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1 Introduction

RZ4-Advanced™ our new premium camera offering that provides for streamlined installation by eliminating the Deutsch and BNC connectors; only wire stripping tools and a screw driver are needed to install and terminate the camera cables. A coax cable stripper with a brown insert should be used to simplify the coax cable preparation. The RZ4-Advanced camera is backward compatible with existing camera installations in the field. Simply cut the existing cables and connectors, strip the power and coax cables, and terminate with a standard screwdriver to the back of the new RZ4-Advanced camera. The RZ4-Advanced camera also gives technicians the option to set up the field of view (FOV) from the bucket truck or on the ground at the cabinet. Technicians can use Iteris’ lens adjustment module (LAM or LAMVIEW) with an adapter harness to set up as currently installed at the camera, OR use an adapter box connected to your existing LAM, set up and configure the camera FOV on the ground.

2 Features and Benefits

- Specifically designed for vehicle detection applications
- Optimized to work with Iteris’ advanced detection algorithms
- Quick-click connectors and adjustable camera mount streamline installation and minimize setup time – no crimping tools required!
- Set up and configure at the camera or from the ground
- Cable termination located at the rear of the camera simplifies cable connection
- Advanced heater enables optimal video detection performance in adverse weather conditions.

3 Tools and Equipment

3.1 Camera Installation Tools

1. Banding tool
2. Ideal Industries 45-521 coax stripping tool (optional)
   a. Brown Cartridge: A .328 B .109in
3. Ideal Industries 30-483 coax crimping tool and die set
4. 9/16” and 3/4” wrench
5. Socket wrenches
6. Screwdrivers
7. Wire cutters and wire strippers
8. Cable cutter
9. Two-way communication equipment (optional)
10. Bucket truck
11. Video monitor/patch cable
12. Vantage Lens Adjustment Module (LAMVIEW)
13. Volt/Ohmmeter
14. Electrostatic discharge (ESD) wrist strap (for Edge processor installation)
3.2 Camera Installation Supplies

1. \(\frac{1}{2}\)” or \(\frac{3}{4}\)” stainless steel banding material – user supplied
2. Amphenol 31-321-1012 BNC connector (one per camera) used in the controller cabinet for the surge protection device – included with camera
3. Belden 8281 coaxial cable (one per camera) – user supplied
4. Three-conductor, 16 AWG power cable (one per camera) – user supplied

3.3 Processor Installation Supplies
A surge suppressor device should be used on the video input line. Iteris provides a surge suppressor from EDCO, part number CX06-M (in-line unit) with every Edge processor.

4 System Installation

4.1 Vantage Installation Turn-On Checklist
This checklist can be used as a guideline for some of the necessary considerations that must be remembered whenever installing and turning on an intersection using the Vantage video detection system.

1. Correct Coax and Power Cable
   a. Video coaxial cable = Belden 8281
   b. Power cable = 3 conductor, 16 gauge, stranded wire
2. Surge Protection - Installed / properly grounded
3. Camera Installation
   a. Use 3 stainless steel bands to mount the pedestal bracket on the luminaire arm.
   b. Power connection on camera backplate – Correct pin assignment
   c. Video connection on camera backplate
   d. Sun shield adjusted - pulled out (Extended)
   e. Camera tilted slightly downward
4. Camera FOV (Field Of View)
   a. No Horizon in FOV
   b. Minimum 4 lane width
   c. Camera FOV sees just past advanced detection zones if under 300’ from stop bar
   d. Car bumpers parallel to bottom of screen
   e. Adequate area remaining for far detection
5. Processor Installation
   a. Jumpers / switches properly set
6. Zones
   a. Size of average vehicle (sedan)
   b. Longitudinal pavement markings out of zone area
   c. Curb and gutter out of zone area
   d. Symbol markings contained in zone
   e. Low Contrast (LC) veto zones properly drawn
7. Programming
   a. Labels: Camera, Configuration, Zones
   b. Check using MOD (Mode) menu item
      Channel Assignment and Zone Type
   c. Set MOD (Mode) 'Inact/Ch to "NoCall"
   d. Set Options if needed
   e. Set Clock (Clk) Time and Date information
   f. Make sure the test switches are all in the middle position (normal)

8. Archive snapshots and configurations. using VRAS

9. Observe operation during critical times
   Morning transition
   Noon time
   Evening transition
   Night time

10. Document count zones (if used)

11. Turn OFF menu / Turn Off Monitor

This is by no means intended to be a detailed and all inclusive list.

4.2 Camera Video and Power Cable Installation

This procedure describes how to install the coaxial and power cables between the camera mounting location and the traffic control cabinet. If you are installing multiple cameras, perform the procedure for each camera.

