return. For more information on the Framing Modes, please reference **Appendix A – Framing Modes**.

### 9.3 Settings

**Note:** In order to access this menu you will need to provide a password. This password is set by the manufacturer of the device and cannot be changed. Do not share this password with the end user in order to prevent them from changing any of the settings held within.

#### 9.3.1 LAN Settings

Changes to these values will not go into effect until after you first tap the Save button and then reboot the Image Processor.

1. **Automatic Configuration – DHCP** – This setting gets all the necessary IP information from the network DHCP server
2. **Static IP (Default)** – This setting allows for setting a Static IP address to the Image Processor
   - **Specify IP Address**
b. Specify Subnet Mask
c. Specify Default Gateway
3. LAN Beacon – This feature is what determines the name of the beacon that is discovered in the Conference Room selector via the Home Page.
4. MAC Address - Displays the LAN MAC Address

9.3.2 Camera Settings
Available within the Settings Menu of the Equal-i Control App. Changes to these values will go into effect immediately, however you must tap the Save button in order for these values to remain after the Image Processor has been rebooted.

From here you can view/adjust the following:

1. Transmit Settings – Factory default is to transmit 1080p @ 30 fps. You may also select to change to 1080p @ 25 fps.
2. Color Saturation – Adjusting this value will change the color saturation of the image
   a. Left Screen
   b. Right Screen
3. Automatic White Balance – This is best accomplished while holding a blank white piece of paper approximately 2 ft from the image, such that the majority of the image displayed is covered.
   a. Left Screen
   b. Right Screen
4. Gain – Values from 1 thru 4. 1 = 1x gain, 2 = 2x gain, 3 = 4x gain, 4 = 8x gain. This is typically used in tandem with Brightness. It is best to adjust Brightness prior to adjusting Gain, however in extreme low lighting areas, Gain will need to be adjusted.
   a. Left Screen
   b. Right Screen
5. Brightness – Adjusting this value will change the brightness of the image. This setting is commonly used in tandem with Gain, however it is best to adjust the Brightness value before adjusting Gain. Commonly, Gain does not have to be adjusted with exception of extreme low light venues.
   a. Left Screen
   b. Right Screen
6. X/Y Axis Fine Adjustment – Adjusting this value will digitally shift the image along the X and Y axis. This is intended for fine adjustment only.
   Note: The Horizontal and Vertical pan settings within the app will only apply to the currently selected framing mode. Be sure to cycle through the different framing modes to ensure that alignment is set for each.
   a. Left Screen
      i. Horizontal Pan
      ii. Vertical Pan
   b. Right Screen
      i. Horizontal Pan
      ii. Vertical Pan

9.3.3 Admin Settings
1. Current firmware version: <displays current version>
2. Current software version: <displays current versions>
3. Load Factory Settings
10. **Troubleshooting**

Listed below are the most common issues how to troubleshoot them.

### 10.1 No Picture

Take the following steps in the event that you are not getting any image on your display(s):

1. Verify that your display is ON and the correct input is selected.
   
   If you are unsure if your display is set to the correct input, then using the remote control for your display, cycle through the various inputs – pausing at each for several seconds to verify that it is receiving a signal.
2. Verify that the Equal-i Image Processor is plugged in.
3. Verify that the Equal-i system is ON via the Android/Crestron/Windows Control Application
4. If you are able to access the Equal-i Image Processor, listen for the fans inside the unit. If you hear the fans then the unit is powered on and should be outputting an image. If you do not hear the fans then the unit is powered off. If it is off, turn it on via the Android/Crestron/Windows Control Application.
5. If you are able to access the Equal-i Image Processor, verify that all cables are securely attached to the appropriate ports on the unit.

   **Warning:** Be sure that the Image Processor is unplugged when connecting/disconnecting camera cables

If you have taken the above steps and the image does not look correct, please contact your Pro AV and system integration technician for further troubleshooting and/or next steps. If you are a representative of the Pro AV organization, please contact the manufacturer for further information.

