

6960 SERIES DUAL HEAD POSITIONER INSTALLATION MANUAL



Figure 1. Typical Dual Head Configuration

NOTE: The Model 6960 Positioner System is capable of having various right and left side heads installed. Because the available heads can be added at any time this manual is organized to place most head related documentation in appendices at the rear of the manual. The currently available heads are:

- APPENDIX A. 6940 Series 35x DAY/NIGHT CAMERA HEADS
- APPENDIX B. 6950 SERIES THERMAL CAMERA HEADS
- APPENDIX C. 6990 SERIES IR Illuminator

This first part of this manual concentrates on overall capabilities of the model 6960 positioner including its azimuth and elevation features. Additional details about the various right and left side heads are contained in the Appendix section of at the rear of the manual.

1.0 GENERAL DESCRIPTION

Cohu cameras of the 6960 series are available in both NTSC and PAL versions.

The following introduction briefly describes overall characteristics of the Model 6960 Analog Camera/Positioner (figure 1) related to its installation and initial setup using Cohu WinMPC software. All references to the 6960 in this manual refer to the analog versions only.

A 6960 can be thought of as a mechanical assembly made up three parts:

1. A positioner unit that provides the movement in azimuth and also tilt up/down for the heads. It is the main platform for the 6960 assembly.
2. A side mounted head on the left side of the positioner. This head tilts up and down.
3. A side mounted head on the right side of the positioner. This head tilts up and down.

Note: Single-head configurations are possible.

Left side and right heads move up and down simultaneously. They cannot be moved independently of each other. Both heads are not required. It should also be noted that these heads are an integral part of the Positioner assembly and are not readily replaced without major assembly operations.

1.1 Model Index Interpretation

Because of the variety of configurations possible, different model index interpretation diagrams are used.

Figure 2 is the overall model number interpretation diagram for the 6960 series.

Figure A1 is the model index for a 35x day/night head that mounts on either the left or right side of the panning unit.

Figure B1 is the model index for a thermal camera head that mounts on the right side of the panning unit.

For a pan/tilt unit facing north, the left head is to the west side; the right head is to the east side.

The first two digits after the dash in the model index shown in figure 2 are assigned to the type of head installed into the panning unit; the first digit is for the right head and the next one is for the left head.

Model number interpretation diagrams for the right and left heads appear in the appendices at the rear of the manual.

1.2 Electrical Characteristics

The 6960 series provides a dual-head configuration pan/tilt positioner system. The pan/tilt housing is environmentally sealed — but not pressurized. Camera heads are sealed and pressurized with dry nitrogen.

All electrical connections are via a single 18 pin sealed connector mounted to the bottom of the pan/tilt base. Table 1 lists electrical and mechanical specifications for the 6960.

The 6960's documented in this manual are typically available with either NTSC or PAL video output, depending on the model. Operating power is 50/60 Hz at either 24 V ac or 115 V ac or 230 V ac — again depending on the model. The 230 V ac model is not CE compliant.

Some camera selections have a day/night feature that increases sensitivity by reverting from color to monochrome output in low light conditions. This feature can be made to operate automatically or by manual control when desired.

1.2.1 Initial Setup Software

Win MPC Graphical User Interface (GUI) software is available for setting the address and

Table 1. Specifications

CAMERAS	
See individual Camera Data Sheets in the appendices at the rear of this manual	
PAN/TILT POSITIONER	
Angular Travel	360° continuous pan range, -90° to +90° tilt range
Pan Speed (preset)	120°/sec
Pan Speed (manual)	Variable from 0.1° to >80°/sec
Tilt Speed (preset)	120°/sec
Tilt Speed (manual)	Variable from 0.1° to >40°/sec
Preset Accuracy	>0.1°
Presets	64 preset positions (each preset includes pan, tilt, zoom and focus coordinates and 24 character ID label)
Video Tours	8 tours, each consisting of 32 presets with dwell time per preset per tour
Sector Zones	Up to 16 programmable zones in the horizontal plane
Privacy Zones	8 programmable zones can be set for video blanking
Compass Direction	8 or 16 direction points (i.e.: north, NE, east, SE, south, SW, west, and NW) can be displayed. Function can be on/off, 3-sec. time out or permanent
Absolute Position	Displayed in 0° - 359° azimuth and +95° to -95° in elevation. Function can be on/off, 3 second, time-out, or permanent.
Cloning	Position settings (presets, title, etc.) can be stored for easy duplication
Title Generation	
Camera ID	2 lines of 24 characters
Preset ID	1 line of 24 characters
Sector Zone	1 line of 24 characters
Privacy Zone	1 line of 24 characters
Alarm label	2 lines of 24 characters
Compass/Position	1 line, includes compass direction and absolute direction
Inverted Operation	Can be mounted in an inverted position. Software setting compensates image and control for inversion
ELECTRICAL	
Power Input	24 V ac, 120 V ac, or 230 V ac depending on model
Power Consumption	100 W: Operation with no heaters turned on by thermostats 200 W: Operation with heaters both cycled on by their thermostats Meets NEMA TS-2 for power variation and transients
Power Transients	Conforms to NEMA TS2 paragraph 2.1.6
VIDEO OUTPUT	
Video (75-ohm NTSC or PAL)	Two video outputs: primary and secondary. Primary output can select either the right side or left side camera head and provide ID generator and character display in that video Secondary video output is dedicated to the left side camera head only. This video output is available even when the primary channel selects the left side head for display in that channel.

Table 1. Specifications (continued)

ENVIRONMENTAL	
Protection Rating	IP-67 and NEMA-4X; Camera housing sealed and pressurized to 5 psi with dry nitrogen. IP-66 pan/tilt assembly
Ambient Temperatures	Operating -34 °C to 74 °C Storage -40 °C to 85 °C (-40 °F to 185 °F) Conforms to NEMA TS2; paragraph 2.1.5.1 (right and left side heads may have different temperature extremes)
Humidity	0-100% relative
Vibration	NEMA TS2 paragraph 2.1.9.
Shock	NEMA TS2 paragraph 2.1.10.
Altitude	Sea level to equivalent of 3,000 meters (10,000 feet) (520 mm / 20 inches of mercury)
Acoustics	Can withstand environments greater than 150 dB continuously for 30 minutes
MECHANICAL	
Weight	Approximately 24 lb / 11 kg (Model dependent)
Dimensions	Approximately 13.35" H x 20.5" W x 20.5" D (width and depth dimensions are related by the turning diameter clearance required. See figure xx)
Construction	Anodized aluminum mounting base; all internal and external parts corrosion protected; stainless steel fasteners
Connectors	MS E weatherproof/non-corrosion type
Mounting	Standard 4.75" diameter BC or 7.00" diameter BC optional

Table 2. Mounting Configurations

MOUNT		6960 POSITIONER	LARGE BASE	ARM ASSEMBLY	POLE MOUNT ASSEMBLY	CORNER MOUNT ASSEMBLY	PARAPET MOUNT ASSEMBLY
DESIGNATION	DESCRIPTION						
PEDD	pedestal, small base	•					
LPEDD	pedestal, large base	•	•				
WALL	wall	•		•			
POLE	pole	•		•	•		
CONR	corner	•		•		•	
PARP	parapet	•		•			•

NOTE: A dot (•) designates an item supplied for each mounting position. Example: a PARP (parapet) mount configuration consists of a 6960 positioner, an arm assembly, and a parapet mount assembly. Note that the LLPED (large pedestal base) does not mount to any of the accessories listed in this table. This adapter plate has a hole pattern typically used by other accessory mounts used with positioners and pan/tilt units.

performing field tests and setups for each camera/positioner. This can be obtained at no cost from either the cohu-cameras.com web site or by mail on CD ROM. This test/setup software does not control auxiliary equipment such as video switches, screen switches, VCR's, and such.

A separate manual is available for the Win MPC software. The part number for that manual is 6X-1032. The latest revision level of the manual, can be downloaded from the website.

1.2.2 Cohu System Control Software

The 6960 can be operated by either the Cohu Win MPC test and setup software or by Cohu Cams, NetCams software or some common third-party software depending on the requirements of the installation. A variety of other common third-party software protocols can be used. Not all features may be available with some of these third-party protocols.

The Cohu 6960 system control software is designed to control the camera, the camera DSP functions, lens functions, positioner pan/tilt functions, as well those of auxiliary equipment such as video switches, screen splitters, monitor selectors, VCR's, and other such equipment. The protocol and message structure for the camera is common for all cameras. No proprietary protocol and message structure is used. Two versions of control software are available:

Cams

The Cams protocol software is intended for controlling multi-camera/positioner systems when the Cohu MPC Master Control Panel is the central control "intelligence" for the system. All control and response commands among the various equipment in the system pass through the Master Control Panel.

Net Cams

The Net Cams software is intended for controlling multi-camera/positioner systems when a Windows based PC is the central control "intelligence" for the system. All control and response commands among the various equipment in the system pass through the Net Cams Server.

1.2.3 Other Control Software/Protocols

During initial setup and testing of a 6960, the Cohu WinMPC software is typically used for communications with the camera module and pan/tilt positioner section of the 6960. This is typically done with the software running on a windows based PC at a test bench or at the installation site location. Once the 6960 is ready to be released for service at its installation site, a "working" protocol can be selected for use in the control system.

1.3 Mechanical Characteristics

Dimensions for a typical configuration are shown in figure 8. The typical 6960 consists of two sealed and pressurized camera heads mounted on the pan and tilt unit. — but a single-head configuration is available.

The pan and tilt unit is environmentally sealed from rain, dust, dirt, and other undesirable contaminants. It is not pressurized.

The camera heads include an integral sun shield to prevent heat build up as a result of exposure to sun light.

All electrical connections are made via a single MS style connector permanently attached to the bottom of the 6960 base.

A Schrader valve (figure 14 — the car tire type air valve on the left) on the rear panel of a typical camera head provides for pressurizing the camera housing with dry nitrogen. This valve can be used to occasionally add dry nitrogen as necessary to maintain pressure in the camera housing at about 5 psig (34 kPa). (Note: psig refers to pounds square inch gauge — which designates pressure relative to the altitude above sea level at which it is being measured.)

During shipping, at which times high altitude might be encountered during aircraft transportation, a pressure relief valve on the rear panel (figure 14) may release some pressure. Back at low altitudes this would be experienced as a housing pressure below the standard 5 psig (34 kPa). Dry nitrogen should be added to bring the pressure back up to 5 psig (34 kPa). During normal purging and pres-

NOTE: Model Number Interpretation diagrams for the right and left side optional heads appear in appendices at the rear of this manual