The procedure is divided into the following parts:

1. Running the cables
2. Preparing the coaxial cable connectors
3. Preparing the power cable connectors
4. Preparing the coaxial cable at the cabinet

Running the Cables

1. Run one continuous pull (without splices) of coaxial cable and power cable between the camera mounting location and the traffic control cabinet. The cables need to meet the following specifications:
   - Belden 8281 coaxial cable
   - Three-conductor, 16 AWG power cable

See the "Technical Information" section for the specific cable specifications.
2. If you are installing multiple cameras at the location, label the camera locations and cables. The following table shows a suggested numbering scheme for a location with four cameras.

<table>
<thead>
<tr>
<th>Cable</th>
<th>Camera</th>
<th>Phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Camera 1</td>
<td>1, 6</td>
</tr>
<tr>
<td>2</td>
<td>Camera 2</td>
<td>2, 5</td>
</tr>
<tr>
<td>3</td>
<td>Camera 3</td>
<td>3, 8</td>
</tr>
<tr>
<td>4</td>
<td>Camera 4</td>
<td>4, 7</td>
</tr>
</tbody>
</table>

Cable and Camera Numbering

4.3 Camera Connections

Remove the cap from the back of the camera by loosening the three screws.

The system is provided with a simple “Quick-Click” connection for the power and a terminal block for the video output.
4.3.1 Power Connection

1. Strip the outer sheath from the power cable back 1” (figure 4.4).
2. Strip the insulation from the three conductors back ¼” (figure 4.4).
3. Loosen the large cord grip (figure 4.5).
4. Thread power cable through large cord grip (figure 4.5).
5. Remove power connector from ship kit.
6. Install the conductors in the connector as per drawing (figure 4.6). Ensure polarity of conductors is correct.

**NOTE:** Failure to install the conductors correctly could result in camera damage and create an electrical shock hazard.
7. Insert the plug into the connector on the back of the camera (figure 4.7).
8. Tighten the large cord grip.
4.3.2 Video Connector

1. Loosen the coax cable clamp screws and remove clamp (figure 4.8).
2. Loosen the small cord grip (figure 4.8).
3. Strip Belden Coaxial Cable to length using Ideal Industries 45-521 coax stripping tool (figure 4.9).
   Brown Cartridge:
   A .328 B .109in

   *Note: Strip .250in of inner conductor for insertion into the video connector.*

4. Feed cable through small cord grip.
5. Feed cable into video connector (figure 4.10).
6. Tighten video connector (right side of terminal block) (figure 4.10).
   
   **NOTE:** The open connector space to the left of the video connection is not used and is only to provide mechanical rigidity to the terminal block.

7. Replace coax cable clamp and tighten screws (figure 4.11).
8. Tighten small cord grip.
9. Replace the cap on the back of the camera and tighten the three screws to complete the connection process.
4.4 Cabinet Connections

4.4.1 Power Connector

In the controller cabinet, AC power will need to be provided to each of the Vantage cameras. It is best to power the cameras from auxiliary breakers, to make sure that any damage to the camera power cables does not affect intersection cabinet power or controller operation. A terminal block attached to an external auxiliary circuit breaker(s) or an auxiliary power strip can be used to make the camera AC power connections in the controller cabinet. To use the power strip, simply terminate each of camera power cables with an AC power plug. All circuit breakers and or fuses should be sized appropriately for the load current.

![Camera Power Connections Using a Surge Protected Power Strip](Image)

![AC Power Plug On the End of the Camera Power Cable](Image)

**NOTE:** When calculating camera current requirements remember that the Vantage standard RZ-4 Advanced camera is rated at 25 watts max.

4.4.2 Video (BNC) Connector (for connection to Edge Processor)

1. At the Edge2 processor end of the coaxial cable, slide the outer ferrule of the Amphenol BNC connector over the cable.

   *Note: In the following steps, distances are measured from the end of the cable. Make all cuts sharp and square. Make sure the coaxial cable stripping tool is properly adjusted.*

   *Use an Ideal coaxial cable stripping tool or manually strip the coaxial cable to the required dimensions.*

![Piece Amphenol BNC Connector](Image)

Figure 4.14

Piece Amphenol BNC Connector
2. When you cut the coaxial cable, it is best to use "cable cutters" to obtain a clean symmetrical cut. Diagonal pliers or straight jaw cutters will deform the coaxial cable and may cause problems crimping on the BNC connector ferrule. The rounded cutting jaws of cable cutter pliers prevent the coaxial cable from being deformed, and provide a round uniform base for the BNC connector ferrule to firmly attach to. Coaxial cable deformation also adversely affects the operation of the coaxial cable stripper, since the cable is grossly out of round.

3. Strip .563" from the outer sleeve of the coaxial cable.

4. Strip .250" from the coaxial shielding and flare the shielding slightly.

5. Strip .125" from the coaxial dielectric.

6. Insert the male contact pin so that it butts up against the dielectric, crimp it in place using an Ideal Industries 30-483 coax crimping tool.

7. Insert the connector body assembly over the dielectric and shielding and snap it into place. Make sure the center pin is completely seated in the connector body. Make sure none of the coaxial braided shield wires are allowed to make contact with the center conductor.