### 10.2 White Picture

Take the following steps in the event that the image displays all white on your display(s):

1. Lunch into the Control app
2. Access the Settings Menu
   
   **Note:** The password to access the Settings Menu is: ATEQI2S!
3. Select the Admin tab
4. Select Load Factory Defaults
5. Select Save
   
   **Note:** Once this is complete, you will need to adjust the camera settings.

If you have taken the above steps and the image does not look correct, please contact your Pro AV and system integration technician for further troubleshooting and/or next steps. If you are a representative of the Pro AV organization, please contact the manufacturer for further information.

### 10.3 Garbled or Scrolling Image

Most problems with the Equal-i system can be resolved by cycling the power to the device. Before troubleshooting further, you should first cycle the power to the Equal-i Image Processor by:

- Within the Equal-i Control App, select Main Menu > Reboot
- Unplug the power to the Image Processor for 10 seconds then plugging it back in.

If you have taken the above steps and the image does not look correct, please contact your Pro AV and system integration technician for further troubleshooting and/or next steps. If you are a representative of the Pro AV organization, please contact the manufacturer for further information.

### 10.4 Equal-i Control Application Issues

Most problems with the Equal-i Control App can be resolved by:
1. Ensure that Image Processor and the Equal-i Control App both exist on the same network
2. Ensure that no other device is connected to the Image Processor. The image processor will only accept one connection at a time.
3. Within the Equal-i Control App, select the Conference Room button and reselect the Image Processor.
4. Reboot the Image Processor
5. Uninstall the Control App and reinstall

If you have taken the above steps and there is still no image on your display(s), please contact your Pro AV and system integration technician for further troubleshooting and/or next steps. If you are a representative of the Pro AV organization, please contact the manufacturer for further information.

10.5 Equal-i Control Application Does Not Detect Image Processor
The Equal-i Image Processor emits a UDP beacon from port 2000 across the network every 2 seconds. The destination is 255.255.255.255 at port 55555. Verify the following to ensure proper functionality:

1. The Image Processor is powered on
2. The Image Processor and the control device exist on the same network and subnetwork
3. There is no firewall in place blocking the UDP beacon from the Image Processor

10.6 No audio through HDMI/Display
The Equal-i Image Processor is unable to pass audio through the HDMI. To resolve this, you will need to pass audio out of the separate audio channel on your codec to the display audio input or a separate speaker system.

10.7 Unable to control codec using my codec remote
This is most likely due to the IR port having previously existed on the old PTZ camera. To resolve this, you will need to use an IR repeater in place of the old. Optionally, your codec may offer an app for the remote control via Android, iOS, Crestron, etc. Depending on the installation environment, it may be beneficial to eliminate the remote control and move to an app on the same platform through which the end user will be controlling the Equal-i Image Processor.

10.8 Framing does not look correct
If the on-screen framing does not look correct, check the codec framing settings for alternative framing modes. Often, the on-screen menu of your codec will look best when the Local Site framing is in Passthrough Mode (:OPMODEBE=1).

11. Regulatory Notices and Safety Guidelines

<table>
<thead>
<tr>
<th>Caution: Use only the provided AC adapter and AC power cable supplied with this system. Use of another AC adapter or AC power cable may damage the device, or may present risk of fire, explosion or electric shock.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Array Telepresence encourages you to recycle your end-of-life products in an environmentally considerate way. In accordance with the requirements of the European Waste Electronic and Electrical Equipment (WEEE) Directive, all Array Telepresence products are marked with the crossed wheelie bin symbol shown to the left. Products that carry this symbol should be not be disposed of in the household or general waste stream.</td>
</tr>
<tr>
<td>The Equal-i System has been marked with the CE mark. This mark indicates compliance with EEC Directives 2006/95/EC, 2004/108/EC, and 1999/5/EC. A full copy of the Declaration of Conformity can be obtained from Array Telepresence, 9480 Meridian Way, West Chester, OH 45069.</td>
</tr>
</tbody>
</table>
12. Manufacturer Contact Information

Array Telepresence
9480 Meridian Way
West Chester, Ohio 45069
800-779-7480
www.arraytelepresence.com
13. Appendix A – Recommended Framing Modes