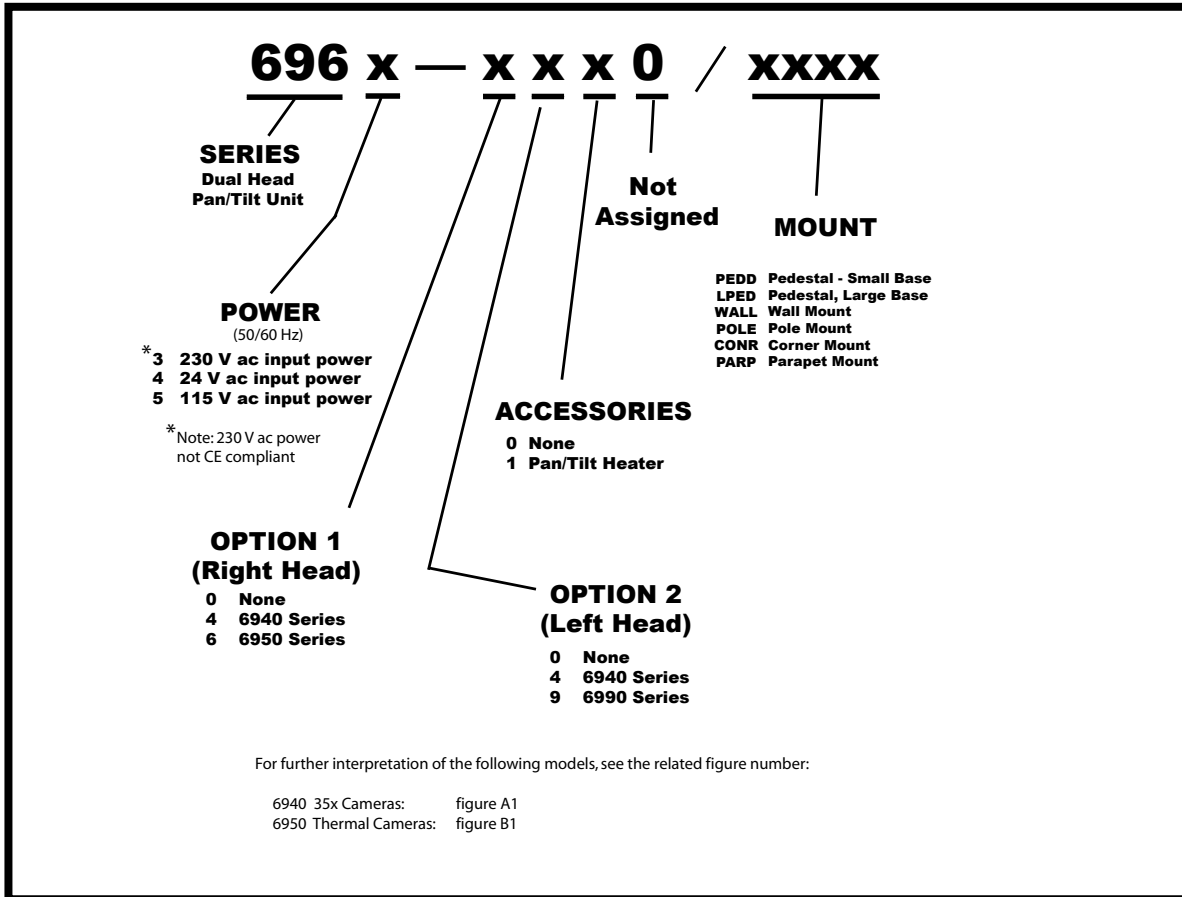


Figure 2. Model Number Interpretation Diagram — 6960 Base Unit



Figure 3. Optional LPEDD Adapter Plate



Figure 4. Wall Mount Arm



Figure 5. Pole Mount

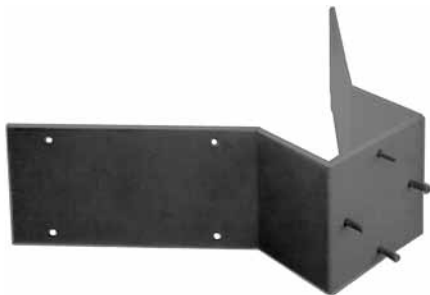


Figure 6. Corner Mount



Figure 7. Parapet Mount

surization, internal pressure should not be allowed to rise above a 5 to 8 psig (34 to 55 kPa) range to prevent stress on the seals.

The pressure relief valve should be lifted off its seat during purging of the camera. This aids in the flow of gas through the housing while purging moisture laden air from inside.

If desiccant bags inside the camera have absorbed moisture they cannot be dried by purging the camera. The camera must be disassembled so that the desiccant bags can be removed and either dried in an oven or replaced with fresh, dry bags. Once the new fresh bags are installed the camera can be reassembled and then purged with dry nitrogen to displace moist air inside the housing. Dry nitrogen is typically flowed through the camera for several minutes to ensure that all residual moisture inside the housing has been removed.

The mounting base for the 6960 has two four-hole patterns (offset by 45 degrees) for attachment to a pedestal, mounting arm, or other suitable base. High quality (grade 316) stainless steel bolts and lock washers should be used. An additional add-on base plate is available to provide additional hole

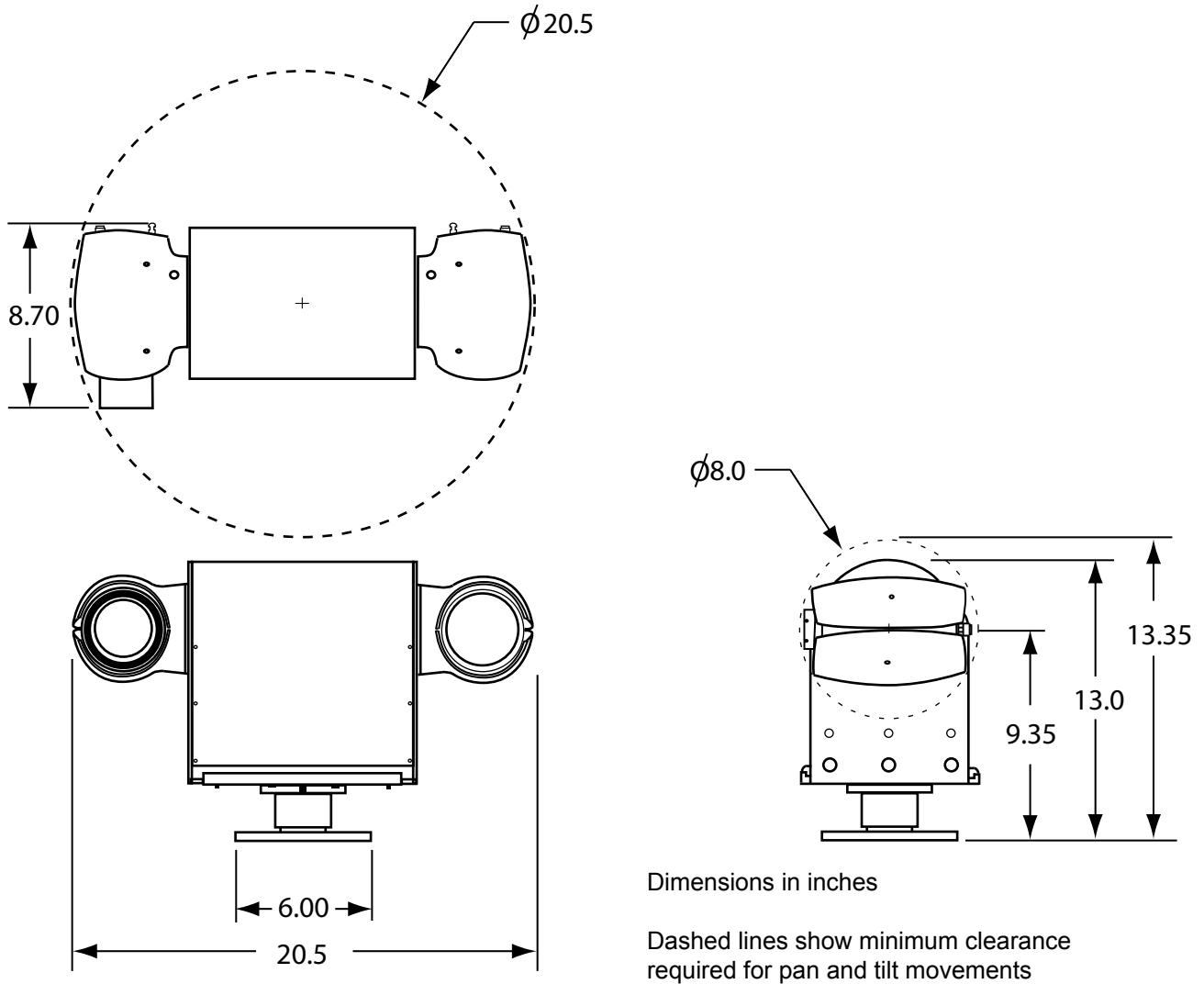


Figure 8. Dimensions, Typical Model 6960

patterns on a larger diameter. Note in figure 16 that one pattern is 1/4-20 UNC threaded while the other pattern requires through bolting to mating nuts.

A 6960 can be mounted in any one of six mechanical configurations depending on the mounting accessories supplied. The model number defines the mounting equipment supplied as part of the 6960. Table 3 shows the mounting items supplied for each of the mounting configurations available with a 6960.

2.0 INSTALLATION

This section covers the general requirements of installing the 6960 including cabling, power requirements, and pressurization considerations. In addition to the actual installation requirements, this section covers a number of other items including static discharge protection and proper shipping and handling of the 6960.

Section 4 at the rear of this manual covers the various mounting brackets, their dimensions, and general installation requirements of bolting the 6960 in place. A prime consideration will be routing of

Table 3. Items Typically Supplied

ITEM	DESCRIPTION	COHU PART NUMBER
1	Camera/Positioner	696x
2	Mating Cable Connector (MIL MS3116F-14-18S) [Amp/Bendix PT06E-14-18S(SR)]	1310230-011
<i>Note: Item 2 attaches to the system cable that connects to the 6960.</i>		

Table 4. Items Required but Typically not Supplied

Item	Description	Characteristics
1	Support base, wall, etc	The camera/positioner mounting base or an optional mounting arm, etc must have something to bolt to: a wall, pole, etc.
2	Cable	An interconnection cable with at least the number of conductors to support the 6960 functions being used. It must have 75 ohm coax. Power wiring must be sufficient to prevent excessive voltage drop. RS-422 Tx and Rx must be twisted pairs and a data ground wire used.
3	Conduit	Conduit, sweeps, pull boxes, and junction boxes may be required for the cable run up to the camera/positioner. Some installations also require equipment cabinets close to the camera installation location.
4	Distance communications	A link back to the control center — such as fiber optic cable, microwave, or various other technologies.
5	Source of power	Either 24 V ac or 115 V ac, or 230 V ac — depending on the model of the camera.
6	Computer (PC)	A computer or local interface to camera with an RS-422 port. (or use a converter to arrive at RS-422). Be aware that not all models of these converters from various manufacturers provide reliable operation (or work at all in some applications).
7	USB to RS-232 or RS-422 Converter	Newer PC's tend not to have RS-232 ports (especially laptops). In such a case a RS-422 port will have to be supplied with a USB-to-RS-232 converter or plug-in card in a full size PC. Read the cautioning statement for item 6 above.
8	GUI control software	Control software such as Cohu Win MPC for setup and testing of a single camera and system operating software for operating multi camera systems.
9	Hardware	High quality grade 316 stainless steel nuts, bolts, and lockwashers should be used.

the system cable to a 6960. This must be planned for during the initial consideration of an installation location.

These mounts should be installed only by qualified installers thoroughly familiar with the various code requirements and industry standard best practices for an installation.

2.1 Unpacking and Receiving Inspection

This item was thoroughly tested and carefully packed in the factory. Upon acceptance by the carrier, they assume responsibility for its safe arrival. Should you receive this item in a damaged condition, apparent or concealed, a claim for damage must be made to the carrier.

If a visual inspection shows damage upon receipt of this shipment, it must be noted on the freight

Table 5. Interface Connector Pin Functions (24 V ac)

PIN	FUNCTION
A	Video 1 ground
B	24 V ac high
C	Video 2 out
D	Video 2 ground
E	Washer power
F	Washer common
G	AC ground
H	Alarm common
J	Alarm 1 in
K	Alarm 2 in
L	Video 1 out
M	Rx+ (RS-422)
N	Rx- (RS-422)
P	Data ground (RS-422)
R	Tx- (RS-422)
S	Tx+ (RS-422)
T	24 V ac low
U	not used

Table 6. Interface Connector Pin Functions (115/230 V ac)

PIN	FUNCTION
A	Video 1 ground
B	not used
C	Video 2 out
D	Video 2 ground
E	Washer power
F	Washer common
G	AC ground
H	Alarm common
J	Alarm 1 in
K	Alarm 2 in
L	Video 1 out
M	Rx+ (RS-422)
N	Rx- (RS-422)
P	Data ground (RS-422)
R	Tx- (RS-422)
S	Tx+ (RS-422)
T	115 V ac low/neutral
U	115 V ac high/line/hot

Table 7. Interface Connector Pin Functions (230 V ac)

PIN	FUNCTION
A	Video 1 ground
B	not used
C	Video 2 out
D	Video 2 ground
E	Washer power
F	Washer common
G	AC ground
H	Alarm common
J	Alarm 1 in
K	Alarm 2 in
L	Video 1 out
M	Rx+ (RS-422)
N	Rx- (RS-422)
P	Data ground (RS-422)
R	Tx- (RS-422)
S	Tx+ (RS-422)
T	230 V ac low/neutral
U	230 Vac line/high/hot

NOTE: For a functional listing of pin functions see tables 8, 9, and 10.

bill or express receipt and the notation signed by the carrier’s agent. Failure to do this can result in the carrier refusing to honor the claim.