---

**Figure 4.15**

Belden Coaxial Cable with Amphenol BNC Connector
8. Slide the outer ferrule over the braid and against the connector body. Crimp the outer ferrule in place using an Ideal Industries 30-483 coax crimping tool. Crimp the ferrule in two locations as shown in the diagram "Final Crimping of the BNC Ferrule" in the following section.

9. Apply a five-pound pull test to verify that the connector is crimped securely.

![Final Crimping of the BNC Ferrule](image)

**4.4.3 Testing Coaxial Cable and BNC Connections**

1. Verify that the coaxial cable is not touching the cabinet or signal pole.

2. Check for short circuit on the coax cable assembly using a multimeter. Set your multimeter to the 'ohms' (resistance) measurement setting. At the processor end of the cable run put one probe on the center pin and the other probe on the outer BNC connector body. A resistance measurement of less than 15Ω indicates a possible short circuit. A resistance measurement of more than 500kΩ indicates a possible open circuit. If the resistance measurement is outside the range indicated check the BNC and camera connections and the integrity of the coax cable. Be aware that some open connections can be intermittent making them more difficult to diagnose.

![Multimeter](image)

This picture shows the technique for checking the BNC connector using a multimeter. One meter lead probe is on the BNC center pin, the other meter lead probe is touching the BNC body. The multimeter should be set to ohms or continuity.
5 Camera Installation

Camera installation involves the following steps:

- Camera Mounting
- Field Of View
- Surge Protection

5.1 Camera Mounting

The physical camera mounting is done using a camera bracket that is banded to the luminaire arm or can be mounted on the mast arm using a suitable extension bracket.

One possible camera mounting location is up on the luminaire arm centered over the field of view, however, it is not always possible to use this mounting. Camera mounting is critical to providing the proper field of view, something that will be discussed in detail in the next section.
Camera height should be at least 30’ (10m) above

Approximately 12” (30cm) from the luminaire head

Figure 5.2

Note: If the luminaire arm is too short to center the camera over the field of view, especially on wide roadways, then an extension bracket on the mast arm may be the better choice. Centering the camera is just as important as gaining camera height. The mast arm mounting would end up with a camera height of about 25 feet when using a 6 foot extension bracket.

Luminaire Arm Mounting with Pelco Bracket

Figure 5.3
Figure 5.4

Iteris Universal Camera Mounting Bracket .......................CAMBRKT4

Note: See the Vantage Camera Bracket under the Technical Information section for more information.

PELCO "Astro Brac" 74 inch Camera Extension Bracket
(Mast Arm Mounting)

Figure 5.5

PELCO has several models depending on band or cable mounting and with or without service outlet. Contact your local PELCO dealer for more information on these brackets.
5.1.1 Occlusion

Consequences of Low Camera Mounting Height

Occlusion caused by low camera mounting height

Figure 5.6

Figure 5.7
5.2 Field Of View

A proper "Field Of View" (FOV) is crucial for optimal Vantage system operation. The following basic FOV guidelines will help the user to obtain optimal Vantage system performance.

There are two parts to obtaining an appropriate FOV:

- Physical camera mounting adjustment
- Electronic camera lens adjustment

5.2.1 Physical Camera Adjustment

The camera should be mounted so that it is centered, as much as possible, in relation to the field of view (vehicle approach). Extreme side shooting can result in reduced performance and vehicle occlusion. See the section in this manual on "Occlusion" for more information.

Proper Mounting Height

The camera should be mounted at approximately 30 feet for optimal system performance. For lower mountings, like a mast arm mount, a suitable camera extension bracket should be used to increase the camera mounting height to a more workable elevation. A camera mounting height of 25 feet or more can usually be obtained by using an extension bracket. Low mounting heights can result in reduced system performance and vehicle occlusion. See the section in this manual on "Occlusion" for more information.

How far can the camera typically see out at a mounting height of 30 feet? The basic formula for LEVEL ground is:

For every one foot of height you can see out 10 feet. So, on level ground, at a 30 foot mounting height, you should be able to get accurate detection as far as three hundred feet. This measurement is from the camera mounting location, not from the intersection stop bar area.
Note: The importance of camera centering versus camera height deserves some further discussion. It must be recognized how important centering the camera is to optimal system performance. In many cases centering the camera is more important than getting an additional five feet of height. For instance, when dealing with a short luminaire arm on a very wide roadway, it might be a better choice to mount the camera on the mast arm with a suitable extension bracket. With the right extension bracket you should be able to achieve a mounting height of about 25 feet. While this is less than the 30 feet you would achieve with a luminaire mounting, the ability to center the camera over the roadway in this example makes the mast arm with a six foot extension bracket the better choice. The luminaire mounting would get the camera up a little higher, but because the luminaire arm is short and the roadway is wide, this would place the camera way off to one side and would adversely impact the field of view. Remember there are two considerations for camera mounting (height and centering) and they both must be carefully evaluated.

