

2750 AND 2790 SERIES SERIALLY CONTROLLED ENVIRONMENTAL CAMERA

INSTALLATION AND OPERATION MANUAL

RS-232C and RS-422

Monochrome RS-170A or CCIR



4.5-inch Housing - Shown with optional sun shield

Figure 1. Serially Controlled Low Light Level Environmental Camera

Technical Manual 6X-1064a

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1.0 GENERAL DESCRIPTION

This introduction briefly describes overall characteristics of the Model 2750 and 2790 monochrome Cameras (figure 1) related to their installation and operation. The only difference between these two cameras is the diameter of their barrel housing. The 2790 is of greater diameter to accommodate bigger zoom lenses.

1.1 Electrical Characteristics

The 2750/2790 provides a highly sensitive interline transfer CCD Camera in a pressurized environmental housing. All electrical connections are via a single 18 pin rear panel connector. Table 1 lists electrical, mechanical, and environmental specifications for the Camera.

The Camera operates with either RS-170A or CCIR format, depending on the model. Both of these formats are available in a high-sensitivity version.

This Camera operates at an internal clock rate of 28.6363 MHz (RS-170A) or 28.375 MHz (CCIR).

Phase adjust line lock is software controlled. The vertical interval of the camera is referenced to the 60 Hz power input for RS-170A (or the 50 Hz power input for CCIR). Software selection then makes it possible to shift this reference in 60 degree increments so that the camera can be phased with other cameras in the system that may not have the same power line phase reference. This phase difference can occur either because the other cameras are on a different phase of the power source or perhaps because they are connected to a power source operating from a different transformer.

The Camera is available with either 115 V ac or 24 V ac input power — depending on the model. An internal 20 watt heater cycles on an off at low environmental temperatures to maintain temperature inside the housing at operating levels.

An optional sunshield over the camera minimizes heat buildup by minimizing direct rays of the sun reaching the barrel housing. It also

provides an air gap as an insulating layer.

The camera 18 pin rear panel connector has pins dedicated to three separate serial communications ports:

- 1. RS-232C for communications with the camera
- 2. RS-422 for communications with the camera
- 3. RS-232C for the camera to send commands to a pan and tilt (special order)

While both camera communications ports are independently wired to the rear panel 18-pin connector only one of these should be used. The system interconnection cable typically has wiring for either the 232C or the 422 but not both. Baud rate can be up to 38,400.

Use of the RS-232C pan and tilt serial port requires camera firmware dedicated to the model of pan and tilt that will be used. To use the camera with a different pan and tilt model would require updated camera firmware. Obtaining this function in a camera is a special order.

Serial control of the zoom lens is implemented by a serial communications board within the camera housing. This board controls zoom and focus. It can also control a motorized iris if the lens has this feature. A motorized iris is used when it is desirable to have manual control of the iris function in addition to automatic control of iris opening