Operating modes are described by name below, and correlate to the following OPMODE API commands:

**Remote Framing Modes:**

<table>
<thead>
<tr>
<th>Mode</th>
<th>OPMODEFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immersive Mode</td>
<td>1</td>
</tr>
<tr>
<td>Video+Content</td>
<td>2</td>
</tr>
<tr>
<td>Stack</td>
<td>3</td>
</tr>
<tr>
<td>Immersive Everywhere</td>
<td>4</td>
</tr>
</tbody>
</table>

**Local Framing Modes:**

<table>
<thead>
<tr>
<th>Mode</th>
<th>OPMODEBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passthrough</td>
<td>1</td>
</tr>
<tr>
<td>Immersive Mode Receive</td>
<td>2</td>
</tr>
<tr>
<td>Immersive PTZ</td>
<td>3</td>
</tr>
</tbody>
</table>

**Note:** Stack Mode has been retired from the Equal-i Control Applications, though it is still an option in the API.

13.1 Remote Site: Multipoint, Bridge, VMR

**Local Framing Modes:**
- **Passthrough** - Left display shows full screen original video + Right display shows content
- **Immersive Mode** - Left display shows left half of equalized PTZ video + Right display shows right half of Equalized video

13.2 Remote Site: Single display with single camera or multipoint bridge

**Local Framing Modes:**
- **Passthrough** - Left display shows full screen original video + Right display shows content
- **Immersive PTZ** - Left display shows left half of equalized PTZ video + Right display shows right half of Equalized video

**Remote Framing Modes:**
- **Video+Content** - Full screen equalized letterbox image

13.3 Remote Site: Dual display with single camera

**Local Framing Modes:**
- **Passthrough** - Left display shows full screen original video + Right display shows content
- **Immersive PTZ** - Left display shows left half of equalized PTZ video + Right display shows right half of Equalized video

**Remote Framing Modes:**
- "**Immersive Everywhere**" - Left display shows left half equalized video + Right display right half equalized video
- **Video+Content** - Left display shows letterbox video + Right display shows content

13.4 Remote Site: Equal-i equipped dual display with dual camera

**Local Framing Modes:**
- **Immersive Mode** - Left display shows left half equalized video + Right display shows right half equalized video
- **Letterbox** - Left display shows letterbox equalized video + Right display shows content
Remote Framing Modes:

- **Immersive Mode** - Left display shows left half equalized video + Right display shows right half equalized video
- **Letterbox** - Left display shows letterbox equalized video + Right display shows content
14. Appendix B – Telnet Commands

14.1 Overview
The Equal-i Image Processor provides an interface to allow remote configuration and control of the system. The device will accept ASCII bytes as commands. Each command ends with a carriage return <cr>. After a carriage return is received, the ASCII string that was received is parsed. If a valid command meeting the protocol rules is received, the command will be executed and an ASCII response string issued.

Before issuing commands, the host controlling system must be connected to the Image Processor via a telnet session. For more details, see the description of system communications.

14.2 Command Processing
The Equal-i system processes one command at a time. Once a command message has been received, no further commands will be accepted until the command has been executed and a response has been sent. Control hosts should wait to receive a response before sending additional commands.

14.3 Protocol Rules
Commands to the Equal-i system are structured in the following format:

: <command-word> <action-character> <param1>, <param>… <cr>

Commands are case insensitive. All characters will be converted to upper case. If a parameter is a string-value, it may be enclosed in quotes (""`). Any characters between quotation characters will not be converted to upper-case. All white-space characters (‘ ’) are ignored.

The command-word is a pre-defined keyword that specifies the command to be executed. The command-word must be followed by an “action character” that indicates the type of command to be executed. The action characters specify the following type of commands:

- ‘?’ – Read value
- ‘=’ – Write value
- ‘!’ – Other action that is not a read or write

The action character is followed by one or more parameters. Parameters must be separated by a comma (‘,’).

The command terminator is an ASCII carriage return (decimal value 13). It is acceptable to follow the carriage return with a linefeed character. This character will be consumed and ignored.