Maintain a Proper Camera Angle
The physical camera adjustments are done by adjusting the camera bracket mounting bolts to set the mechanical camera pan and tilt after the camera bracket has been mounted to the arm or pole. The camera should always be tilted slightly downward and should never be flat or beyond horizontal. When could a camera be in danger of being beyond horizontal? When the camera is aiming uphill on a steep grade. The distance the camera can look out is significantly reduced on approaches with a steep uphill grade.

![Diagram of proper camera angle](image)

**Figure 5.9**

Pull the visor forward
You should have the camera sun shield (visor) far enough forward to give the camera maximum protection from the sun. By loosening the two hose clamp set screws, the camera body can be moved backward in the clamps, effectively lengthening the sun shield visor. Move the camera body back all the way or until the edges of the sun shield visor are just barely visible in the top left and right corners of the field of view. See the following examples.
Rotate the Camera Body

Ideally, for most intersection applications, vehicles should flow from the top of the screen to the bottom of the screen. By loosening the two hose clamp set screws, the camera body can rotate to better square up the FOV image.

The car bumpers should also end up being parallel with the bottom of the screen.

Figure 5.10
Too Much Camera Visor in the FOV

Figure 5.11
Maximum Acceptable Amount of Visor in the FOV

Figure 5.12
The Camera Body Could Be Rotated To Help Square Up The Stop Bar Area

Figure 5.13
The above picture shows an acceptable FOV and stop bar area alignment.
5.2.2 Electronic Camera Adjustment

Lens Adjustment Module (LAM) Hook Up
RZ4-Advanced™ is Iteris’ new premium camera offering that eliminates the need for a bucket truck to perform Field Of View setup and configuration. The advanced communication features of this camera allow control of zoom, focus and saving of settings of the FOV from the ground through the video coax cable.

To enable current LAM/LAMView modules to take advantage of this feature, a LAM Adapter module has been developed.

The following diagram shows how the LAM Adapter is used in the case where the lens control is conducted from the controller cabinet (ground level).

If, however, the RZ4-Advanced camera needs to be adjusted directly at the back of the camera a LAM Harness Adapter is provided.
5.2.3 LAM Adapter Kit Components

Figure 5.16

5.2.4 LAM Harness Adapter Cables

Figure 5.17
5.2.5 Installing the LAM Adapter Module

1. Remove Power Cable (Deutsch Connector) from LAM/LAMView if attached (figure 5.18).
2. Slide Communication Cable/Connector through hole in the bracket on LAM Adapter (figure 5.19).
3. Hook LAM Adapter bracket under the bottom of the existing LAM bracket on the back of the LAM/LAMView (figure 5.19).
4. Hook Top Mounting Bracket over the top left of the bracket on the back of the LAM/LAMView and slide into position (figure 5.20).
5. Screw the two brackets together with the thumbscrews provided (figure 5.21).
6. Connect the LAM Adapter Video BNC connector to the BNC connector on the LAMView or to the Video input on the cabinet monitor (figure 5.22).
7. Connect the LAM/LAMView Communication Cable/Connector to the Power/Comm Connector (Deutsch Connector) on the bottom of the LAM Adapter (figure 5.22).
8. Connect the Power Connector supplied as part of the LAM Adapter kit (Deutsch Connector) to the LAM/LAMView (figure 5.22).
9. Connect the coax video cable from the camera to the BNC connector on the LAM Adapter (figure 5.22).
10. The unit is now ready for use.
Hook over and slide into position

Tighten Thumbscrews

Connect LAM Comm Cable to LAM Adapter

Connect Video from Camera to BNC Connector

Connect LAM Adapter Video to LAM

Connect Power Connector to LAM

Figure 5.20

Figure 5.21

Figure 5.22
5.2.6 Installing the LAM Harness Adapter

NOTE: Before beginning, power to the Camera should be turned off.

1. Remove Power Cable (Deutsch Connector) from LAM/LAMView (figure 5.24).
2. Attach Power Adapter Cable to LAM/LAMView (figure 5.25).
3. Attach 6ft Video Cable (supplied with LAM/LAMView) to the LAM/LAMView (figure 5.25).
4. Disconnect the power connector from the back of the camera, remove through cord grip (figure 5.26).

NOTE: If the power to the camera has not been turned off this connector will be energized. Please handle with extreme caution. Electrical shock hazard exists.

5. Attach Power/Comm/Video Adapter Cable to the back of the camera (figure 5.26).
6. Connect the Comm (Deutsch Connector), Video and Power from the Camera to the LAM/LAMVIEW (figure 5.27).
7. Restore power to the camera.
8. The unit is now ready for use.
LAM Harness Block Diagram

Remove cable if attached

Figure 5.28
5.3 Electronic Camera Adjustment

Lens Adjustment Module (LAM) Hook Up

The Camera FOV is adjusted using the Vantage Lens Adjustment Module (LAM). The LAM is hooked up in series with the Vantage camera during camera installation.

After attaching the LAM to the camera (see section 5.2.5 or 5.2.6 above) follow the directions below to correctly set the Field Of View.