When the damage is not apparent until the unit is unpacked, a claim for concealed damage must be made. Make a mail or phone request to the carrier for inspection immediately upon discovery of the concealed damage. Keep all cartons and packing materials.

Since shipping damage is the carrier’s responsibility, the carrier will furnish you with an inspection report and the necessary forms for filing the concealed-damage claim.

To return the product to the factory for service, please contact the Customer Service Department for a Return Authorization (RA) Number.

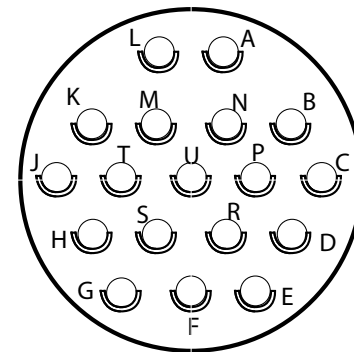


Figure 9. Wiring View, System Cable Plug (Solder Cups Shown)
This is not the camera baseplate connector. Instead, it is the wiring side of the plug that mates with the camera connector.

Table 8. 24 Vac Camera Connections		
Name	Pin	Pin Function
Video 1	L	Video 1 Out
	A	Shield / Ground
Video 2	C	Video 2 Out
	D	Shield / Ground
RS-422	M	Rx+
	N	Rx-
	S	Tx+
	R	Tx-
	P	Data ground
Alarms In	J	Alarm 1 in
	K	Alarm 2 in
	H	Alarm common
24 V ac	B	24 V ac high
	T	24 V ac low
	G	24 V ac ground
Not Used	U	
	E	
	F	
	R	

Table 9. 115 Vac Camera Connections		
Name	Pin	Pin Function
Video 1	L	Video 1 Out
	A	Shield / Ground
Video 2	C	Video 2 Out
	D	Shield / Ground
RS-422	M	Rx+
	N	Rx-
	S	Tx+
	R	Tx-
	P	Data ground
Alarms In	J	Alarm 1 in
	K	Alarm 2 in
	H	Alarm common
115 V ac	U	115 V ac line/high/hot
	T	115 V ac neutral
	G	115 V ac ground
Not Used	B	
	E	
	F	
	R	

Table 10. 230 Vac Camera Connections		
Name	Pin	Pin Function
Video 1	L	Video 1 Out
	A	Shield / Ground
Video 2	C	Video 2 Out
	D	Shield / Ground
RS-422	M	Rx+
	N	Rx-
	S	Tx+
	R	Tx-
	P	Data ground
Alarms In	J	Alarm 1 in
	K	Alarm 2 in
	H	Alarm common
230 V ac	U	230 V ac line/high/hot
	T	230 V ac neutral
	G	230 V ac ground
Not Used	B	
	E	
	F	
	R	

Table 11. 6960 Connector & Mating Cable Plug

PART NUMBER REFERENCE	CAMERA PIGTAIL CONNECTOR	MATING SYSTEM CABLE PLUG
Cohu Part No.	1310230-017	1310230-011
MIL No.	MS3111F-14-18P	MS-3116F-14-18S
Amp/Bendix No.	PT01E-14-18P(SR)	PT06E-14-18S(SR)

(Also Available from Cohu as P/N 3010100-001)

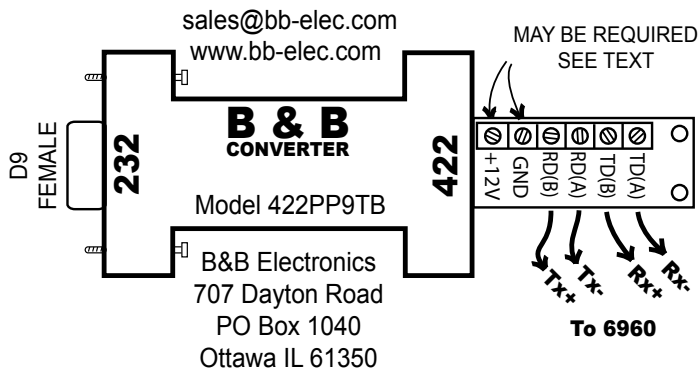


Figure 10. Typical 232/422 Converter

2.2 Static Discharge Protection

Procedures in this manual do not require entry into the housing of the 6960. But in the event that a disassembled 6960 is being handled, the following precautions should be followed:

CAUTION

This 6960 contains sensitive devices that can be damaged by static discharge. Use appropriate static control methods when working inside the 6960.

Components used in modern electronic equipment, especially solid state devices, are susceptible to damage from static discharge. The relative susceptibility to damage for semiconductors varies from low with TTL to high with CMOS. Most other semiconductors fall between TTL and CMOS in susceptibility to static discharge. As a minimum,

therefore, observe the following practices when working inside this or any other electronic equipment:

1. Use conductive sheet stock on the work bench surface.
2. Connect the sheet stock to ground through a 1 megohm or greater value resistor.
3. Use a wrist strap connected to ground through a 1 megohm or greater value resistor when working at the bench.
4. Maintain relative humidity of the room above 30 percent. This may require a room humidifier. Working

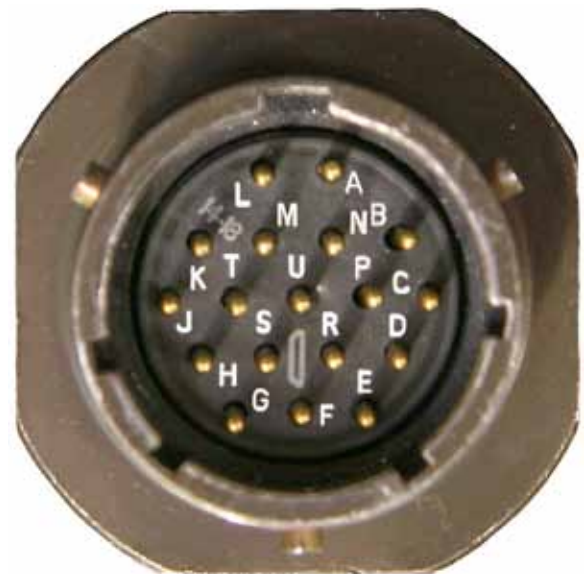


Figure 11. Mating View Pin Location Diagram, 6960 Baseplate Connector



Wiring Side - Solder Cups



Front Side - Mating Sockets



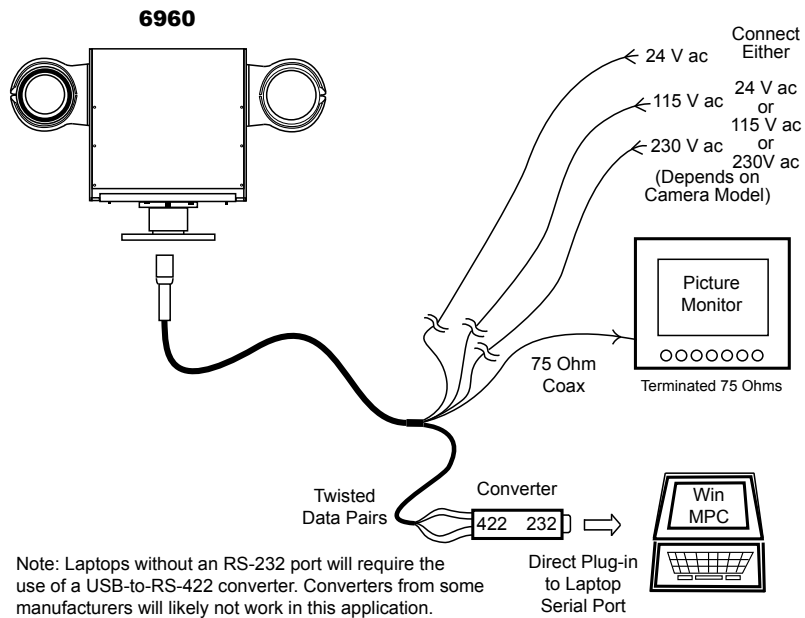
Connector Kit Contents



Typical Package for Connector Kit

MS-3116F-14-18S

Figure 12. Type 1310230-011 Mating Cable Connector Kit



Cohu manufactured cables are available for 6960 series operating from 230 V AC, 115 V AC power, or 24 V AC with MS connector.

Figure 13. Interconnection Diagram, Typical Test Setup

on circuits with relative humidity below 30 percent requires extraordinary procedures not listed here.

5. Use antistatic bags to store and transport an exposed chassis, circuit boards, and components. Use new antistatic bags. Old, used bags lose their static protection properties.

This list serves as a reminder of the minimum acceptable practices. Be sure that all static discharge devices at the work bench are properly installed and maintained. Standard grounding mats and wrist straps purchased for use at work benches are supplied with leads having current limiting resistors for safety. Never substitute with a grounding lead not having the resistor.

2.3 Equipment Supplied

The assembly consists of one or two heads. Depending on the model, the camera heads could be either a day/night module with an integral zoom lens or a thermal camera head (or both). An IR illu-

minator can be mounted to the left side in place on another type head. These camera heads or illuminator would be mounted to the pan/tilt base assembly. Refer to table 3 for items typically supplied.

A mating connector is supplied to provide electrical interface to the 6960 connector on the bottom of the unit. Refer to table 5 for connector pinout functions for a 24 V ac model, to table 6 for the pin functions of a 115 V ac model, or to table 7 for the 230 V ac model. (Tables 8 through 10 provide the same information in functional groupings.)

If the optional large mounting base is ordered (LPED option) it will be supplied with four 1/4-20 x 3/4 mounting screws. If the plate is factory installed these screws will be used for that installation and not supplied as loose parts.

2.4 Equipment Required but Not Supplied

Table 4 is a list of equipment that may required to install and make use of the 6960. As a minimum the 6960 requires a source of operating power, at least one monitor on which to view a scene, an



Figure 14. Camera Module Rear Panel

interconnection cable, and a computer running Graphical User Interface (GUI) software for control of the 6960 if this is desired. Programming the optional ID generator messages requires a GUI software such as the Cohu WinMPC setup and maintenance software. This is available at no cost from Cohu Electronics:

www.cohu-cameras.com

During maintenance and setup operations using either a laptop or desktop PC it is likely that a 422/232 converter will be required. PC's typically have had only a serial RS-232 communications ports and not RS-422 ports. Thus a 232/422 converter has always been required to communicate with an RS-422 camera.

Newer PC's have only USB ports and thus a

USB-to-232 converter may be required in addition to a 232/422 converter.

These converters are offered by many different manufacturers and not all of them will provide reliable communications.

Installing the 6960 will also require high quality stainless steel (preferably grade 316) mounting bolts and a platform of some type on which to mount it. Gasket materials and sealing compounds may also be required to provide waterproofing of mounting holes in structures.

2.5 Mounting Hardware

Installing the Camera will also require grade 316 stainless steel mounting bolts of high quality and a platform of some type on which to mount it. Gasket materials and sealing compounds may also be required to provide waterproofing of mounting holes in structures.

Be aware that stainless steel hardware is subject to galling of the threads when being fastened together.

Galling occurs when excessive friction between high spots on the threads results in localized welding. This leads to a further roughening of the threads and thus more galling.

In severe cases the bolts can actually be broken off when they seize during tightening. Galling is predominantly a problem with larger sized bolts — especially when using any kind of power driven fastening device that rapidly rotates the threads together.

This galling can be minimized by the use of anti seizing compound on the threads.

But putting any compound on the threads acts as a lubricant which can make it necessary to



Figure 15. Model 9300 Local Control Panel (Optional Installation Equipment)

reduce the amount of torque applied as indicated by a torque wrench. When threads are lubricated a torque wrench setting intended for dry threads will lead to the bolt being stretched too much due to overtightened.

Any qualified installer will be aware of the need for anti seizing compound and the effect it will have on torquing the fasteners.

Also be aware that stainless steel fasteners cannot be allowed to remain continuously submerged in water over long periods of time. They will deteriorate and fail

Again, only a qualified installer should be used for the installation of this equipment.

2.6 Cabling Requirements

All electrical connections for the 6960 route through an 18-pin MS “E” type male pin connector on the bottom of the pan and tilt unit.

The required system cable, then, must have a compatible connector with 18 sockets (female) to mate with this camera connector.