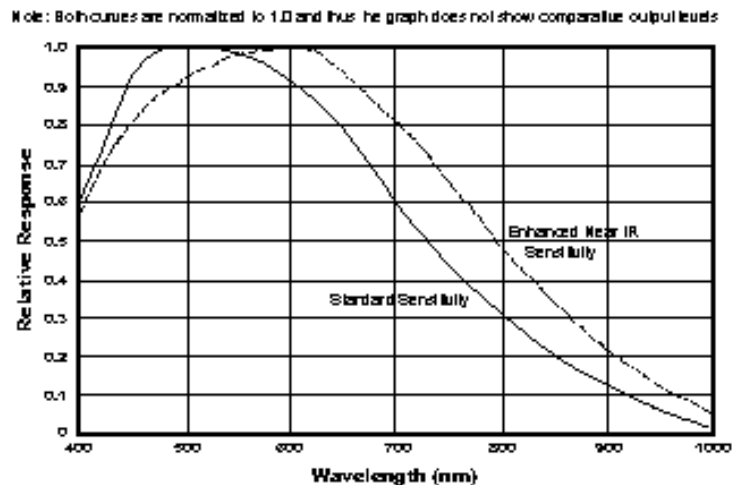


Figure 2. Sensor Wavelength Response Characteristics

Table 1. Specifications

ELECTRICAL	
Format	RS-170A: 1/2-inch interline transfer monochrome CCD operating in field mode or CCIR: 1/2-inch interline transfer monochrome CCD operating in field mode (both available with extended near IR sensitivity)
Pixels	768 × 494 RS-170A; 752 × 582 CCIR
Pixel Cell Size	8.4 (H) × 9.8 (V) μm RS-170A; 8.6 (H) × 8.3 (V) μm CCIR
Resolution	580 HTVL (RS-170A) 560 HTVL (CCIR)
Internal Clock	28.6363 MHz (RS-170A) 28.375 MHz (CCIR)
Sync	Internal crystal or serial control of line lock phase
Frame Rate	30 fps (RS-170A); 25 fps (CCIR)
Sensitivity, Faceplate	Full video, max gain, agc off: Standard: 0.0012 lux Extended: 0.0009 lux 80% video, max gain, agc off Standard: 0.0010 lux Extended: 0.0007 lux Agc On, extended sensitivity sensor: 0.28 lux, nominal min gain; 80% video, max gain, 0.0007 lux
Gamma	0.6 normal fixed (optional fixed 0.45 or 1.0 special order)
Sharpness Circuit	None used
Gain	0 to 46 dB gain control — either agc or internal manual adjustment
Shutter	1/60 (1/50 CCIR) to 1/100,000 sec; 8 steps (Internal switch access. Special order)
S/N	58 dB max; 10 dB S/N with 46 dB gain (0.6 gamma)
Spectral Response	See figure 2
Power Input	24 V ac ±10 % or, depending on model, 115 V ac ±10 %
Power Consumption	30 W ; heater draws an additional 20 W each time it cycles on in cold weather
Video Output	75-ohm, RS-170A or CCIR, depending on model
Lens Control	Serial control of zoom, focus, (and iris with motorized auto iris lens)
MECHANICAL	
Dimensions	See figures 4 (2750) & figure 5 (2790)
Weight	12 lb / 5.4 kg (2750); 35 lb / 15.9 kg (2790) (with typical lenses)
Camera Mount	5 each 1/4-20 threaded holes on mounting base attached to barrel housing
Connectors	18-pin on rear panel. Schrader valve for pressure charging with dry nitrogen, pressure relief valve
ENVIRONMENTAL	
Temperature	-20 to 60 °C (-4 to 140 °F) operating -40 to 60 °C (-40 to 140 °F) operating with heaters -30 to 85 °C (-22 to 185 °F) non operating
Humidity	Up to 100 % relative humidity
Vibration (less lens)	0.001 g ² /Hz from 1 Hz to 10 Hz 0.075 g ² /Hz from 10 Hz to 2000 Hz (non-operating conditions)
Shock (less lens)	Up to 10 g's, 11 ms, in any axis under non-operating conditions, MIL-E-5400T, paragraph 3.2.24.6
Altitude	Sea level to equivalent of 3,000 meters (10,000 feet) 508 mm / 20 inches of mercury)
Air Contaminants	Withstands exposure to sand, dust, fungus, and salt atmosphere, per MIL-E-5400T, paragraph 3.2.24.7, 3.2.24.8, and 3.2.24.9.
Explosion	MIL-E-5400T, paragraph 3.2.24.10
Acoustical Noise	Greater than 150 dB continuously for 30 minutes
Immunity	EN 61000-4, EN 61000-6, and EN 61000-8 interference immunity tests

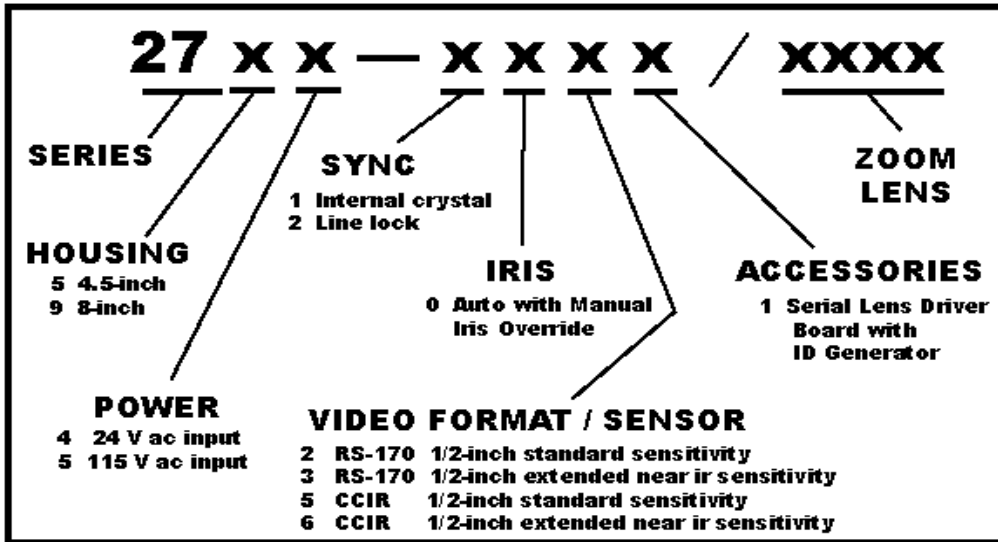


Figure 3. Model Number Interpretation Diagram

and closing.

An ID generator is included as a function of this serial communications board. It can be programmed to provide messages in the video. The board also provides barrel internal pressure and temperature when these displays are turned on.

Cohu's Win MPC software can be used to communicate with the internal serial communications board for control and setup of functions. WinMPC is available at no cost from the cohu-cameras web site or by mail on CD. A separate technical manual is available for WinMPC part number 6X-1032. Any suffixes after this number designates version levels.

The camera can also be operated with the system control software if this software has been implemented with the proper protocol messages for installation and setup functions.

Cohu WinBurn software is available to perform firmware updates on a camera. This software and any available firmware upgrades are typically available on the cohu-cameras.com web site.