Lens Adjustment Module (LAM) Field of View Adjustments

There are two buttons on the LAM which allow you to control the zoom, wide angle (zoom out) or telephoto (Zoom in) and two buttons which allow you to control the focus adjustment. In addition there are two buttons marked ‘Set’ and ‘Auto Focus’

1. Turn “On” the monitor if your LAM is equipped with one. Camera video should now be visible. If the LAM is not equipped with a monitor, camera video should be visible on the cabinet monitor.

2. Use the LAM “Zoom Buttons” to obtain the proper Field Of View (FOV). Remember: The FOV should be a minimum of four lanes wide and medium sized vehicles at the stop bar area should be about the size of your thumb when using a nine inch monitor. Horizon should never be included as part of the FOV.

3. Once the proper FOV has been obtained, press the LAM “Auto Focus Button”. It is best to wait till traffic is stopped before attempting to Auto Focus. A pink rectangular shape will appear in the lower right corner of the monitor image indicating that the camera is trying to focus. Never press any other buttons while the rectangular focus indicator is still visible.

4. When proper focus has been obtained you must save the camera settings. To do this, press the LAM “Set Button”. The “Save Light” on the LAM module should illuminate indicating the settings are being saved. Do not press any buttons while the Save Light is still on. If the camera settings are not properly saved, the camera will return to its factory default settings whenever camera power is cycled.

5. This completes the camera setup process. Disconnect the LAM module and reconnect the camera video cable to the Edge processor and remove power from the LAM module.

More details on camera setup and correct field of view can be found in the Edge Processor, RZ4-Advanced Camera and LAM user manuals.

You should now see the video image displayed on the monitor in the traffic control cabinet. If you have a LAMVIEW with a built in video monitor the image should be displayed on the LAMVIEW monitor also. If a video image is not displayed, check the following:

a. Are the camera power cables and video cables connected correctly? Recheck the cable connections by referring to the previous diagrams and table found in this section.
b. Is the cabinet monitor connected, adjusted correctly, and plugged in to a valid working power source?

c. Is power correctly connected to the camera? See the "Power Connector" section of this manual for more information.

d. Is the camera power cable correctly terminated at the cabinet? See the "Cabinet Camera Power Connections" section of this manual for more information. Is the power "On"? Check the circuit breaker or fuse.

e. If the LAM has a built-in monitor, is the switch "ON"?

If you are unable to obtain a video image, contact your local Vantage Dealer or contact the Vantage Product Support Team for assistance. See the "Vantage Product Support" section of this manual for contact information.

**Lens Adjustment Module (LAM) Field of View Adjustments**

There are six push button switches LAMVIEW. The top left most switches allow you to control the zoom, wide angle (zoom out) or telephoto (Zoom in). The top right most switches allow you to control the focus adjustment. The focus adjustment will be discussed in detail after the section on proper FOV. The results of pushing these switches will be evident while viewing the video monitor. The camera can be auto focused using the Autofocus button on the bottom left and final FOV settings are stored using the Set button on the bottom right.

**Some Basic Considerations Regarding Proper Field of View (FOV)**

**The Stop Bar Four Lane Minimum Rule**

This rule states that if the region of interest is less than four lanes, for instance a two lane side street, the FOV should still remain approximately four lanes wide. Why? It has to do with vehicle size, if you zoom in the FOV to less than a four lane width, the vehicles become too large. If the vehicles are too large in the FOV, the system detection performance can be adversely affected. Can you extend the FOV to over four lanes? Of course, with the stock variable focal length lens, up to six lanes or more can usually be covered with acceptable vehicle size. What is the proper vehicle size? See the next rule.

**The Rule of Thumb**

Proper vehicle size is determined by the FOV setting, and vehicle size is important for optimal vehicle detection performance. If the FOV is correctly set, a medium sized vehicle (sedan) in the stop bar area, should be about the size of your thumb on a nine inch monitor. The measurement is taken from the tip of the thumb to the first joint. This measurement can give you a ball park idea of whether or not your FOV is correct. Larger vehicle size usually indicates that the FOV is not the minimum recommended four lanes wide. Smaller vehicle sizes can point to other problems, causing exceptionally large FOV’s. These problems are less frequent, but can occur if the camera is mounted an exceptionally long distance from the stop bar area or if the zoom lens range is exceeded.
This picture graphically demonstrates the "stop bar four lane rule" and "the rule of thumb" vehicle size relationship.

Figure 5.29

Other Important Field of View Considerations

1) Make sure that there is no horizon in the FOV. This can result in serious operational problems for East or West approaches. Why? Because of the sun! During sunrise or sunset the sun can completely blind the camera. Proper FOV, visor adjustment, and camera tilt can prevent this potential problem.

Poor Setup - Horizon Is Included As Part Of The Field of View (FOV)

Figure 5.30

2) Make sure the stop bar area is located toward the bottom of the FOV. This will also leave room for advance zone detection. The following example photo shows the stop bar area located in the middle of the FOV, which is not the ideal location.