A mating connector (figure 12) is supplied for making system interconnections. This connector should not be attached to the system cable until it is known that the cable can be routed through any narrow places (such as conduit) with the connector attached. Note that bends and turns in a routing can sometimes be difficult with an attached connector.

Figure 9 illustrates the wiring side pin locations of this system cable connector. It shows solder cups for the wiring connections.

Figure 13 shows a typical test setup interconnection diagram for the 6960 using a laptop PC running Cohu WinMPC as the control point.

2.6.1 Optional Model 9300 Local Control Panel Cabling

Figure 15 shows an optional Cohu Model 9300 Local Control Panel. This panel is typically used only in traffic applications where these panels are mounted in equipment cabinets near the cameras on a highway.

The panel is useful when an on-site local control panel is desired for setup and maintenance

operations at remote locations. This panel typically is installed in a weatherproof cabinet located near the 6960 installation location. This optional panel can control some functions of the 6960 without use of a local laptop PC running WinMPC but additional functionality is available when using a laptop connected to the front of this panel.

A front panel D9 connector on the 9300 provides for connection with the RS-232 serial port of a laptop PC. The panel must be placed in LOCAL mode. The laptop, then, can be used to communicate with the 6960 using WinMPC.

Also on the front panel is a BNC connector for viewing the video from a 6960.

When a 9300 local control panel is installed at the 6960 site location, it becomes the site address for the 6960. Any address programmed into the 6960 is not seen by the system.

Figure 10 shows a typical 232/422 converter. The terminal labels used on various models of these converters differ, so it is important to read the literature accompanying the converter being used. Handshake is not used in this application. It is recommended that a B & B model 422PP9TB converter be used. This converter is available from Cohu Electronics as part number 3010100-001.

The Panel has an RS-232 D9 connector on its front panel for local control with a laptop PC.

The system cable from the central control station connects to the rear of this panel. Communications passes through the panel to another rear panel connector to which the 6960 is interconnected.

2.7 Power Requirements

Three versions of the 6960 are available related to power: The model 6964 operates from 24 V ac; the 6965 operates from 115 V ac, and the model 6963 operates from 230 V ac.

The maximum power requirement is 154 watts — which occurs when heaters in both the optical camera and the pan/tilt unit cycle on during cold conditions (Thermal cameras cannot have internal heaters.) Also, the optical camera and the pan/tilt unit operate under control of separate thermostats.

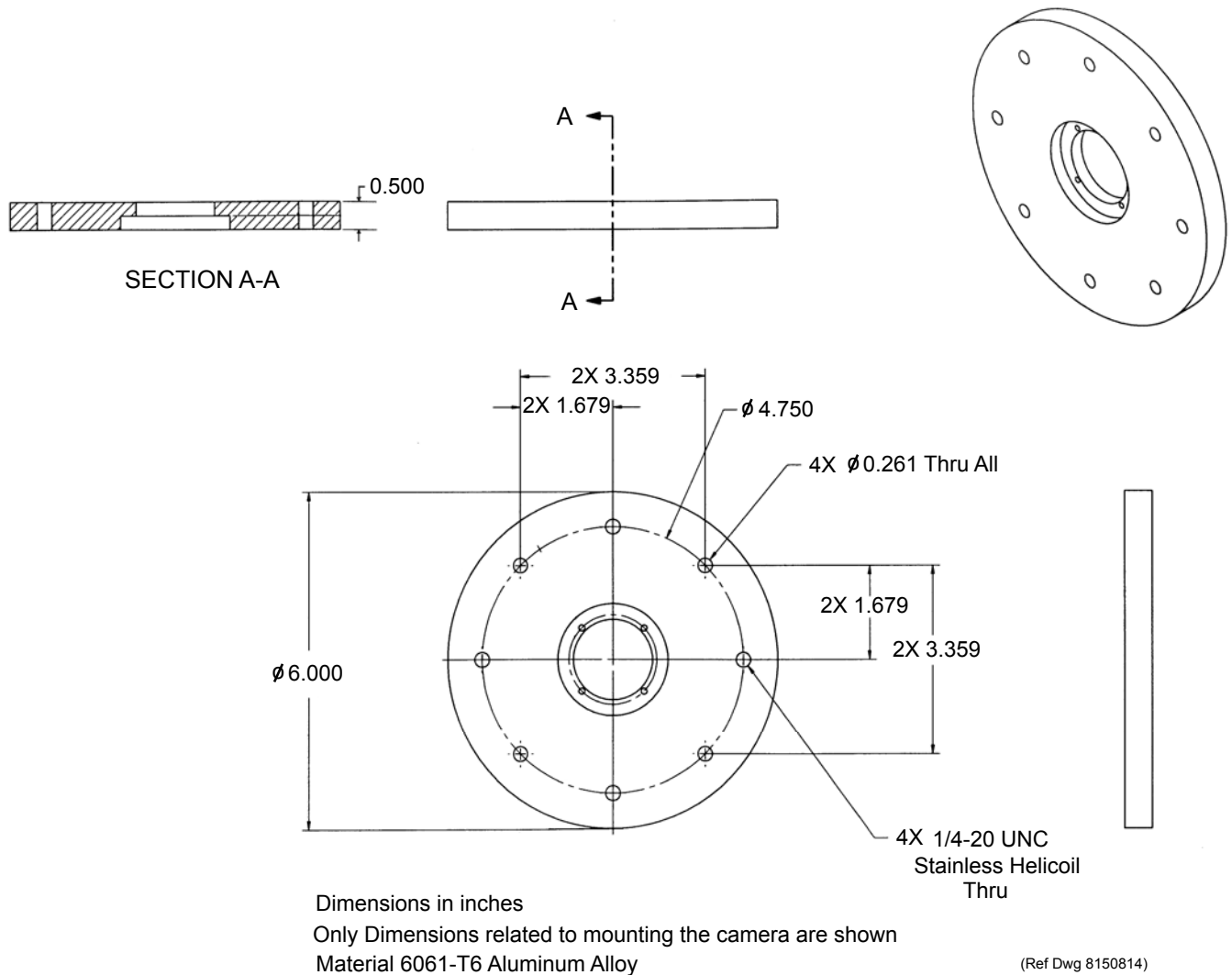


Figure 16. Dimensions, 6960 Standard Base (Permanent Part of 6960)

Heater-off operation requires 54 watts.

See tables 5 through 10 for pinouts of the various power options.

2.8 Mounting Requirements

The dimensions shown in figure 8 and its base plate (figure 16) relate to mounting the 6960. The 6960 can be mounted in any of six different configurations depending on the accessories supplied:

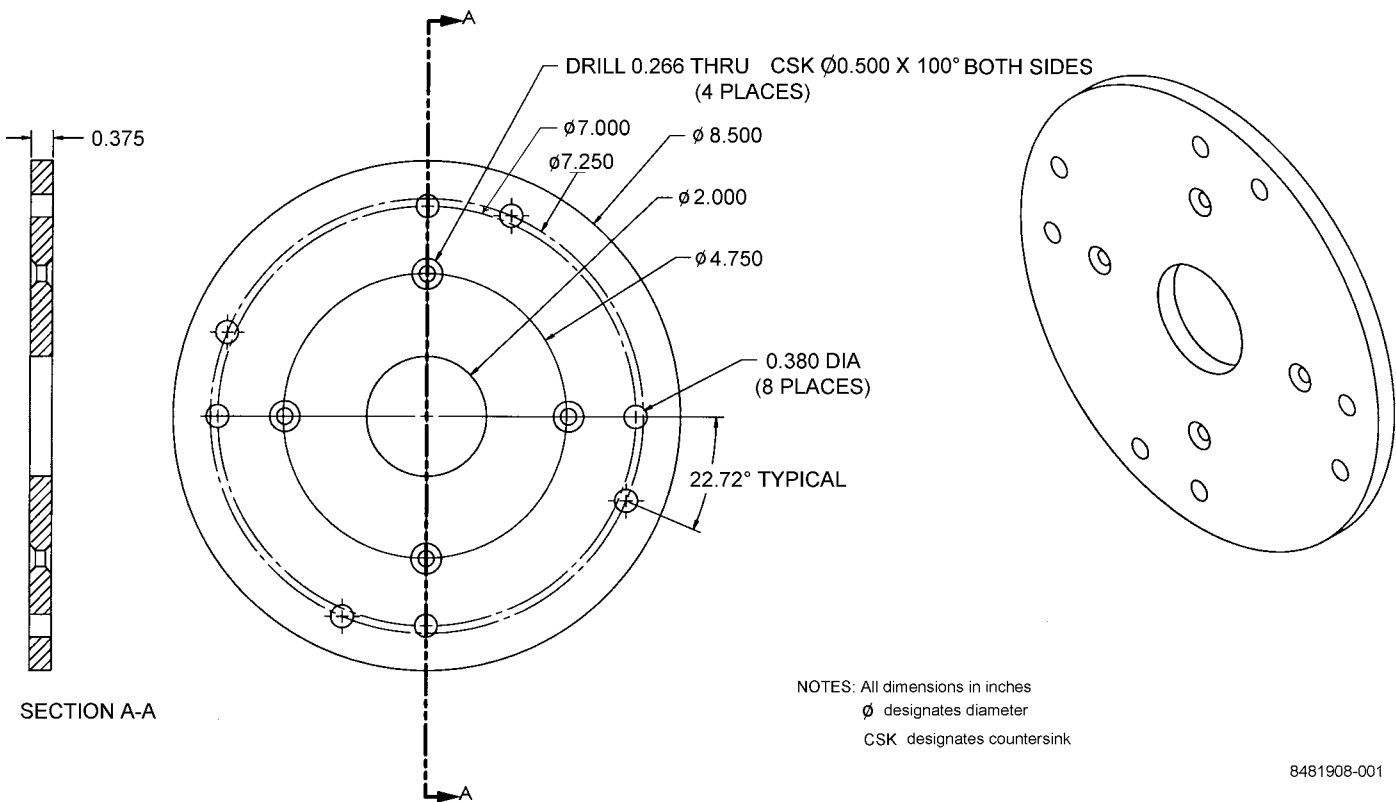
1. Direct mounting to the base plate on the 6960. See section 4.1 for details about this standard mounting base.

2. Mounting to a second, larger circular mounting base (figure 17) which then mounts to a suitable surface. See section 4.2 for mounting with this option.

3. Wall Mount Arm (for direct mounting to a suitable wall surface or for mounting to items 4, 5, or 6 below)

4. Pole Mount. Clamps to a pole using stainless steel straps. The wall mount arm then attaches to this pole mount.

5. Corner Mount. Bolts to the corner of a building or other structure. The wall mount arm then attaches to this corner mount.



Fastens to Standard Base Above

**Four 1/4-20 x 3/4 Flathead Screws Included
Cohu P.N. 0310210-093**

Figure 17. Dimensions, Optional Large Base (attaches to standard base shown in figure 18)

6. Parapet Mount. Bolts to the inside of a parapet on a roof of a building or other structure. The wall mount arm then attaches to the parapet.

All mounting hardware should be of high quality stainless steel — preferably of grade 316. This will ensure high strength fasteners resistant to corrosion.

Two mounting hole patterns are discussed in this section. Both are four holes 90 degrees apart — but offset from each other by 45 degrees. One pattern is 1/4-20 UNC threaded while the other pattern is unthreaded and intended for through bolting to securing lock washers and nuts. See figure 16.

Mechanically indexing to a home position should not be required since the 6960 will return to the last position at shut down when turned on again.

Refer to section 4 at the back of this manual for additional details concerning these various methods

of mounting a 6960 to a pole, building, or other type of structure.

The following paragraphs describe some of the features of the 6960 related to the installation process.

2.9 Installation Procedure

It is important to carefully plan for all cable routing before starting an installation. In some situations cable will have to be pulled through conduit or other narrow places before adding a connector to the end of a system cable. Any through-wall holes may require weatherproofing.

Installing the 6960 is straightforward. It is only necessary to mount the 6960 to a suitable base, mate the cable connector to the system cable and apply power. This assumes the other end of the

cable is properly connected to a source of power, a tv monitor, a graphical user interface (GUI), and any other required equipment. Figure 13 shows a basic setup of the 6960 in a test setup as would be used in a test facility. This diagram should give some idea of a typical installation. Each installation site, though, will have its own unique requirements.