A model number interpretation diagram appears in figure 3. That diagram shows the various configurations of the Camera. An optional sun shield is also available but it is not modeled into this number sequence.

Cameras in this series may have any of the following features depending on the model number and other selections:

1. 4.5- or 8-inch diameter housing (depends on size of zoom lens)
2. 24 V ac or 115 V ac input power
3. Internal sync or phase-adjust line lock
4. RS-170A or CCIR — with either standard or high sensitivity in each case
5. Various zoom lenses — including motorized iris versions for manual control of the iris
6. Sunshield

1.1.1 Sensor Characteristics

Figure 2 shows the typical response characteristic across relevant wavelengths of the sensor. This chart shows both the standard sensitivity curve and the enhanced sensitivity curve.

The camera lens and the window in the barrel housing will have a slight impact on these curves.

These characteristic curves apply to both RS-170A and CCIR sensors.

1.2 Mechanical Characteristics

Dimensions are shown in figure 4 (2750) and figure 5 (2790). The Camera consists of a sealed and pressurized barrel housing attached to a mounting base with two stainless steel straps.

An optional sun shield can be mounted over the housing to prevent heat build up from direct sun light on the barrel. This sun shield extends beyond the ends of the barrel about three inches at each end. It can provide some protection from direct sun exposure on the camera lens in certain situations.

All electrical connections are made via a 18-pin connector located on the rear panel.

A Schrader valve (car type air valve) on the rear panel provides for pressurizing the housing with dry nitrogen. This valve can be used to occasionally add dry nitrogen as necessary to maintain pressure in the barrel at about 5 psi (35 kPa).

A pressure relief valve on the rear panel releases pressure at 20 psi (138 kPa) to prevent extreme over-pressurization of the housing.

The mounting base for this camera has five 1/4-20 holes down the center line. This mounting base plate aluminum is 1/4-inch thick.

At least two of these threaded holes must be used to secure the camera to its mounting platform. Use high quality stainless steel bolts and lock washers. Grade 316 stainless steel is preferable.

The threads on these bolts should extend beyond the camera baseplate by at least 1/16 inch to ensure that at least one full thread is exposed. But the bolts must not extend beyond the camera base plate more than 3/8 inch or they could bottom out on the barrel housing.

2.0 INSTALLATION

In addition to the actual installation requirements, this section covers a number of other items including proper shipping and handling of the Camera. These cameras can be installed in a variety of configurations especially in regards to

communications back to the central control location.

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 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 and if possible shoot pictures of the unpacking process once the damaged area is discovered.

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.

2.2 Equipment Supplied

See table 2. The camera consists of a single environmental housing with attached mounting base. A mating connector for the rear panel 18-pin connector is supplied as a loose part. This connector has solder cups on the wiring side of its sockets and thus does not require a special crimping tool to make connections.

Cameras intended for use outdoors typically are fitted with an optional sun shield assembly that wraps around the top half of the camera and extends about three inches beyond the housing at

Table 2. Items Supplied

ITEMS SUPPLIED	
ITEM	DESCRIPTION
1	Camera Barrel
2	Base
3	Stainless steel base-to-barrel attachment straps (2)
4	Mating rear panel connector Cohu 1310230-011 (MS3116F-14-18S)
<i>Notes: Items 1, 2, and 3 are supplied as one assembly Item 4 is supplied loose</i>	

each end.

This sunshield minimizes heat buildup inside the camera by shielding it from the direct rays of the sun. It can also provide some protection from lens flare in certain situations.

2.3 Equipment Required but Not Supplied

As a minimum the camera requires a source of operating power, a monitor on which to view the scene, an interconnection cable, and a computer running the Cohu WinMPC software for setup of serial board features including the ID generator. This software also can be used to control the zoom lens functions. Table 3 lists typical items that could possibly be required in a fully configured system.

WinMPC also selects the proper protocol to use with a pan and tilt unit if one is to be used with the camera. This selection is required only if the system cable connects to the camera.

This software is available at no cost as a download from Cohu Electronics (www.cohu-cameras.com) or by mail on a CD.

Installing the camera will also require stainless steel mounting hardware (grade 316 is preferable) and a platform of some type on which to mount it.

2.3.1 Compatible Pan and Tilt Unit

Table 3. Items Required But Not Supplied

ITEMS REQUIRED BUT NOT SUPPLIED	
ITEM	DESCRIPTION
1	Platform arm, etc on which to mount camera or pan and tilt
2	Mounting hardware for camera and pan and tilt unit
3	Pan and tilt unit (see section 2.3.1)
4	Cable, system interconnection
5	Cable, camera to pan-and-tilt unit
6	Fiber optic or other type link back to a central control location such as an operator's console
7	Equipment cabinet or junction box nearby to camera and pan-and-tilt unit
8	Power source, camera, 24 V ac or 115 V ac, depending on model
9	Power source, pan and tilt, depending on requirement
10	Scene monitor, RS-170 or CCIR, depending on model of camera
11	Laptop computer with serial port (setup & maintenance)
12	WinMPC camera setup software
13	WinBurn camera setup software
14	System computer
15	System control software for camera / pan-and-tilt (such as Cohu Net Cams)
16	Video recorder
17	Video Switcher

The pan and tilt unit intended for use with this camera must have either of the following two features.