Poor Setup - Stop bar Area Is In The Middle Of The Field of View (FOV)

Figure 5.31
Proper Camera Focus Adjustment

When you are sure that you can obtain the desired FOV, you will need to focus the camera using the LAM. Proper focus is crucial for optimal Vantage system detection performance. A camera that is out of focus can significantly reduce the Vantage systems ability to perform; so it is important to take the time to adjust the focus properly.

Monitor Vertical Hold Adjustment

Some monitors do not show the user the true field of view, therefore, it is actually possible to have horizon in the FOV and not realize it. If the monitor has a vertical hold adjustment control, roll the picture up and down to see everything that is actually contained in the frame. When purchasing a monitor for use with the Vantage systems it is recommended that you buy a monitor with a vertical hold adjustment or an underscan switch.

Process Completed

Disconnect the LAM and reconnect the camera power and video cable. You are ready to move on to setting up the Vantage processor.
5.4 Surge Protection
Surge protection must be correctly installed as a crucial part of every Vantage system installation. The surge protector not only protects your Vantage equipment from voltage spikes, but also bleeds off voltages induced on the video coaxial cable. These standing voltages, if they were not neutralized, have the potential to damage the Vantage processor.

The surge protector device that ships with the Vantage equipment is the EDCO CX06-M; which is a good general purpose, multi-strike, in-line surge protection device. The EDCO CX06-M is the surge protection device that has been approved for use with the Vantage video detection equipment. The EDCO surge suppressor is provided with each Vantage processor. The EDCO CX06-M is a readily available, off the shelf, surge protection device.

The specification sheet for the surge protection device is available in the "Technical Information" section of this manual. All surge protection must be approved by Iteris for use with the Vantage video detection systems. Failure to install surge protection, or using non-approved surge protection devices, will void the Vantage equipment warranties.

REMEMBER: The surge protection device must be grounded to operate correctly. Failure to correctly ground the surge protection device may result in damage to the Edge2 modules. A 14 gauge or larger wire run the shortest distance to ground, without severe bends, and to a common chassis ground point, is usually best. See the surge protection device manufacturer’s recommendations for more specific information.

Also, make sure the surge protector is oriented correctly. The "cable" side should come from the Vantage camera, while the "equipment" side should go to the Vantage processor video input. Reversing these surge device connections can result in significantly reduced surge protection and a greater risk of damage to your Vantage equipment.
6 Technical Information
The following section contains detailed technical information on the Vantage Edge2 Processor and its associated components.

- Belden Coaxial Cable
- Power Cable
- Camera Bracket
- EDCO Surge Protection

6.1 Belden Coaxial Cable

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8281</td>
<td>500</td>
<td>36.1</td>
<td>73.5</td>
<td>20 (Solid) BC 0.031 in. 3.9 ohms/m²</td>
<td>0.198 in. 0.305 in.</td>
<td>TC Braid TC Braid Inner 1.1 ohms/m²</td>
<td>75.0</td>
<td>65.0%</td>
<td>20.5 pf/m</td>
</tr>
<tr>
<td>Metric</td>
<td>(Meters) 152.4</td>
<td>(Kg) 3.84</td>
<td>(g) 33.4</td>
<td>.787 mm 32.5 ohms/km</td>
<td>5.029 mm 7.747 mm</td>
<td>Inner 3.6 ohms/km</td>
<td>67.2 pf/m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description:
- Insulation: Polyethylene
- Jacket: Polyethylene
- Plenum Version(s): n/a

Suggested Operating Temperature Range: Non-UL: -55°C to +80°C
Sweep Tested: 5 MHz - 216 MHz, SRL 27 dB minimum.

<table>
<thead>
<tr>
<th>Attenuation</th>
<th>Freq MHz</th>
<th>Nom. Attenu. (dB/100ft)</th>
<th>Nom. Attenu. (dB/100m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>0.25</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>3.6</td>
<td>0.54</td>
<td>1.77</td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>0.70</td>
<td>2.56</td>
<td></td>
</tr>
<tr>
<td>71.5</td>
<td>2.1</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>135.0</td>
<td>3.0</td>
<td>9.8</td>
<td></td>
</tr>
<tr>
<td>270.0</td>
<td>4.4</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td>360.0</td>
<td>5.1</td>
<td>16.7</td>
<td></td>
</tr>
<tr>
<td>720.0</td>
<td>7.6</td>
<td>24.9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attenuation</th>
<th>Freq MHz</th>
<th>Nom. Attenu. (dB/100ft)</th>
<th>Nom. Attenu. (dB/100m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000.0</td>
<td>9.2</td>
<td>30.2</td>
<td></td>
</tr>
</tbody>
</table>
## 6.2 Sample Power Cable