In all commands that write a value, the first parameter following the action character is the value to be written. This value may be specified in decimal or hexadecimal format. Decimal values allow only the digits ‘0’-’9’. Hexadecimal values must begin with the characters ‘0x’ or ‘0X’ followed by the hexadecimal digits ‘0’-’9’, ‘a’-’f’, or ‘A’-’F’. All commands return a decimal value (except FPGAREG which returns a hex value).

In any commands that must be directed at either the right or left camera, the last parameter identifies which camera will be affected. In commands that do not require any other information, the affected camera is the only parameter. The value ‘l’ or ‘L’ indicate the left camera. The value ‘r’ or ‘R’ indicate the right camera.

Commands that return a value will respond by echoing the command keyword followed by ‘=’ and the value. Example: HORPAN=43,R

Commands that do not return a value will respond with 'OK:' followed by the command that was executed. Example: OK: INTTIME
Commands that cannot be parsed correctly, have a parameter error, or fail on execution respond with ‘ERR –’, followed by a short description of the error type. Example: ERR – Unknown Command.

Responses from the Image Processor will be terminated with an ASCII carriage return and linefeed (decimal 13 and decimal 10).

All commands that require parameters have a specified range of acceptable values. If a parameter is entered that is out of range, an error will be returned and the command will not execute.

14.4 Read/Write Commands

These commands either read or write a system value. To get the current value, use the read (?) form of the command. To write a new value, use the write (=) form of the command.

14.4.1 HORPAN – Horizontal Pan

This command reads or writes the horizontal pan value for the right or left camera.

<table>
<thead>
<tr>
<th>Pan Range</th>
<th>0-1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:HORPAN? &lt;R</td>
</tr>
<tr>
<td>Write value</td>
<td>:HORPAN= &lt;new value&gt;, &lt;R</td>
</tr>
</tbody>
</table>

14.4.2 VERTPAN – Vertical Pan

This command reads or writes the vertical pan value for the right or left camera.

<table>
<thead>
<tr>
<th>Pan Range</th>
<th>0-1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:VERTPAN? &lt;R</td>
</tr>
<tr>
<td>Write value</td>
<td>:VERTPAN= &lt;new value&gt;, &lt;R</td>
</tr>
</tbody>
</table>

14.4.3 GAMMA – Gamma

This command adjusts the amount of gamma correction applied to both right and left camera images. Note: This command was introduced in system firmware release v1.15/2.08

<table>
<thead>
<tr>
<th>Gamma Range</th>
<th>1-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:GAMMA? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:GAMMA= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

14.4.4 BALBOXES – White Balance Boxes

This command enables (1) or disables (0) the ROI (Region of Interest) boxes that are used for white balancing. This command is then used in conjunction with BALL, BAlMATCH, and BALBOXPOS commands. Only the area within the Balance Boxes will be considered when performing a white balance (BALL, BALMATCH).

Note: This command was introduced in system firmware release v1.15/2.08

<table>
<thead>
<tr>
<th>Int Time Range</th>
<th>0-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:BALBOXES? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:BALBOXES= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>
14.4.5 BALBOXPOS – Balance Box Position
This command changes the position of the Balance Boxes (BALBOXES) along the vertical axis. A value of 1 is at the bottom of the display, and a value of 100 is at the top of the display. The factory default is 50. This command is then used in conjunction with BALL, BALMATCH, and BALBOX commands.
Note: This command was introduced in system firmware release v1.15/2.08

<table>
<thead>
<tr>
<th>Balance Box Pos Range</th>
<th>1-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:BALBOXPOS? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:BALBOXPOS= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

14.4.6 INTTIME – Integration Time
This command sets the sensor integration time for the right or left camera. Adjusting this value up or down will brighten or darken the image. This command is commonly adjusted in tandem with SENSGAIN.

<table>
<thead>
<tr>
<th>Int Time Range</th>
<th>1-1640</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:INTTIME &lt;R</td>
</tr>
<tr>
<td>Write value</td>
<td>:INTTIME= &lt;new value&gt;, &lt;R</td>
</tr>
</tbody>
</table>

14.4.7 COLGAIN – Color Gain
This command sets the color gain for the right or left camera. Adjusting this value up or down will saturate or desaturate the image with color.