- 1 It must be capable of accepting commands via RS-232C from the camera (only special order cameras provide this function), or
2. It must be capable of supplying Cohu commands to the camera over either RS-232C or RS-422.

In the first case, the system cable connects to the camera and the camera then passes com-

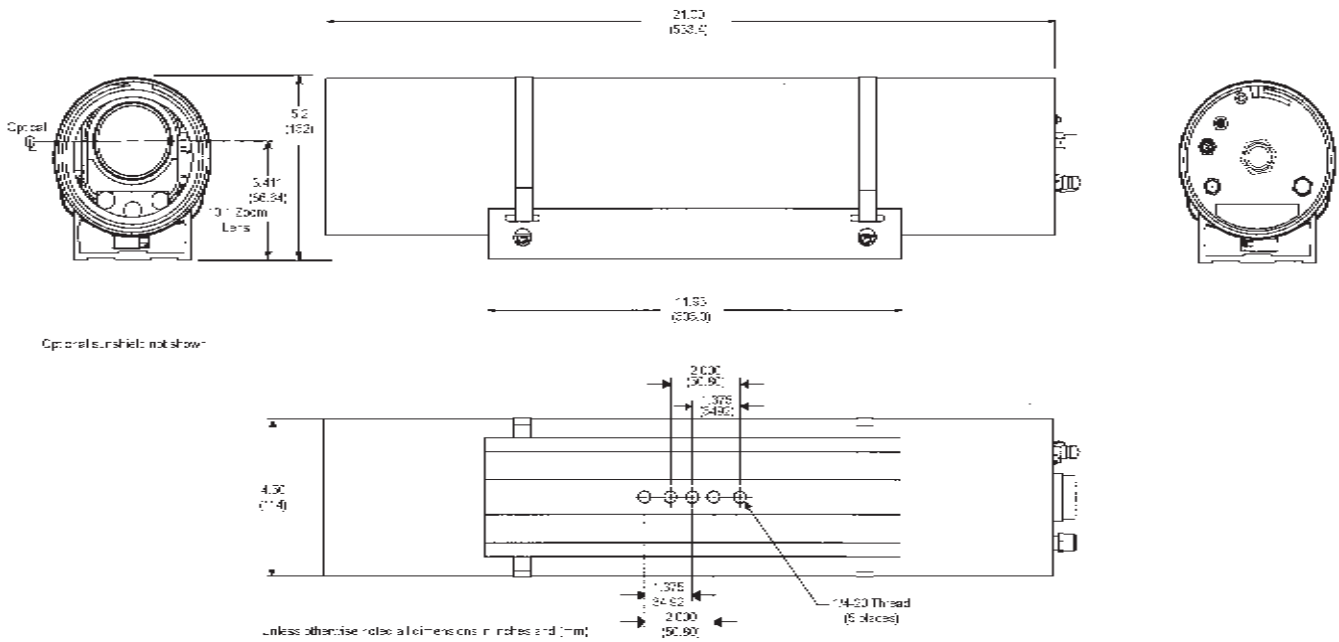


Figure 4. Dimensions, Model 2750 Camera (4.5-inch Housing)