### PRODUCT DATA SHEET

1586 South Lakeside Drive  
Waukegan, IL 60085  
Toll-Free (800) 322-0355  
Fax (847) 639-1162

**PART NUMBER:** 23326  
**DESCRIPTION:** 1603 STRANDED TYPE SJEOOW FLEXIBLE POWER CABLE  
**CONSTRUCTION:** This cable consists of three bare copper insulated conductors cabled with fillers and an overall jacket.  
**APPROVALS:** UL Standard 62, CSA 22.2 No. 49, NEC Article 400.  
**APPLICATION:** 300V Portable Oil Resistant Submersible Outdoor Flexible Power Cable

### Construction Parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor</td>
<td>16 AWG Bare Copper</td>
</tr>
<tr>
<td>Stranding</td>
<td>26/00</td>
</tr>
<tr>
<td>Insulation Material</td>
<td>TPE</td>
</tr>
<tr>
<td>Insulation Thickness</td>
<td>0.031&quot; Nom. (0.80mm)</td>
</tr>
<tr>
<td>Insulated Conductor Diameter</td>
<td>0.120&quot; Nom. (3.05mm)</td>
</tr>
<tr>
<td>Number of Conductors</td>
<td>3</td>
</tr>
<tr>
<td>Lay Length</td>
<td>2.00&quot; Nom. (50.8mm)</td>
</tr>
<tr>
<td>Filler Type</td>
<td>Polypropylene</td>
</tr>
<tr>
<td>Separator/Wrap</td>
<td>Paper Tissue</td>
</tr>
<tr>
<td>Jacket Material</td>
<td>TPE</td>
</tr>
<tr>
<td>Jacket Thickness</td>
<td>0.035&quot; Nom. (0.89mm)</td>
</tr>
<tr>
<td>Overall Cable Diameter</td>
<td>0.330&quot; Nom. (8.40mm)</td>
</tr>
<tr>
<td>Approximate Cable Weight</td>
<td>69.2 Lbs/100' (1.05kg/30m)</td>
</tr>
<tr>
<td>Flame Rating</td>
<td>UL/CSA Horizontal Flame Test</td>
</tr>
</tbody>
</table>

### Electrical Properties:

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Rating</td>
<td>-50°C to 105°C</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>300 V RMS Max.</td>
</tr>
<tr>
<td>DC Resistance per Conductor @ 20°C</td>
<td>4.00 Ohms/100' Nom.</td>
</tr>
<tr>
<td>Max Amperage per Conductor (Per NEC Table 400-5a)</td>
<td>13 amps/second (Assume two current carrying conductors)</td>
</tr>
<tr>
<td>(Note: Because of 105°C temperature rating, higher current can be used under engineering supervision)</td>
<td></td>
</tr>
</tbody>
</table>

### Insulation Colors

- Black  
- White  
- Green

### Legend

- **COLEMCABLE SEOPRENE 105 16 AWG (1.32mm²) SJEOOW (UL) 300V-50°C TO 105°C CSA LL39753 SJEOOW(TPE) - 50°C TO 105°C FT2 WATER RESISTANT**  
  (White Surface Ink Print - P-341-3-MSHA in instant)

On special orders, the customer will accept all factory lengths and +/- 10 percent of total order requested.

The information presented here is, to the best of our knowledge, true and accurate. However, since conditions of use are beyond our control, all recommendations or suggestions are presented without guarantee or responsibility on our part. We disclaim all liability in connection with the use of information contained herein or otherwise.

This specification is proprietary intellectual property of Coleman Cable. Any information contained herein shall not be disclosed to any party without written consent of Coleman Cable.

### Customer Information

- **Customer Name:**
- **Date Signed:**
- **Customer Approval:**
- **Specification Issue Date:** February 10, 2004

1-800-322-0355 (Phone)  
1-847-639-1162 (Fax)  
23326  
© 2004 Coleman Cable, Inc.
Carolprene® Jacketed Type SJOW
90°C 300 Volt UL/CSA Portable Cord

Product Construction:
Conductors:
- 18 through 10 AWG fully annealed stranded bare copper per ASTM B-174
Insulation:
- Premium grade color coded 90°C EPDM
- Color Code: See chart below
Jacket:
- Carolprene®, Black
- Temperature Range: -40°C to +90°C
Jacket Marking:
- CAROL (SIZE) 90°C (UL) WATER RESISTANT SJOW CSA (-40°C)
- FT-2-P-7K-120303 MSHA - MADE IN USA – 300 VOLT
Applications:
- Portable tools and equipment
- Portable appliances
- Small motors and associated machinery
Features:
- Excellent resistance to oil and moisture
- Good tensile strength, elongation and aging characteristics
- High flexibility
- Excellent abrasion resistance
- Water resistant
- UL Listed and CSA Certified for indoor and outdoor use
Industry Approvals:
- UL Flexible Cord - UL Subject 62
- CSA Flexible Cord - C22.2-49
- OSHA Acceptable
- MSHA Approved
- JC 590
Packaging:
- 250' (76.2 m), 500' (152.4 m), 1000' (304.8 m)
- Other put-ups available on special order

COLOR CODE CHART

<table>
<thead>
<tr>
<th>NO. OF CONDUCTORS</th>
<th>COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Black, White</td>
</tr>
<tr>
<td>3</td>
<td>Black, White, Green</td>
</tr>
<tr>
<td>4</td>
<td>Black, White, Red, Green</td>
</tr>
</tbody>
</table>
6.3 Iteris Vantage Camera Bracket
The Universal Camera Bracket is designed to accommodate both horizontal and vertical structure mounting. The mounting bracket mates perfectly with Iteris’s wired and wireless cameras and is constructed using high strength 6061 aluminum. For added protection, the assembly is gray powder coated.