2.9.1 Camera Module Rear Panel Features

Only two features appear on the rear panel (figure 14) of the camera module of a 6960. One is a Schrader valve for applying dry nitrogen to the interior of the Camera assembly housing and the other is a 20 psig (138 kPa) pressure relief valve.

2.9.1.1 Schrader Valve

A Schrader valve is functionally identical to those used for car tires. But this valve should be used only to introduce dry nitrogen to a camera. During assembly cameras are purged of normal room air (which typically has a high relative humidity) by flowing dry nitrogen into the Schrader valve and out the pressure relief valve. This relief valve should be held open to aid in the flow of nitrogen out of the camera.

This purging process removes moist room air from inside the camera and provides an internal relative humidity of five percent or less. A camera is typically pressurized to 5 psig (34 kPa). Pressure can be allowed to go below this — even down to one or two pounds so long as the pressure does not ever become zero. An occasional recharge of dry nitrogen can be used to maintain pressure near 5 psig (34 kPa). If pressure continually drops it is an indication of a slow leak. These pressure references are gauge pressures (psig). They are relative to the altitude above sea level at which they are being measured.

2.9.1.2 Pressure Relief Valve

The pressure relief valve opens at about 20 psig (138 kPa). This relief pressure allows the 6960 to be taken to high altitude during transportation without excess bleed off of dry nitrogen from the camera housing. If the camera module should lose some dry nitrogen during high altitude transportation (as indicated by a pressure reading below

about 5 psig) then some additional dry nitrogen may be added to replenish the lost nitrogen.

This valve should be manually lifted off its seat or pushed slightly to the side when it is desired to flow dry nitrogen through the camera to purge moisture laden atmospheric air from the camera module.

Regularly applying pressure above 5 to 8 psig (34 to 55 kPa) may cause seals to weaken and leak.

2.9.2 18-pin Base Connector

This connector is permanently attached to the bottom of the 6960. Different pin arrangements are used to apply the power to 24, 115, and 230 V ac power. The camera model number identifies which of these three power options the 6960 is configured for.

Figure 11 is the pin location diagram of this connector. It is a view from the mating side of the connector. This view is identical to the wiring view of a mating connector (supplied) for the system cable that plugs into this 6960 connector.

The connector supplied for the system cable should not be installed until it is verified that the cable can be pulled through any conduit or other restricted passage on its way to the mounting location of the 6960.

Note that the pin location diagram for the **wiring** side of the mating system cable connector is identical to the pin location diagram of the **mating** surfaces of the system cable connector pins.

2.10 Connector Sealing

Even though the connector used with this camera is designed to maintain a weather tight seal with its mating system cable plug, it is recommended that for additional protection against moisture in severe conditions a sealing wrap be used on the connectors.

Coax Seal is the recommended product:

www.coaxseal.com

sales@coaxseal.com

United States: 1-800-241-8171

or international: 1-828-293-2222

This product is available from a variety of commercial supply houses, consumer stores, and in the U.S. Government supply channels as GSA Schedule GS-07F-5739R

This product is a plastic tape-like material separated by a paper divider in its roll to prevent bonding to itself before use. After this material is wrapped around a connector, it forms a permanent weather-tight seal.

The cable and connectors should be clean and dry before wrapping with Coax-Seal.

Use a full wrap of this tape on the cable at the beginning. Then continue with a diagonal half overlap wrap up to the Camera housing. Then add a full wrap at the end of the coverage.

Squeeze together the wrapping so that it forms a tight bond both to itself and the mating connectors.

The web site for Coax-Seal has complete information about this product.

2.11 Preparation for Shipment and Storage

Maintain the 6960 storage environment within a range of -40 to 85 °C (-40 to 185 °F) .

Right and left side heads may have a more limited range of temperature extremes.

For shipment, package with enough foam padding or other packing material to prevent damage that can occur during shipping. The original shipping carton is a good container if it has not been damaged or subjected to excessive moisture.

Please contact the Customer Service Department for a Return Authorization (RA) number before sending any shipments to the factory:

Prominently display the RA number on the outside of the shipping container(s) and on paperwork contained inside. Give a brief description of why the equipment is being returned and list the symptoms of any problems being experienced with the equipment.

3.0 OPERATION

Several GUI interfaces are available for use with the 6960:

1. Win MPC is used to control a single 6960 during installation or maintenance operations. This can be done either at a central shop facility or at the site location of the 6960.
2. CAMS is used to control multiple 6960 systems when an MPC Master Control Panel is being used as the central control point.
3. NET Cams is used to control systems with multiple 6960 when the central control is a Net Cams Server.

This section of the manual describes use of the WinMPC maintenance and setup GUI software.

3.1 Local Panel Control

If the 6960 has been connected through a nearby Model 9300 Local Control Panel back to the central control facility, it is possible to connect a tv monitor to the Panel and control basic functions of the 6960. A laptop PC running Windows would connect to the RS-232 BNC connector on the front of the panel for communications with the 6960. The LOCAL/REMOTE switch on the 9300 must be set to LOCAL to perform this local control.

The model 9300 local control panel can be programmed for a site address. That address is used for the site address — not the address of the 6960.

The system cable plugs into the 9300 and a second cable then interconnects between the 9300 and the 6960. The 9300 becomes the site address.

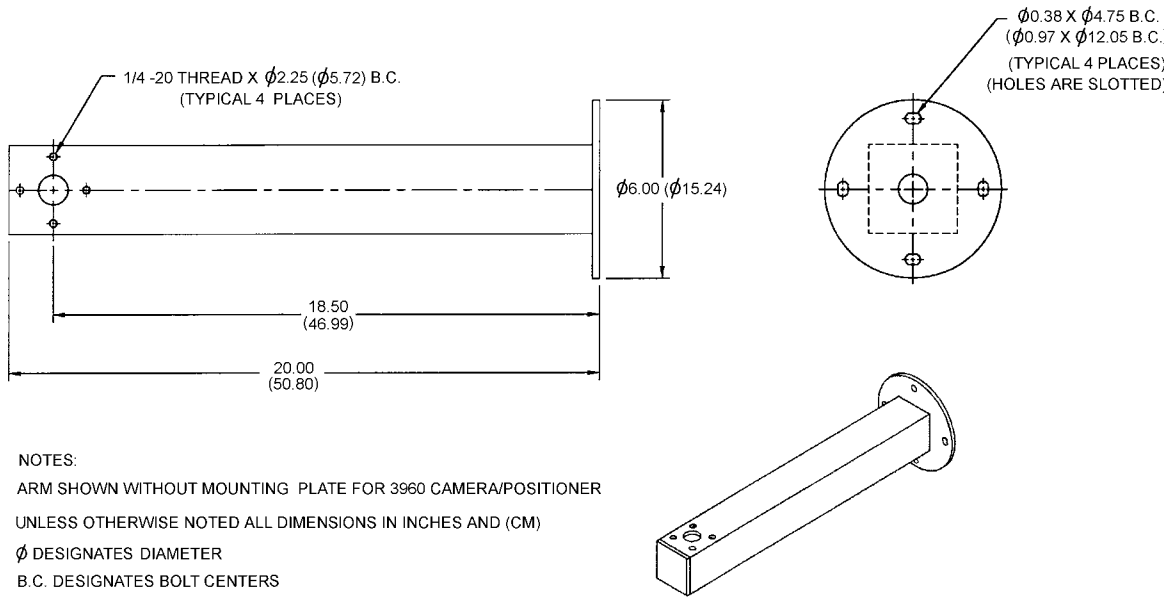


Figure 18. Dimensions, Wall Mount Arm

3.2 Local Laptop PC Control

A local laptop PC running Win MPC software can be used to connect to the 6960 and control a full range of functions including the setting of its address. This laptop can either connect through an RS-232 connector on the front of an optional Local Control Panel or it can connect directly to the 6960 RS-422 cable — in which case the RS-232 to RS-422 converter is required.

3.3 Checkout Procedure

After communications has been established with the 6960 various functions should be tested to verify proper operation. Use the Win MPC interface to perform tests and setups.

Check all the Momentary functions: zoom, focus, iris, color, and integration. Latch commands also should be tested: 6960 power, lens fast, manual iris, and color balance. Several presets should be set and then re-established to verify their operation.

After presets are established, the tour function should be tested for proper operation. Once it has

been verified that the 6960 is operating properly it can be released for use.

4.0 MOUNTING METHODS

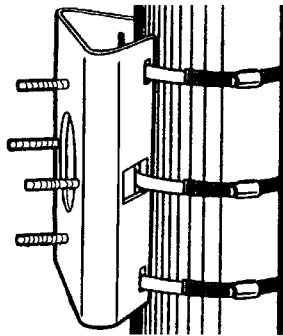
Since installation of a 6960 may require that it be mounted to any of a variety of structures, different types of mounting assemblies are required. This section is a generic description of typical installations for each of the mounting assemblies that can be optioned with the 6960. Each mounting site will likely have its own unique requirements.

A 6960 can be ordered with any one of six mounting arrangements. Two of these are related to base plates for the 6960 and the remaining four are actual mounting arms and brackets for an installation.

Before preparing to mount a 6960 it is important to have either pre-installed the system cable or to have verified that the cable can be routed to the location of the mounting assembly. This often requires pulling cable through conduit and other tight places. It is also necessary to plan for weather-proofing any through-wall holes

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NOTE:
Requires a strap tensioner tool
to secure straps to pole.
(Type 7411411-001)

- Supplied with:
- 3 - Stainless steel straps
 - 4 - Stainless steel nuts
 - 4 - Stainless steel flat washers
 - 4 - Stainless steel lock washers

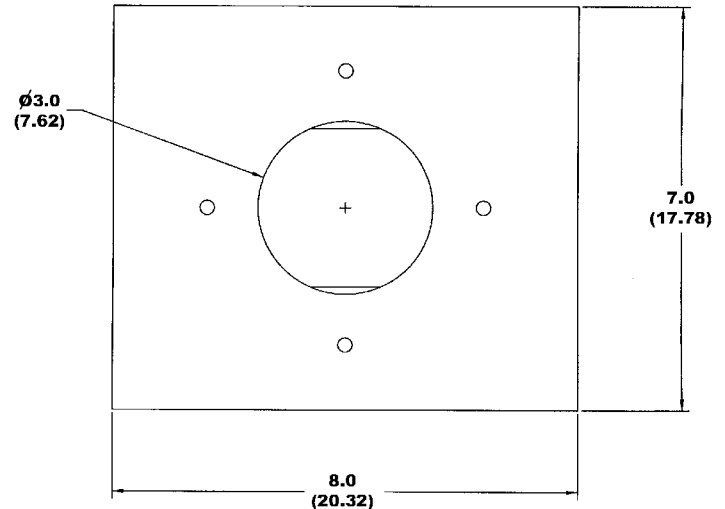
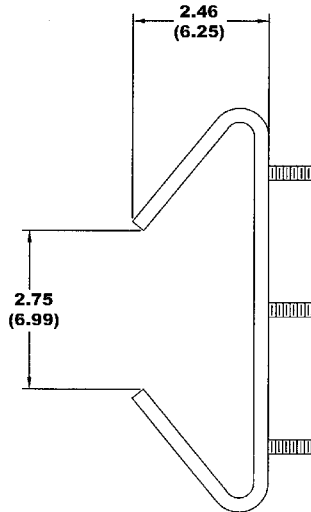
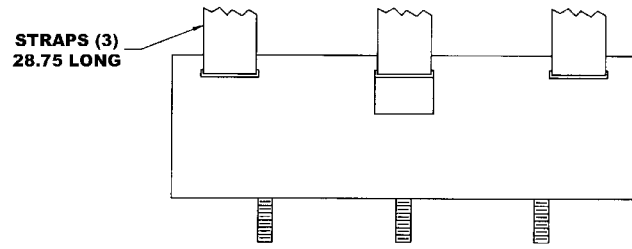


Figure 19. Dimensions, Pole Mount

Cable pulls through conduit sometimes require that no connector be installed. Thus, these procedures assume that the system cable connector will not be attached to the cable until the pull is all the way to the mounting location of the 6960. However, this connector can be installed on the system cable anytime it is known that the cable can be routed to the 6960 mounting location with the connector installed.