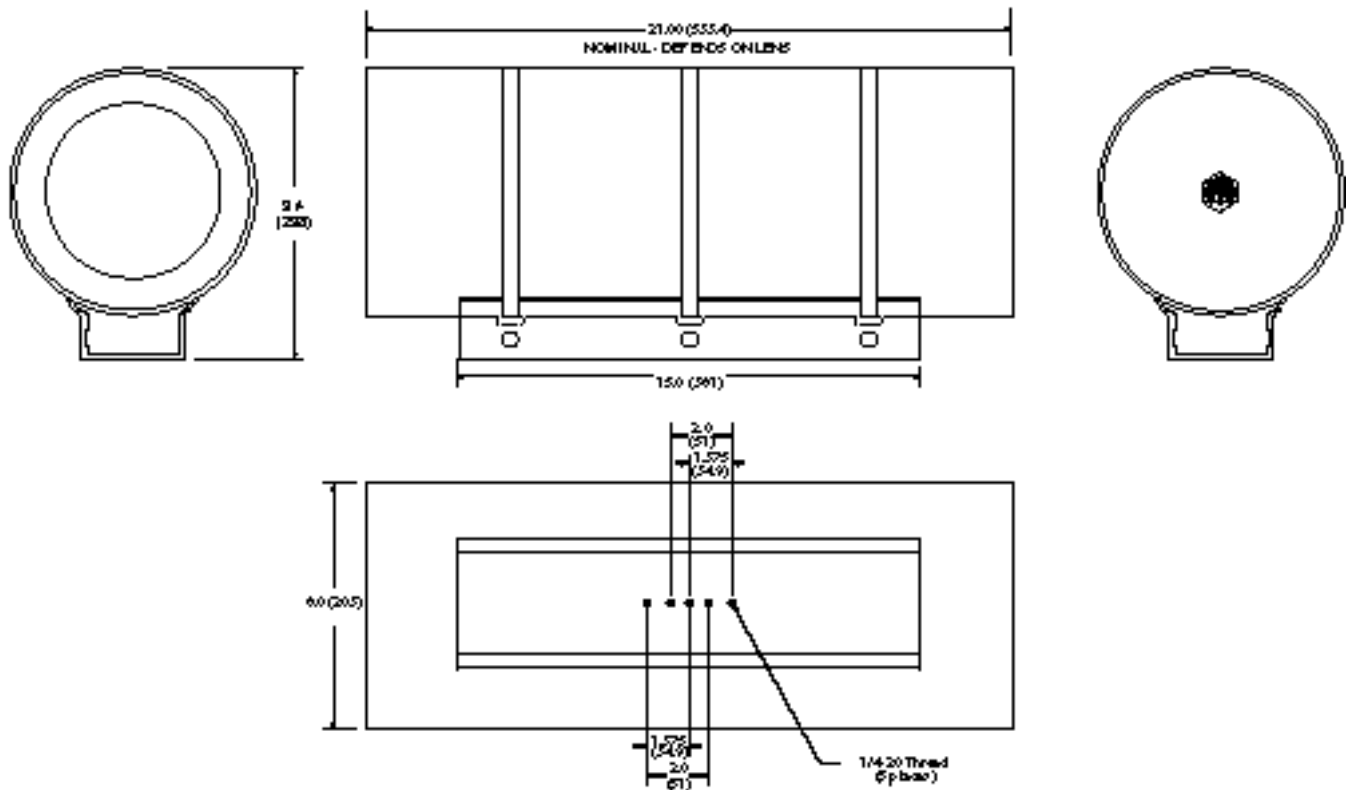


Figure 5. Dimensions, Model 2790 Camera (8-inch Housing)

INSTALLATION AND OPERATION

Table 4. Rear Panel Connector and Mating Cable Plug

REAR PANEL CONNECTOR	MATING CABLE PLUG
Cohu 1310225-011 (Amphenol/Bendix PT07C-14-18P)	Cohu 1310230-011 (MS3116F-14-18S)
<i>Note: The mating cable plug does not require any additional backshell, clamp, sockets, or other accessory parts. The 18 sockets have solder cups on the wiring side of the connector.</i>	

mands down to the pan and tilt unit via a dedicated RS-232C port.

In the second, more common, case the system cable connects to the pan and tilt unit and it then sends commands up to the camera on another cable to control zoom, focus, and iris.

In either situation the unit connected to the system cable must “know” the other units protocol so it can pass along the proper messages.

This is a translation function built in to the firmware on the camera when it must pass messages down to a pan and tilt.

When a pan and tilt must pass messages up to a camera, though, the function may either be built into the pan and tilt firmware or a translation board may have been added inside the pan and tilt to perform this function.

Once an installation has been designed with the system cable going to either the camera or the pan and tilt unit it is not possible to then revise the installation so that the system cable connects to the other unit.

2.4 Cabling Requirements

A single 18-pin connector on the rear panel provides all electrical connections for the Camera.

Various cables of the Cohu CA-295 series can be used with this Camera.

If the camera is used with a serially controlled pan and tilt unit then the preferred cabling arrangement is to have the system cable connect to the pan and tilt unit then have a second cable interconnect between the pan and tilt unit and the

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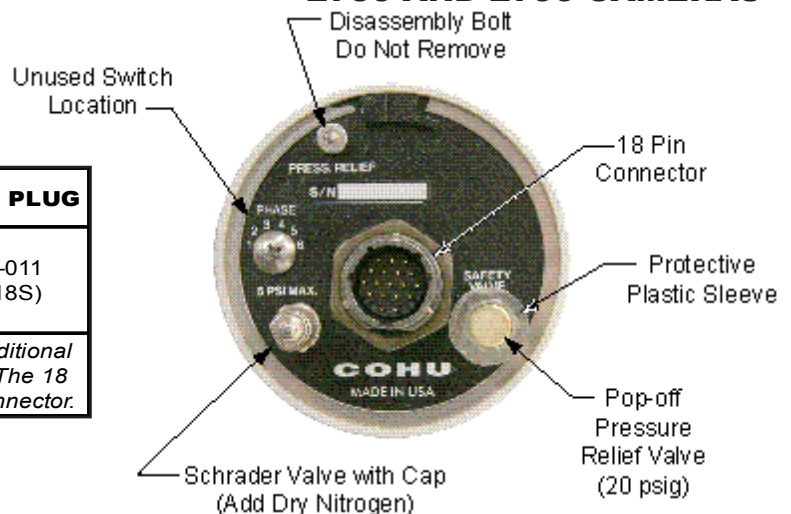


Figure 6 . Model 2750 Rear Panel Features (Model 2790 Similar)

camera. See figure 8.