FEATURES & BENEFITS

- Universal Camera Mounting
- Horizontal for luminaire arm mounting
- Vertical for standard pole mounting
- High strength, light weight aluminum construction
- Easy pan/tilt angle adjustment
- Three banding slots for stainless steel banding of up to ¾ inch

Vertical Mount

Horizontal Mount

Iteris Universal Camera Bracket
Iteris Part: CAMBRKT4
# 6.4 EDCO Surge Protection

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping Voltage</td>
<td>6</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>0 to 20 MHz</td>
</tr>
<tr>
<td>Equipment Location</td>
<td>IEEE Category C, and Category B</td>
</tr>
<tr>
<td>Rated Load Current</td>
<td>0.15 amperes</td>
</tr>
<tr>
<td>SPD Topology</td>
<td>2-port Series</td>
</tr>
<tr>
<td>SPD Technology</td>
<td>Primary Stage Gas Discharge Tube (GDT), and Secondary Stage Silicon Avalanche Diode (SAD), w/ Series PTC</td>
</tr>
<tr>
<td>Modes of Protection</td>
<td>Signal to Ground</td>
</tr>
<tr>
<td>Nominal Discharge Current per Mode</td>
<td>10.0 kA</td>
</tr>
<tr>
<td>Maximum Discharge Current per Mode</td>
<td>20.0 kA</td>
</tr>
<tr>
<td>EMI Attenuation</td>
<td>&lt; 0.1 dB at 20 MHz</td>
</tr>
<tr>
<td>VSWR</td>
<td>&lt; 1.2</td>
</tr>
<tr>
<td>Continuous Power</td>
<td>0.72 Watts</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>0-95 % Non-condensing</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40 C to +85 C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 C to +85 C</td>
</tr>
<tr>
<td>Input Connection Type</td>
<td>BNC, 50 Ohm</td>
</tr>
<tr>
<td>Output Connection Type</td>
<td>BNC, 50 Ohm</td>
</tr>
<tr>
<td>Mounting</td>
<td>Flange</td>
</tr>
<tr>
<td>Enclosure Type</td>
<td>Metal</td>
</tr>
<tr>
<td>Warranty</td>
<td>5 Year</td>
</tr>
<tr>
<td>Special Features</td>
<td>Sneak/Fault Current Protection</td>
</tr>
<tr>
<td></td>
<td>Low Insertion Loss</td>
</tr>
<tr>
<td></td>
<td>Shielded Case</td>
</tr>
</tbody>
</table>
6.5 Vantage RZ-4 Advanced Camera Specifications

<table>
<thead>
<tr>
<th>Camera Specification</th>
<th>North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Format</td>
<td>NTSC</td>
</tr>
<tr>
<td>Video Output</td>
<td>Composite 1V p-p@75ohm</td>
</tr>
<tr>
<td>Universal Power Source</td>
<td>85-265V, 50/60Hz</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>25 W Max</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-31°F to +140°F</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>0% to 100% relative humidity, non-condensing</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Length 14.5”, Diameter 5” (Tube Only)</td>
</tr>
<tr>
<td>Weight</td>
<td>5.7 lbs</td>
</tr>
</tbody>
</table>

7  Maintenance

The Vantage Video Detection System, once correctly installed, requires a minimal amount of maintenance.

Camera Cleaning

Because Vantage video detection is a machine vision based system, a regular maintenance program should be implemented to ensure the front camera glass is kept free from dirt and debris. The camera housing glass should be cleaned at least once a year, or more frequently if required, especially under severe environmental conditions. Cleaning the glass ensures optimal performance.

The use of a soft cotton cloth (non-abrasive) and water is the recommended method for camera glass cleaning. Avoid leaving streaks on the glass. Avoid anything that might scratch the glass, cloud the glass, or leave an undesirable residue.

Connector and Cable Inspection

Periodically, it is wise to check camera power and video connections. Look for connector corrosion or moisture damage. Replace any defective connectors. Cabinet power and video cable and connections can also be checked for excessive wear or other defects. Repair or replace the defective cable or connectors as needed.

8  If You Need Assistance

The Iteris Vantage Product Support Team consists of a group of highly skilled individuals that are knowledgeable and readily available to answer your questions or assist you with any of our Vantage products. Please do not hesitate to contact us at:

(888) 254-5487

For more information on Iteris and the products and services that we provide, visit our website at www.iteris.com.