4.1 PEDESTAL MOUNT INSTALLATION - SMALL BASE PLATE

This is the simplest configuration. Only the 6960 is supplied. It bolts directly onto the top of a site-supplied pedestal having the correct hole pattern or to an adapter plate providing the proper hole pattern.

Figure 16 is a dimensional diagram of the hole pattern on this plate. This base is a 6-inch diameter 0.5-inch thick plate permanently mounted to the 6960.

It provides four 1/4-20 threaded bolt holes spaced 90° apart on a 4.75-inch diameter hole pattern. A second four-hole pattern is 45 degrees offset from the first pattern. These holes are not threaded.

The 1/4-20 fasteners threaded into these holes must not jam against the base of the pan and tilt unit above.

The 6960 can be directly mounted to the wall mount arm (section 4.3 below) or to any other base that matches the 4.75-inch diameter hole pattern on the 6960 Base.

5. Refer to section 3 to set up and check out the 6960.

4.2 LARGE BASE PLATE INSTALLATION

This plate is not required for any of the Cohu supplied mounting arms and brackets covered in this manual. It is an optional 8.5 inch diameter base plate that attaches to the 6960 base plate to provide additional mounting hole options.

Figure 17 is the dimensional diagram of this optional base.

It attaches to four threaded holes on the 6960 standard base with flat-head 1/4-20 x 3/4 mounting screws. Use of flathead screws maintains the entire surface of the adapter plate flat for placing on an existing on-site support base

These attachment holes are on the 4.750 diameter pattern. They are countersunk on both sides so that this plate can be mounted from either side. This provides an offset choice in azimuth when mounting the 6960 to a support platform.

If site-supplied flathead screws are used they must not protrude through the standard base plate by more than an inch or so. Extremely long screws could jam into the 6960 housing.

This optional base has two four-hole patterns for mounting to a pedestal or other type mount. One pattern is on a 7-inch diameter and the other on a 7.25-inch diameter pattern. Holes on each pattern are spaced 90° from each other. These patterns are offset from each other by 22.72°.

All support mounting holes are 0.380 diameter. They are intended for 3/8-inch hardware. Use high quality fasteners made from grade 316 stainless steel when fastening this plate to a support base.

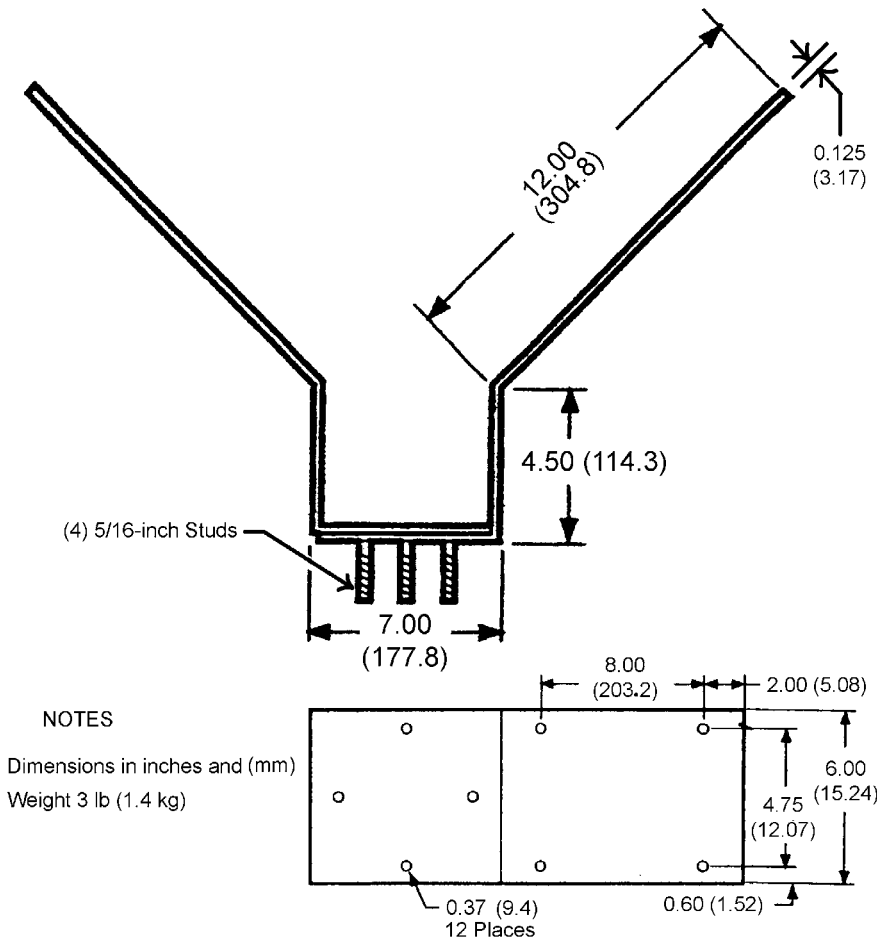
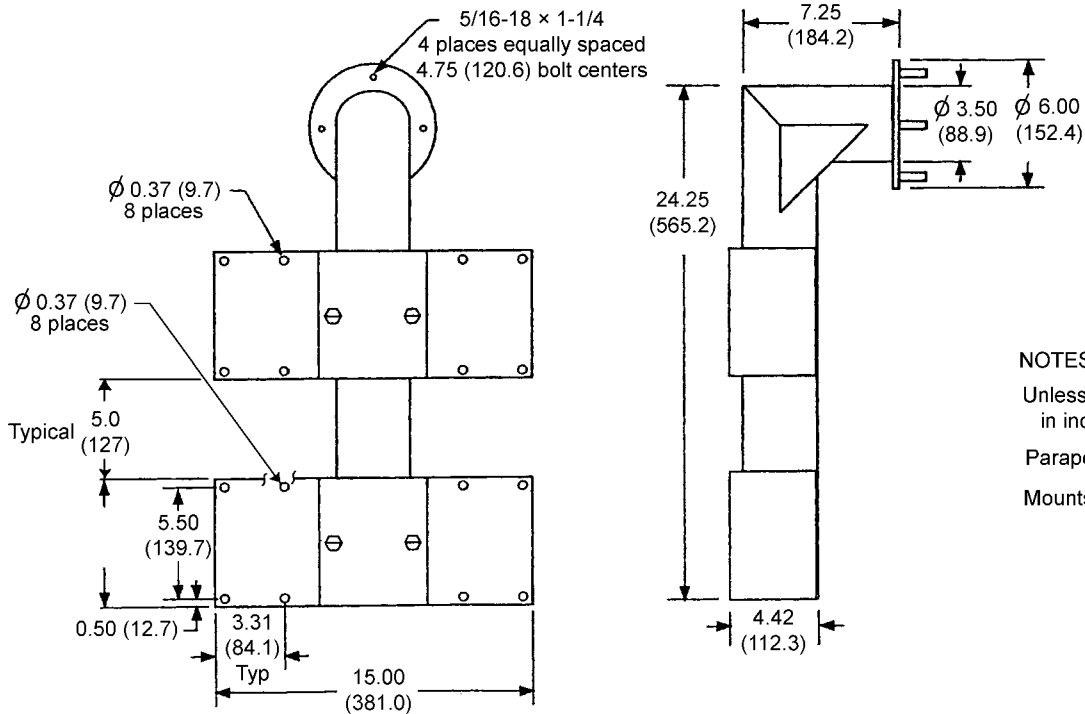


Figure 20. Dimensions, Corner Mount

Proceed as follows to install the 6960 on a pedestal:

1. Verify that the system cable is accessible for connection to the 6960 connector at the mounting location. If there is a long cable run in the pedestal, this cable should be secured by a strain relief and not allowed to hang free within the pedestal
2. Connect the system cable to the connector on the base of the 6960. 3. Bolt the 6960 to the pedestal using stainless steel hardware.
4. Verify that the 6960 will have a full range of movement without striking any nearby structure.



NOTES

- Unless otherwise noted all dimensions in inches and (mm)
- Parapet mounting plates symmetrical
- Mounts to inside of parapet

Figure 21. Dimensions, Parapet Mount

4.3 WALL MOUNT INSTALLATION

Figure 4 shows the wall mount arm. For a wall-mount installation, the support arm bolts directly to a wall. An adapter plate on the end of the arm matches the hole pattern of a 6960 base. The 6960 is placed on the arm and is then bolted to it. This arm is also used with the remaining three mounting methods (pole, corner, and parapet).

Figure 18 shows dimensions of the basic wall mount arm. The 0.38-inch diameter holes (slotted) are suitable for use with 5/16-inch mounting hardware. All mounting hardware should be of high quality and made from grade 316 stainless steel.

This diagram does not show the adapter plate on the end of the arm to which the 6960 fastens.

This adapter plate has four 1/4-20 threaded holes on a 4.75-inch diameter hole pattern to match the baseplate of the 6960.

The basic installation procedure is:

1. Verify that the system cable is accessible for connection to the 6960 connector at the mounting location.
2. Install a weather tight gasket between the arm and the surface of the wall (if this is required) being sure the system cable has been routed through it.
3. Attach the adapter plate to the wall mount arm (if not already attached).
4. Route the system cable through the arm and out the center of the mounting plate. Note that plastic plugs protecting the connector can be removed to aid in this process.
5. Mount the arm to the wall.
6. Install a connector to the end of the system cable (if not already installed).
7. Position the 6960 base near the arm adapter plate

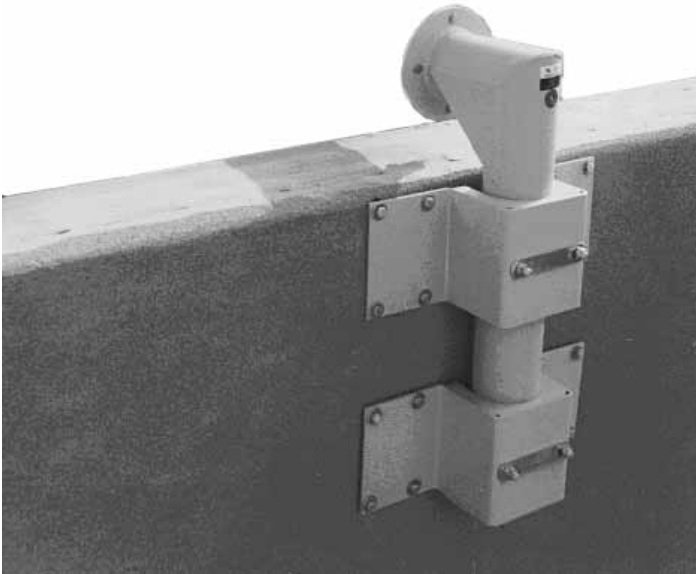


Figure 22. Installed Parapet Mount

and fasten the system cable connector to the connector on the base of the 6960.

8. Pull or push the system cable back into place so that the 6960 can be set in place on the arm mounting plate.
9. Install stainless steel bolts, lockwashers, and nuts to secure the 6960 to the arm plate.
10. Verify that the 6960 will have a full range of movement without striking any nearby structures.
11. Refer to section 3 to set up and check out the 6960.

4.4 POLE MOUNT INSTALLATION

Figure 5 shows the pole mount bracket. Figure 19 is the dimensional drawing. This mounting arrangement provides a pole mount bracket to which the wall mount arm attaches. The bracket attaches to the pole using stainless steel straps.

Provisions must be made for routing the system cable up to the 6960 location on the pole. Cables often route up through the pole and exit at an access port near where the pole mount bracket will attach. Provisions may have to be made to sup-

port the cable inside the pole so that the full cable weight is not supported solely at the top.

A pole mount installation is similar to the wall mount installation except that the arm fastens to a pole mount bracket instead of directly to a wall.

1. Verify that the system cable has been properly routed to a location where the pole-mount bracket will be attached to the pole. There must be an access port on the pole for the cable to extend through at this location. Plan this routing before doing any installation.
2. Fasten the cable to strain reliefs inside the pole if there is a long cable run down the pole. This cable should not be allowed to hang free within the pole for long lengths
3. Fasten the pole-mount bracket to the pole using stainless steel hardware – being sure that the system cable is routed so that it is available for the wall-mount arm.
4. Route the system cable through the arm and up through the center of the mounting plate. Note that plastic plugs protecting the connector (if it has been installed) can be removed to aid in this process.
5. Mount the arm to the pole mount bracket.
6. Install a connector to the end of the system cable (if not already installed).
7. Position the 6960 base near the arm adapter plate and fasten the system cable connector to the connector on the base of the 6960.
8. Push the system cable back into place so that the 6960 can be set in place on the arm mounting plate.
9. Install stainless steel bolts, lockwashers, and nuts to secure the 6960 to the arm plate.
10. Verify that the 6960 will have a full range of movement without striking any nearby structures.
11. Refer to section 3 to set up and check out the 6960.