<table>
<thead>
<tr>
<th>Gain Value Range</th>
<th>0-65535</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:COLGAIN? &lt;R</td>
</tr>
<tr>
<td>Write value</td>
<td>:COLGAIN= &lt;new value&gt;, &lt;R</td>
</tr>
</tbody>
</table>

14.4.8 OPMODEFE– Front-end Operating Mode
This command selects the Transmit Image operating mode. This is defined as the image that is coming from the local camera and is then transmitted to the remote location. <See Appendix A for Framing Modes.>

Note: The Equal-i system stores a separate set of horizontal and vertical pan values for each operating mode. To set the pan values for any given operating mode, first select the operating mode and then change the pan values. These values will apply to that specific operating mode. Changing the operating mode selection will cause the horizontal and vertical pan values to change (assuming that different values have been set for each operating mode). For this reason, any system that interacts with the Equal-i should re-query the horizontal and vertical pan values whenever the front-end operating mode is changed.

<table>
<thead>
<tr>
<th>Operating Mode Number Range</th>
<th>1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:OPMODEFE? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:OPMODEFE= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

:OPMODEFE=1 - This is used to transmit a dual screen image to an Equal-i processor on the remote end. Used for Immersive mode.

:OPMODEFE=2 - This is used to transmit a “Video+Content” single screen image to an Equal-i processor on the remote end’s left side or to a single screen PTZ system.
:OPMODEFE=3 - This is used to transmit a stacked dual screen image to an Equal-i processor on the remote end’s left side or to a single screen PTZ system. **Note:** This mode has been retired for use within the Windows and Android apps, but can still be called through a telnet session or custom API.

:OPMODEFE=4 - This is used to transmit a dual screen image to a remote site that does not have an Equal-i processor. Used for Immersive Mode.

### 14.4.9 OPMODEBE – Back-End Operating Mode

This command selects the back-end operating mode. This is defined as the image that is coming from the remote location and is then transmitted to the local displays.

<table>
<thead>
<tr>
<th>Operating Mode</th>
<th>Number Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:OPMODEBE? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:OPMODEBE= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

**OPMODEBE=1** - This is a passthrough. No equalization of image is performed in this mode and is used when content is connected, when receiving a PTZ image from the remote site, or when receiving Letterbox or Stack from an Equal-i processor equipped site.

**OPMODEBE=2** - This is used to receive the dual screen image from an Equal-i processor equipped site. Used for Immersive Mode.

**OPMODEBE=3** - Referred to as “Immersive PTZ”, and is used when receiving a single screen PTZ image. It will split the image vertically down the center then equalize the image. Once equalized, the image will then be displayed across both displays. This is referred to as “Immersive PTZ”.

### 14.4.10 SENSGAIN – Sensor Gain

This command sets the sensor gain for the right or left camera. Gain can be set to amplify at x1, x2, x4, or x8. The values 1-4 are used to select these settings. Adjusting this value up or down will brighten or darken the image. This command is commonly adjusted in tandem with INTTIME. The change will take effect immediately, however will not be stored permanently until the :SAVEPARAM command has been issued.

<table>
<thead>
<tr>
<th>Gain Selection</th>
<th>1-4, 1=x1 gain, 2=x2 gain, 3=x4 gain, 4=x8 gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:SENSGAIN? &lt;R</td>
</tr>
<tr>
<td>Write value</td>
<td>:SENSGAIN= &lt;new value&gt;, &lt;R</td>
</tr>
</tbody>
</table>

### 14.4.11 SLEEP – System Sleep

This puts the system into a sleep state or awakens it from sleep. The sleep state disables power to parts of the system, but keeps the system firmware and communications running. There is a pause of 5-10 seconds as the system saves or restores its state and goes into or out of sleep mode.