2.5 Power Requirements

The Camera is available as either a 24 V ac or a 115 V ac version. A Camera will be configured for only one of these input voltages. They are applied to different pins on the rear panel connector — except that pin T is shared as 24 V ac low and 115 V ac neutral.

A camera draws 30 watt — with an additional 20 watts required every time the internal heaters cycle on during cold weather.

2.6 Mounting Requirements

The dimensions shown in figure 4 and figure 5 illustrate characteristics of the camera related to securing it to a pan-and-tilt unit, pedestal base, arm, or similar mounting platform.

Note that these illustrations do not show the optional sun shield that may be fitted over the housing.

The five 1/4-20 holes on the bottom of the camera mounting base are threaded through 1/4-inch thick aluminum plate.

The bolts used to hold the camera to a mounting platform should extend at least 1/16 inch beyond the 1/4-inch camera base plate so that a

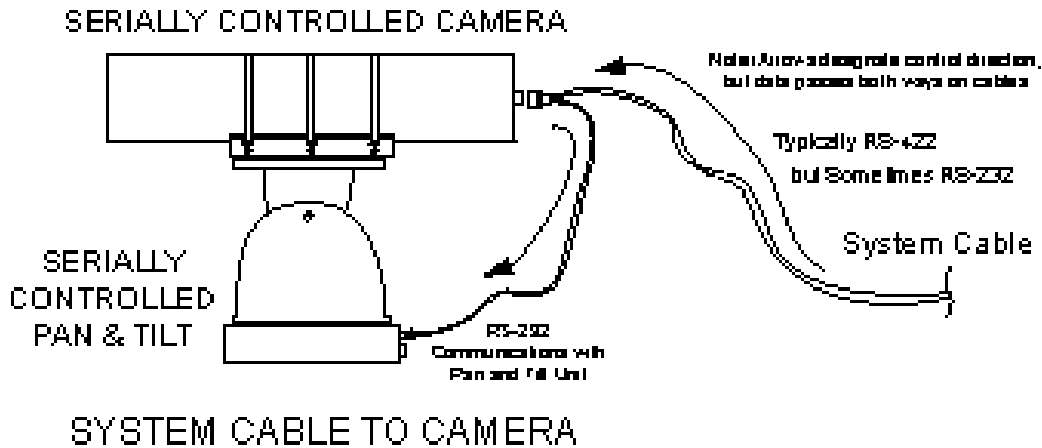


Figure 7 . System Cable Connected to Camera

full thread is exposed. Bolts extending more than 3/8 inch beyond the camera base plate could jam against the barrel housing of the camera. This should not be allowed to happen.

Grade 316 stainless steel hardware should be used. When larger sizes of stainless steel nuts and bolts are threaded together it is recommended that antiseizing compound be used to prevent galling of the threads. This would primarily be of concern when installing large, heavy support arms, pedestals, and other such supports where large bolts and nuts would be used.

2.7 Line Lock Operation

The line lock feature of this Camera relies on a sync reference derived from the ac power line in place of an internal crystal oscillator as the reference source. This feature is software controlled.

When widely separated equipment operates from different phases of the power line, or perhaps off a different transformer or other source of power, a typical step-phase change in 60 degree increments makes it possible to match with the vertical interval of other cameras or equipment in the system.

2.8 Installation Procedure

Installing the Camera is straightforward. If it is known that the internal camera module control

functions are properly set, it is only necessary to mount the Camera to a suitable base, mate the rear panel connector, and apply power. This assumes the other end of the cable is properly connected to a source of power, a tv monitor, and any other required equipment.

Table 3 lists a complete assortment of equipment that may be required in a system configuration, but for a straightforward installation of a single site much less equipment is required.

2.8.1 ID Generator Messages

Entering messages into the ID generator requires use of either Cohu’s WinMPC maintenance software or the system control software if that software has been implemented with the proper Cohu protocol messages. WinMPC can be obtained at no cost from the cohu-cameras.com website or by mail on CD.

The ID generator messages are programmed in via the 18-pin rear panel connector.

If the computer does not have an RS-232C port it likely will have a USB port. In that case, a USB-to-422 converter will be required.

WinMPC (or properly configured system control software) can also be used to turn on and off a display of internal housing pressure and temperature when the ID generator option is