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4.5 CORNER MOUNT INSTALLATION

Figure 6 shows the corner mount bracket.. A corner mount attaches to the corner of a building or other structure to provide viewing on two sides of the structure. The wall mount arm attached directly to the corner mount. Figure 20 shows dimensions of the corner mount assembly.

A corner mount installation is similar to the wall mount installation except that the arm fastens to an corner mount bracket instead of directly to a wall.

1. Verify that the system cable has been properly routed to a location where the corner-mount bracket will be attached. Plan the routing before doing any installation.
2. Fasten the corner mount bracket to the structure – being sure that the system cable is routed so that it is available for the wall-mount arm.
3. Attach the adapter plate to the wall mount arm (if not already attached).
4. Route the system cable into the arm and out the hole in the center of the arm adapter plate. Note that plastic plugs can be removed to aid in this process if the connector is already attached to the system cable.
5. Attach the connector to the system cable (if not already installed).
6. Pull the system cable back so the arm can be slid over the corner mount threaded studs..
7. Install stainless steel lock washers and nuts to secure the arm to the bracket..
8. Connect the system cable connector to the connector on the base of the 6960.
9. Install stainless steel bolts, lock washers and nuts to secure the 6960 to the arm adapter plate.
10. Verify that the 6960 will have a full range of movement without striking any nearby structures.
11. Refer to section 3 to set up and check out the 6960.

4.6 PARAPET MOUNT INSTALLATION

Figure 7 shows the parapet mount. A parapet is the wall that rises above the flat roof of a typical commercial building. This mount typically attaches inside this raised wall and the vertical mounting surface faces out toward the surrounding area. The wall mount arm bolts directly to the parapet mount.

Figure 22 shows a parapet mount installed on the roof of a building. Dimensions are shown in figure 21.

1. Verify that the system cable has been properly routed to a location where the parapet-mount bracket will be attached. Plan the routing before doing any installation.
2. Fasten the parapet mount bracket to the structure – being sure that the system cable is routed so that it is available for the wall-mount arm.
3. Attach the adapter plate to the wall mount arm (if not already attached).
4. Route the system cable into the arm and up through the center of the adapter plate. Note that plastic plugs can be removed to aid in this process if the connector has already been installed..
5. Attach the connector to the system cable (if not already installed).
6. Pull the system cable back so the arm can be slid over the parapet mount threaded studs.
7. Install stainless steel lock washers and nuts to secure the arm to the bracket.
8. Connect the system cable connector to the connector on the base of the 6960.
9. Position the 6960 on the arm adapter plate and secure it with the hardware.
10. Verify that the 6960 will have a full range of movement without striking any nearby structures.
11. Refer to section 3 to set up and check out the 6960.

Use these guidelines to maintain and recharge the 6940 and 6950 series camera heads if needed.

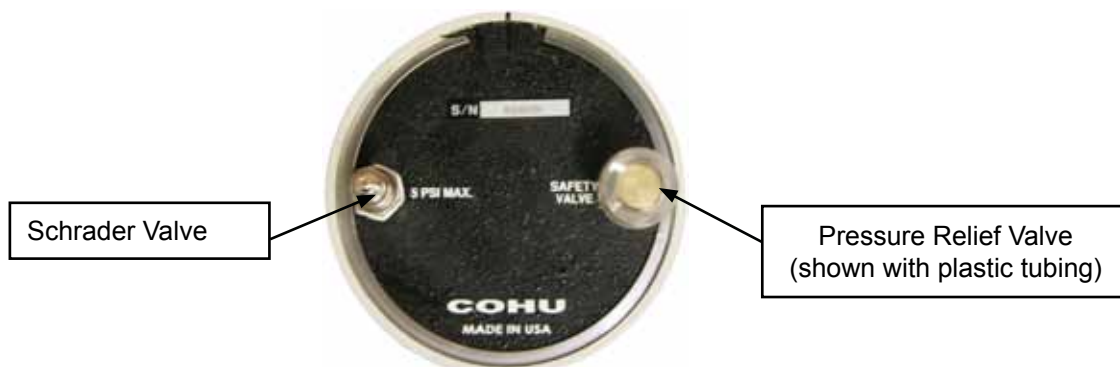
5.0 Maintenance

The system is intended for long-term unattended use and the maintenance requirements are minimal:

- clean exterior as needed when the Camera is operated in a harsh environment
- clean the front window on the Camera head as needed
- check pressure periodically. Occasional pressurization of the Camera may be required. See section 5.1 for more details. Pressure can be checked remotely with CoHU protocol by enabling the on screen maintenance mode using WinMPC.
- check cables for deterioration and connectors for corrosion periodically

5.1 Camera Head Housing Pressurization

Before shipping from the factory dry packs of desiccant are secured inside the Camera housing. The housing is then sealed and purged with dry nitrogen to remove moist air from inside the housing. The purging process provides an internal relative humidity of five percent or less. The Camera housing is then pressurized to approximately 5-7 psi (pound per square inch) and tested for leaks.



**Figure 23. Rear Plate
(shown for 6940 series model)**

If the Camera head housing pressure drops to zero over a period of a few weeks, it is likely that a seal is leaking and the Camera should be returned for servicing.

NOTE: It is not recommended to pressurize the Camera head to greater than approximately 5 psi. However, during operation of the Camera in the field the acceptable range of pressure inside the Camera head housing is 0.5-10 psi due to temperature rise, elevation, etc.

5.1.1 Schrader Valve

A Schrader valve is used to pressurize the housing with dry nitrogen.

5.1.2 Pressure Relief Valve

The 20 psi pressure relief valve is used to limit the maximum pressure inside the camera head.

IMPORTANT: Due to high temperature, high altitude, or etc the pressure inside the camera may increase. The pressure relief valve opens when pressure rises above 20 psi (138 kPa), allowing excess internal pressure to bleed off. After the Camera returns to normal conditions, the internal pressure should be checked and the camera should be pressurized with dry nitrogen to bring the pressure back to approximately 5 psi +/- 1 psi. See section 5.1.3 for pressurization procedure.

5.1.3 Pressurizing Procedure

The following items are required for pressurizing:

- a tank of dry nitrogen with a regulator
- a hose with an air chuck to connect to the Schrader valve

NOTE: Preferred gas for pressurization is dry nitrogen. Argon is an acceptable substitute. Do not use compressed air. It may contain oil and other contaminants.

Below are steps for recharging the Camera:

1. Set the regulator gauge to approximately 7-10 psi. (A regulator kit ER2914 is available for purchase.)
2. Remove the plastic tubing from the pressure relief valve if purge is required.
3. Remove the cap from the Schrader valve, place the air chuck on the Schrader valve and fill the housing with nitrogen.
4. Carefully lift the poppet on the pressure relief valve and purge the camera with dry nitrogen for a minimum of one minute by manually lifting the relief valve on the rear plate while injecting the dry nitrogen into the Schrader valve.

CAUTION:

Do not use a sharp object to open the pressure relief valve.
Use care to avoid damage or contamination of the valve seat.

5. Remove the air chuck and verify with a pressure gauge that the pressure is 5 psi +/- 1 psi. Press the pin in the center of the Schrader valve to release extra pressure from the barrel if needed.
6. Firmly install the cap on the Schrader valve to get a good seat. Cap is required for a proper seal.
7. Install the tubing back on the pressure relief valve if it was removed.

5.2 Wiper Unit

The 6940 series is available with a wiper blade option to keep the Camera head window clear in inclement weather. The wiper design allows for easy replacement of the wiper blade or wiper arm.

5.2.1 Wiper Blade Replacement, Cohu p/n 8157-9

To replace a worn or deteriorated wiper blade, use table with Cohu part numbers for a replacement:

Table 12. Wiper Blade Replacement Kit. Cohu p/n 8157-9

No	Description	Cohu p/n	Characteristics
1	Wiper Blade Replacement Kit Kit consists of:	8157-9	2-56 hardware is used to attach a wiper blade to the wiper arm
	• Wiper Blade Assembly (1)	8139078-001	
	• Screw, Socket Head, Nylon Lock Patch, SS 2-56 x 1/2"L (1)	0310232-004	
	• Lock Nut, Hex, Nonmetallic Insert, 2-56 THD (1)	0310003-007	

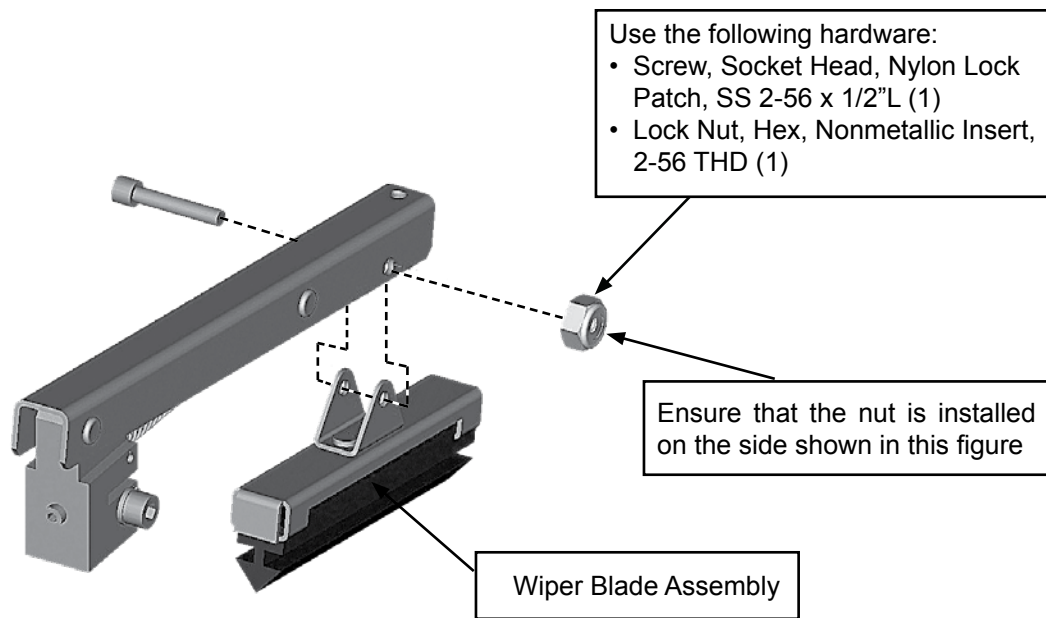


Figure 24. Wiper Blade Replacement

Suggested hex wrench tool:

- 5/64 - inch

Below are steps for replacing the wiper blade:

- switch off the power
- note the free play of the wiper blade on the arm
- replace the blade using 2-56 hardware (see figure 24)

NOTE: Ensure that the nut is installed on the side shown in figure 24.

CAUTION: Be careful not to scratch the glass.

- verify that the new wiper blade assembly has free movement on the arm. If not, loosen the screw and check again for free movement
- position the arm with the blade to the right edge of the Camera window (see figure 25)
- check to ensure that the wiper arm works properly. When the power is on, the wiper blade must go all the way across the window face.