<table>
<thead>
<tr>
<th>Sleep Range</th>
<th>0, 1 (sleep off, sleep on)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:SLEEP? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:SLEEP= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>
14.4.12 LANIPADDR – LAN IP Address
This command sets the IP address of the wired Ethernet port on the Image Processor. The IP address must be an IPv4 address formatted in the xxx.xxx.xxx.xxx format. A valid IP address must be specified. The new IP address will not have any effect on the current session’s LAN configuration. In order for the change to take effect two things must occur: 1) the user LAN configuration must be saved with the :SAVELAN! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

<table>
<thead>
<tr>
<th>IP Address Value</th>
<th>Must be specified in xxx.xxx.xxx.xxx format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:LANIPADDR?  &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:LANIPADDR= &lt;new value&gt;  &lt;cr&gt;</td>
</tr>
<tr>
<td>Example</td>
<td>:LANIPADDR=192.168.1.232</td>
</tr>
</tbody>
</table>

14.4.13 LANIPMASK – LAN IP Mask
This command sets the IP address mask of the wired Ethernet port on the Image Processor. The IP mask must be an IPv4 mask formatted in the xxx.xxx.xxx.xxx format. A valid IP mask must be specified. The new mask setting will not have any effect on the current session’s LAN configuration. In order for the change to take effect two things must occur: 1) the user LAN configuration must be saved with the :SAVELAN! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

<table>
<thead>
<tr>
<th>IP Address Mask Value</th>
<th>Must be specified in xxx.xxx.xxx.xxx format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:LANIPMASK?  &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:LANIPMASK= &lt;new value&gt;  &lt;cr&gt;</td>
</tr>
<tr>
<td>Example</td>
<td>:LANIPMASK=255.255.255.0</td>
</tr>
</tbody>
</table>

14.4.14 LANIPGATE – LAN IP Gateway
This command sets the IP gateway address of the wired Ethernet port on the Image Processor. The gateway address must be an IPv4 address formatted in the xxx.xxx.xxx.xxx format. A valid IP address must be specified. The new gateway address setting will not have any effect on the current session’s LAN configuration. In order for the change to take effect two things must occur: 1) the user LAN configuration must be saved with the :SAVELAN! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

<table>
<thead>
<tr>
<th>IP Gateway Address</th>
<th>Must be specified in xxx.xxx.xxx.xxx format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:LANIPGATE?  &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:LANIPGATE= &lt;new value&gt;  &lt;cr&gt;</td>
</tr>
<tr>
<td>Example</td>
<td>:LANIPGATE=192.168.2.1</td>
</tr>
</tbody>
</table>

14.4.15 LANDHCP – LAN DHCP Usage
This command enables or disables the use of DHCP for the Image Processor. When DHCP is enabled, and the unit is connected to a network with a DHCP server and will request an IP address from the DHCP server. When DHCP is disabled, the Image Processor unit will use its assigned static IP address. The DHCP setting will not have any effect on the current session’s LAN configuration. In order for the change to take effect two things must occur: 1) the user LAN configuration must be saved with the :SAVELAN! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

<table>
<thead>
<tr>
<th>DHCP value</th>
<th>1=DHCP Enabled, 0=DHCP Disabled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:LANDHCP?  &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:LANDHCP= &lt;new value&gt;  &lt;cr&gt;</td>
</tr>
</tbody>
</table>
14.4.16  DEVNAME – Set Unit name
Sets a user-defined device identifier. The identifier string is 1-18 characters long and must contain only alphanumeric characters with no spaces. The device name will appear in the Equal-i Control App in the Conference Room section. In order for the change to take effect two things must occur: 1) the user configuration must be saved with the :SAVEPARAM! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

<table>
<thead>
<tr>
<th>Device name</th>
<th>Alphanumeric string 1-18 characters long, no spaces.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:DEVNAME? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:DEVNAME=&lt;name&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

14.4.17  PASSWORD – Set Password
Sets a user-defined password that is required for access to command mode of the Image Processor. When a connection is opened to the system, it prompts for a password. If the correct password is entered, the system responds with "OK" and then user may proceed to enter commands. If an invalid password is entered, the system will prompt for a password again. This will continue until the correct password is entered, or the connection is closed.

The PASSWORD command allows the user to assign a password to the system. The password must be 8-12 characters and all alphanumeric digits. In order for the change to take effect two things must occur: 1) the user configuration must be saved with the :SAVEPARAM! command, and 2) the Image Processor must be rebooted manually or with the :RESET! command.