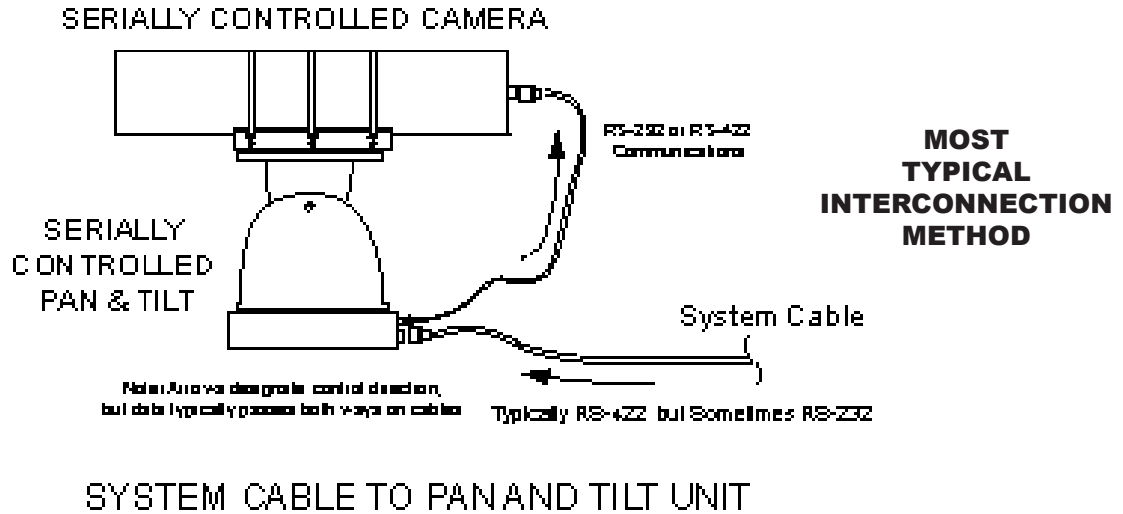


Figure 8 . System Cable Connected to Pan and Tilt Unit

installed.

Messages to be displayed by the ID generator, an indication of the nitrogen pressure, and interior barrel temperature readings can also be controlled by the system software if the correct protocol messages have been implemented and serial communications is established with the camera.

2.8.2 Rear Panel Features

Figure 6 identifies features on the rear panel of a camera. This figure shows the 4.5 inch barrel housing. The rear panel of an 8 inch barrel camera is similar.

2.8.2.1 18-pin Connector

All interconnections with the camera are via the 18-pin connector. Figure 9 identifies the letter designation for each pin in the connector. Note that this mating view of the camera connector can be used as a wiring diagram for the rear (wiring) side of a mating cable plug but care must be taken to ensure proper indexing.

Table 5 lists the function for each pin on the connector. For each type of installation, certain pins will not be used.

For example, the camera will be internally

configured to accept either 24 V ac or 115 V ac. Never both.

And either RS-232C or RS-422 serial communications will be used but not both

Also, pins C, J, and K are dedicated solely to sending RS-232C commands to a serially controlled pan and tilt unit, but this is not a common arrangement. Use of these pins requires a special order camera.

The more common arrangement is for the pan and tilt unit to send commands up to the camera. These commands would typically enter the camera on RS-232C pins D and E, but the RS-422 pins could also be used to receive commands from a pan and tilt unit.

2.8.2.2 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 two connectors.

Coax-Seal is the recommended product:

www.coaxseal.com
sales@coaxseal.com



Figure 9. Connector Pin Locations

**Unites 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 material is a thick 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 cures to form a permanent weather-tight seal.

The cable and connector should be clean and dry before wrapping with Coaxseal.

Use a full wrap of the tape on the cable at the beginning, then continue with a diagonal half-overlap wrap up to the rear panel of the camera and finally another full wrap at the end of the coverage.

The wrap then should be squeezed slightly together by hand to remove air gaps and ensure it has molded itself to the cable and connector.

This sealer will fuse itself together after a while and removal will require cutting it off.

Refer to the Coaxseal web site and to the instructions accompanying this product for more information .

Table 5. Pin Functions, Rear Panel Connector

PIN	FUNCTION
A	ground (video out)
B	24 V ac high
C	232 out ground (special order)
D	232 TXD
E	232 RXD
F	232 RTS
G	ground, ac power (115)

2.8.2.3 Connector Tx (Transmit) and Rx (Receive) Conventions

Table 4 and figure 7 show pin functions for RS-422 connections. The Tx+ Tx- and Rx+ Rx- notations for these RS-422 connectors and all other RS-422 connectors in a system using this notation cause much confusion for field installers. There is a tendency to want to connect Tx to Tx and Rx to Rx. This almost always is wrong.

The Tx+ output of one piece of hardware should go to the Rx+ input of another. And Tx- goes to Rx-. Note that “not” can be used for the “-” (minus) designation, e.g., Tx (not) and Rx (not).

To add to the confusion Tx and Rx are not universally used notations for the same functions. Some times “Command Out” is used for Tx and “Command In” for Rx. Other naming conventions

are also used among different equipment and cables.

Because this RS-422 provides half duplex bidirectional communications over the same cable (although on different wire pairs) a connector can be an input at one moment and then an output milliseconds later (RS-422 half-duplex). Thus, markings that would attempt to label connectors as either input or output would be somewhat arbitrary.

With RS-422, the wire pairs themselves, though, pass data in only one direction. For example, output pins on connector A must be routed to the input pins of connector B. And to get data back the other direction, the output pins on B must then be connected to the input pins on A. The concept is simple but in practice the labeling found in the field can sometimes be confusing.

If any confusion exists it is best to contact the Customer Support department at Cohu or your local Cohu representative.