Figure 25.
Wiper Blade Replacement

5.2.2 Wiper Arm Replacement. Cohu p/n 8208-3

To replace a wiper arm, use table 13 with Cohu part numbers:

Table 13. Wiper Arm Assembly. Cohu p/n 8208-3

No	Description	Cohu p/n	Characteristics
1	<p>Wiper Arm Assembly</p> <p>The following hardware is a part of the wiper arm assembly:</p> <ul style="list-style-type: none"> • Screw, Socket Head, Nylon Lock Patch, SS 4-40 x 3/8"L • Washer, Spring Lock, SS, #4 • Set Screw, Headless, SS, 4-40 x 1/8"L 	<p>8208-3</p> <p>0310232-010</p> <p>2010732-004</p> <p>2010345-020</p>	<p>Hardware attaches wiper arm to the wiper shaft on the wiper unit</p>

Suggested hex wrench tools:

- 0.050 - inch and
- 3/32 - inch

Below are steps for replacing the wiper arm:

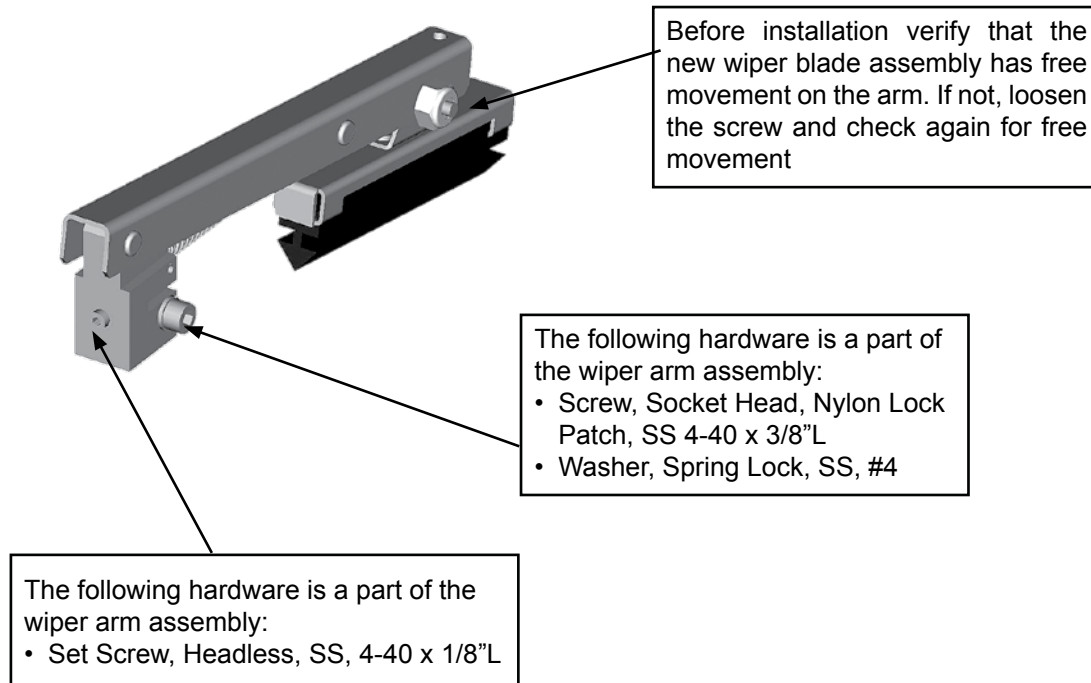


Figure 26. Wiper Arm Replacement

NOTE: Before installation verify that the new wiper blade assembly has free movement on the arm. If not, loosen the screw and check again for free movement

- switch off the power
- loosen socket screw and set screw on the old arm
- loosen socket screw and set screw on the new arm
- replace the arm
- tighten both screws on the new arm
- position the arm to the right edge of the Camera window (see figure 25)
- check to ensure that the wiper arm works properly. When the power is on, the wiper blade must go all the way across the window face.

5.3 Positioner

Beyond an occasional exterior cleaning, the positioner should not require any periodic maintenance.

LIST OF APPENDICES

- Appendix A. 6940 Series 35X Camera Heads
- Appendix B. 6950 Series Thermal Camera Heads
- Appendix C. 6990 IR Illuminator

Appendix A. 35X CAMERA HEAD

The 35X camera head has an optical zoom range from 3.4 to 119 mm using selectable auto or manual focus. The camera utilizes digital signal processing (DSP) to maximize its capabilities.

Automatic switching between day and night modes offers daytime color scenes at normal sensitivity but with monochrome for maximum sensitivity at night.

Image stabilization corrects for shaking and vibration. Two modes, 5 and 16 Hz, offers a wide range of stabilization to correct for a wide variety of wind and mounting conditions.

For more information on specifications and datasheets, please refer to the Cohu website.

Table A1. 6940 Series 35x Camera Specifications

Imager	1/4-inch color interline transfer CCD. NTSC or PAL depending on model
Resolution	520 horizontal tv lines
Pixels	768 x 494
Progressive Scan	Yes
Lens Zoom	3.4 to 119 mm, f/1.4 wideangle or f/4.2 telephoto
Lens Horizontal Angle of View	55.8 ° wideangle or 1.7 ° telephoto
Iris/Focus/Shutter Operation	Auto/manual
Wide Dynamic Range	On/off
EIS 5 Hz Suppression	20 dB suppression from 3 to 13 Hz
EIS 16 Hz Suppression	20 dB suppression from 7 to 17 Hz
Digital Zoom	12 x auto/manual (not supported in EIS mode)
White Balance	Auto/manual
Sync	Crystal
Signal to Noise Ratio	>50 dB
Sensitivity	1 lux at 1/60 second (color day) 0.1 lux at 1/4 second (color day) 0.01 lux at 1/4 second (monochrome night)
Environmental	IP-67 and NEMX 4X; camera housing sealed and pressurized with dry nitrogen
<i>- end table -</i>	

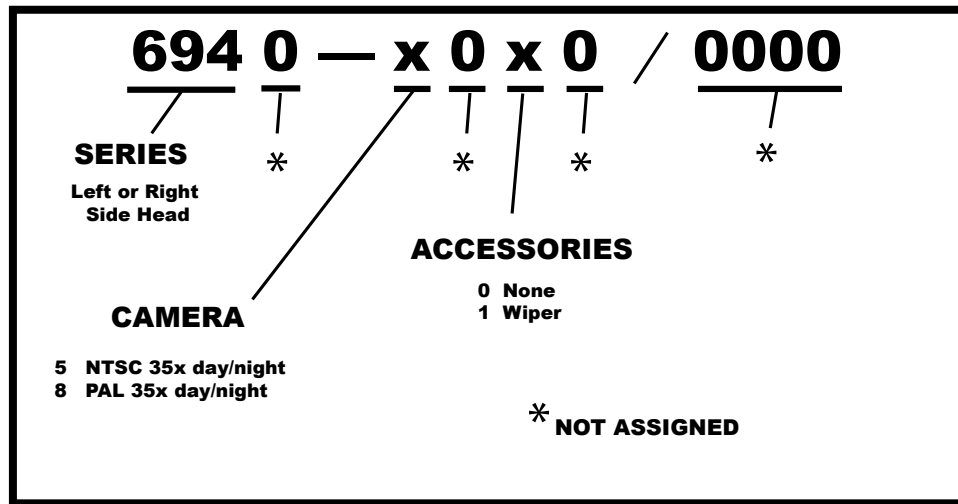


Figure A1. Model Number Interpretation Diagram — 6940 Series 35x Cameras

**Appendix B.
6950 THERMAL CAMERA HEAD**

The thermal surveillance camera head uses a high performance microbolometer for precision imaging. It is available in two detector resolutions and with either NTSC or PAL output.

This military grade thermal imager delivers high quality video even in extreme conditions such as total darkness, smoke, atmospheric haze or dust, rain, light foliage, and most types of fog. Either 640 x 480 or 320 x 240 focal plane arrays (FPA) are available. To provide high thermal sensitivity five different color pallets are available within the camera.

An aSi (amorphous silicon) microbolometer image sensor provides 8-14 μm spectral range. This range is best for short to medium distances and for wide angle of view. It is ideal for distances less than 5 km. Five lenses are available ranging from 13 to 150 mm.

The thermal imager uses a remote focusing technique that moves the focal plane array. This allows the use of fixed focus lenses rather than expensive motorized lens assemblies. This allows a simplified design with a sealed lens assembly.

For information on specifications and datasheets, please refer to the Cohu website.

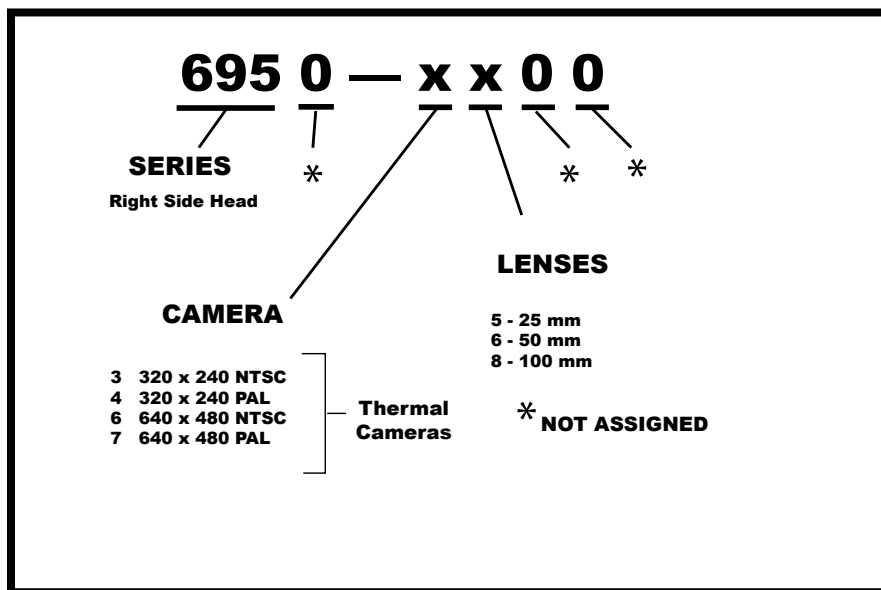


Figure B1. Model Number Interpretation Diagram — Thermal Camera

Table B1. Thermal Camera Head Specifications

Thermal Detector	
Detector Type	Uncooled micro-bolometer
Array Format Options	NTSC or PAL: Either 640 x 480 or 320 x 240
Pixel Size / Fill Factor	320 x 240: 35 x 35 μm / 80% 640 x 480: 25 x 25 μm / 70%
Spectral Range	8 - 14 μm
Dynamic Range	>1000:1, typical
Operability	>99.9%
FPA Operating Temperature	30 °C
NEdT (camera level)	<60mK (with f/1.0 optics)
Video Format Options	NTSC or PAL, model dependent
FPA Frame Rate	60 frames per second NTSC 50 frames per second PAL
Video A/D Resolution	14 bits
Calibration Flag	Ambient and elevated temperature, automatic / periodic one-point refresh
Lens Coating	Hard carbon coated germanium (all len options)
Thermal Control Functions	
Focus	Near / Far under manual control
One-point Refresh Calibration	User selectable manual or automatic modes Auto mode adjustable from 1 to 60 minutes Image refresh period <2 seconds image freeze Control refresh period: 320 x 240 detector <2 seconds 640 x 480 detector <20 seconds
Color Pallet	Five palette selections
Digital Zoom	320 x 240 detector: off / 2x 640 x 480 detector: off / 2x / 4x
Image Freeze	On / off
Image Polarity	Normal / inverted
Color Bar	On/off
Environmental	
Protection Rating	IP67/NEMA-4X: Thermal camera housing sealed and pressurized to 5 psi with dry nitrogen
Humidity	Up to 100 percent relative humidity

**Appendix C.
6990 IR Illuminator**

An IR illuminator can be selected to match the camera on the opposing side. This design allows evenly distributed illumination with viewing distances over 200 meters (660 feet). Another advantage is the low power consumption and long life.

The Cohu camera/illuminator interface utilizes the ambient light sensor of the illuminator to control the day/night rollover of the camera. This method provides for the full monochrome capability of the camera by preventing it from reverting to the day mode when the IR level generated by the illuminator is present. Manual override of the illuminator is available.

For information on specifications and datasheets, please refer to the Cohu website.

6.0 Warranty

Please refer to the Cohu website for product warranty information:

<http://www.cohu-cameras.com/warranty/WarrantyStatement.pdf>.

Revision History		
Revision	Date	Comments
Rev A	03/28/2011	<ul style="list-style-type: none">• this manual has been revised to comply with the latest engineering requirements. See ECO 030943 for the list of changes
Rev B	11/28/11	<ul style="list-style-type: none">• the manual is revised See ECO 031169 for the list of changes
Rev C	6/27/12	<ul style="list-style-type: none">• the manual is revised to replace contact information with a link to the web page. See ECO 031169