The factory default password is: ATEquali

<table>
<thead>
<tr>
<th>Password</th>
<th>Alphanumeric string 8-12 characters long, no spaces.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:PASSWORD? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:PASSWORD=&lt;name&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

14.4.18  FRAMERATE – Change between 25Hz / 30Hz
This command sets the framerate from the camera out of the Transmit Module to either 25Hz or 30Hz. The factory default is 30Hz.

Note: The change will take effect immediately, however will not be stored permanently until the :SAVEPARAM! command has been issued. Requires firmware version 1.09 and higher. This setting will not be affected by the :LOADFAC! command.

<table>
<thead>
<tr>
<th>Rate Selection</th>
<th>1=25 fps, 2=30 fps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:FRAMERATE? &lt;cr&gt;</td>
</tr>
<tr>
<td>Write value</td>
<td>:FRAMERATE= &lt;new value&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

14.5  Read-Only Commands
14.5.1  FWVER – System Firmware Version
This command returns the controller firmware version number. The version number is returned in a digits-only format with no punctuation. The last two digits are the minor firmware version. Leading digits represent the major version. (i.e. FWVER=109 represents version 1.09)

<table>
<thead>
<tr>
<th>Return Value Range</th>
<th>0-65535</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:FWVER? &lt;cr&gt;</td>
</tr>
</tbody>
</table>
14.5.2  FPGAVER – FPGA Firmware Version
This command returns the FPGA firmware version specified in the command line. The Image Processor has three FPGAs identified as FPGA #1, FPGA #2 and FPGA #3. Specify the number of the FPGA you would like to the read version information on the command line.

<table>
<thead>
<tr>
<th>FPGA# Range</th>
<th>1-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return Value Range</td>
<td>0-65535</td>
</tr>
<tr>
<td>Read value</td>
<td>:FPGAVER? &lt;FPGA#&gt; &lt;cr&gt;</td>
</tr>
</tbody>
</table>

14.5.3  LANMAC – Ethernet MAC address
This command returns the MAC address of the Ethernet port. The address is returned as a string in the standard MAC address format of six hexadecimal values delimited by the ‘:’ character.

<table>
<thead>
<tr>
<th>Return Value Range</th>
<th>String</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read value</td>
<td>:LANMAC? &lt;cr&gt;</td>
</tr>
</tbody>
</table>

14.6  Action Commands
These commands cause the system to execute an action that does not involve reading or writing a particular value in the system. The results of the action may or may not affect other settings in the system.

14.6.1  BALL – White Balance of left-side image
This command adjusts gains for the specified camera to perform a one-shot white balance. Use in conjunction with BALBOXES command to set region of interest.
Note: This command was introduced in system firmware release v1.15/2.08

Command | :BALL! <cr> |

14.6.2  BALMATCH – White balance for right-side image
This command adjusts gains for the specified camera to perform a one-shot white balance. This command is designed to be utilized after the BALL command has been issued, and in conjunction with BALBOXES command to set region of interest.
Note: This command was introduced in system firmware release v1.15/2.08

Command | :BALMATCH! <cr> |

14.6.3  WHITEBAL – One-shot white balance
This command adjusts gains for the specified camera to perform a one-shot white balance.
Note: This command has been retired as of system firmware release v1.15/2.08.

Command | :WHITEBAL! <R/L> <cr> |

14.6.4  LOADFAC – Load Factory Settings
This command loads factory default values to all system settings.

Command | :LOADFAC! <cr> |
14.6.5 **SAVEPARAM – Save System Settings**
This command saves all current system settings to non-volatile memory, with exception of LAN settings.

```
Command :SAVEPARAM! <cr>
```

14.6.6 **RESET – Reset System**
This command reboots the Image Processor, which is similar to cycling power. All systems are re-initialized.

```
Command :RESET! <cr>
```

14.6.7 **SAVELAN – Save LAN configuration**
This command saves IP address, IP mask, gateway address, and DHCP status for the wired Ethernet port on the Image Processor. Current values are written to non-volatile memory. They will take effect the next time the unit is booted.

```
Command :SAVELAN! <cr>
```

14.6.8 **LOADFLAN – Load Factory LAN**
This command causes the wired Ethernet port configuration to revert to factory default values. After this command is executed, the change will not take effect until the next time power is cycled on the Equal-i unit.

```
Command :LOADFLAN! <cr>
```
15. Appendix C – Recommended Room Configurations

DX camera layout
Use EQ Map Set A for tables in this orientation
All dimensions are approximate
DX camera layout
Use EQ Map Set A for this table shape
All dimensions are approximate
DX camera layout

Use EQ Map Set A for tables in this orientation
All dimensions are approximate
DX camera layout
Use EQ Map Set B for this table shape
All dimensions are approximate
DX camera layout
Use EQ Map Set B for this table shape
All dimensions are approximate
DX camera layout
Use EQ Map Set B for this table shape
All dimensions are approximate
DX camera layout
Use EQ Map Set B for this table shape
All dimensions are approximate
DX camera layout
Use EQ Map Set B for this table shape
All dimensions are approximate
DX camera layout
A racetrack or boat shape table with these dimensions is also appropriate.
Use EQ Map Set B for this table shape.
All dimensions are approximate.
DX camera layout
A boat shape table with these dimensions is also appropriate
Use EQ Map Set C for this table shape
All dimensions are approximate
DX camera layout
Use EQ Map Set C for this table shape
All dimensions are approximate
Rotated DX camera head for seating at the end of the table
Use EQ Map Set C for this table shape
All dimensions are approximate
DX camera layout
A boat shape table with these dimensions is also appropriate
Use EQ Map Set C for this table shape
All dimensions are approximate
DX camera layout
Use EQ Map Set C for this table shape
All dimensions are approximate
Rotated DX camera head for seating at the end of the table
Use EQ Map Set C for this table shape
All dimensions are approximate
DX camera layout
A boat shape table with these dimensions is also appropriate
Use EQ Map Set C for this table shape
All dimensions are approximate
DX camera layout
Use EQ Map Set C for this table shape
All dimensions are approximate
Rotated DX camera head for seating at the end of the table
Use EQ Map Set C for this table shape
All dimensions are approximate
DX camera layout
A boat shape table with these dimensions is also appropriate
Use EQ Map Set C for this table shape
All dimensions are approximate
DX camera layout
Use EQ Map Set C for this table shape
All dimensions are approximate
DX camera layout
Use Custom EQ Map Set X2 for this table shape
All dimensions are approximate
DX camera layout
Use Custom EQ Map Set X1 for this table shape
All dimensions are approximate
16. **Appendix D – Installation Certification Site Survey**

![Diagram of a site survey layout with labeled sections A to J.]

- **A.** Room Length
- **B.** Room Depth
- **C.** Distance from wall to wall
- **D.** Distance from front of wall to wall
- **E.** Distance from front of wall to table
- **F.** Distance from wall to table
- **G.** Width of wall
- **H.** Height of wall
- **I.** Distance from wall to corner of room
- **J.** Distance from wall to bottom of display or viewable area

[Diagram details include specific measurements and dimensions for each labeled section, indicating a comprehensive site survey layout for installation certification.]
17. Appendix E – Cabling Diagrams

Equal-i Connection Guide
Connections to codecs with 1080p 30/25 content channel

[Diagram of Equal-i Connection Guide with labels for Video, Video or Content, Camera cable 1, Camera cable 2, Secondary Display, Primary Display, Camera Input, Content Input, Control System or Splitter, Inputs, Outputs, PC, Video Codec]
Equal-i Connection Guide

Connections to codecs without 1080p 30/25 content channel
Equal-i Connection Guide

Connection to PC for soft codecs

Video

Video or Content

Camera cable 1

Camera cable 2

HDMI to USB3 converter
(not supplied)

Secondary Display

Primary Display

USB3 Input

PC
Equal-i Connection Guide

Connection for camera alignment

Video

Video or Content

Camera cable 1
Camera cable 2
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