2.8.2.4 Camera RS-232C Interface to Control Pan & Tilt Unit (special order)

Pins C, J, and K on the rear panel connector of special order cameras can be used to provide RS-232C communications to an external pan and tilt unit.

These pins would be used only when the system interconnection cable connects to the camera and not to the pan and tilt unit. This is not the most common method of making a system interconnection to a camera / pan and tilt combination. Typically the system connection would first go to the pan and tilt unit — eliminating the need to use pins C, J, and K.

A connection between the pan and tilt unit and the camera is still required, though, but this would be to pass through control signals to the camera on different pins.

But if the system cable does connect to the camera it is then necessary to pass control signals to the pan and tilt unit on pins C, J, and K.

Using these pins to send RS-232C control messages to the pan and tilt unit requires selection of the pan and tilt model number from a listing in the WinMPC camera setup software — if it had not yet been selected.

If in the future the camera is to be used with a different model of pan and tilt unit, then WinMPC would have to be used again to select the new pan and tilt unit.

If a particular model or series of pan and tilt is not listed in WinMPC, contact either your Cohu representative of the factory directly about the availability of such firmware.

The model number does not designate what pan and tilt unit the camera has been configured for. This can only be determined by connecting to the camera with WinMPC and clicking to the listing of pan and tilt units.

2.8.2.5 Schrader Valve

The Schrader valve installed on this camera is functionally identical to those used for car tires — but this valve should be used only to introduce dry nitrogen into a camera housing.

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 is held open to aid in the flow of nitrogen out of the camera. The **PRESS. RELIEF** bolt (figure 6) can also be removed when it is desired to flow dry nitrogen through the housing, but removing this bolt is really part of the disassembly process and the threads could leak nitrogen if not properly coated with a thread sealer when reinstalling.

This purging process removes moist room air from inside the camera to provides an internal relative humidity of about five percent.

A camera is typically pressurized to 5 psi (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

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used to maintain pressure near 5 psi (34 kPa). If pressure continually drops it is an indication of a slow leak and the camera requires maintenance.

These pressure references are gauge pressures (psig). They are relative to the altitude above sea level at which they are being measured.

2.8.2.6 Pressure Relief Valve

The pressure relief valve opens at about 20 psi (138 kPa). This valve should be manually lifted off its seat when it is desired to flow dry nitrogen through the camera to purge any moisture laden atmospheric air from the camera.

This valve has short section of clear tubing around it to prevent the pop-up stem from accidentally being moved and thus releasing pressure. This plastic will have to be taken off to gain access to the pop up valve for manual release of pressure. Be sure to install the tubing again after purging and pressurization is completed.

2.9 Front Window Features

The camera lens is mounted behind the window at the front of the camera housing. Near the bottom of this window are three circular disks inside the camera housing. The disk on the left is labeled 10, the middle one 20, and the one on the right 30. See figure 10.

When relative humidity inside the camera is below 10 percent, all these disks will be blue in color. If humidity inside the camera should for some reason rise above 10 percent, the 10 disk will change color to pink. Likewise, if relative humidity rises above 20 or 30 percent the related disk will also turn pink. These disks can be used as an indication of the approximate relative humidity inside the camera. It should be below 10 percent and all disks blue in color.

If these disks turn pink it is an indication that pressurization with dry nitrogen has dissipated and moisture laden air has entered. Or it could mean that the camera was not properly reassembled and purged with dry nitrogen during maintenance procedures.

INSTALLATION AND OPERATION



Figure 10. Humidity Indicators (Blue is a Normal Dry Condition)

It may be possible to flow dry nitrogen through the camera for several minutes in an attempt to purge moist air from the camera and thus turn a humidity indicators blue again — but this could expend a large amount of dry nitrogen. And if a desiccant pack inside the housing has absorbed moisture (which is likely) the camera would then require disassembly to replace this pack.

When a camera is being assembled warm air is blown across the humidity indicators with a heat gun to remove moisture and turn them blue. Stripping them of moisture by flowing dry nitrogen across them is not recommended. It can require far more dry nitrogen than is required to purge moisture laden air from the housing components.

2.9.2 Desiccant Pack Drying

Once an internal desiccant pack absorbs excess moisture it has to be removed and either oven dried for at least 16 hours at 105 ± 5 °C (221 ± 9 °F) temperature or replaced by a fresh, dry pack that has been kept in a tightly sealed container.

If a large number of desiccant packs are to be oven dried do not spread them more than two deep in the oven.

Newly dried packs should be allowed to cool for several minutes and then placed into a tightly sealed container. This containers should be no larger than necessary to hold the dry packs.

2.10 Preparation for Shipment and Storage

INSTALLATION AND OPERATION

For storage periods exceeding about one month, seal the unit in a vapor-proof bag containing a fresh desiccant pack.

Maintain the Camera storage environment within a range of -30 to 85 °C (-22 to 185 °F).

For shipment, package with enough foam padding or other packing material to prevent shipping damage that can occur. The original shipping carton is a good container if it has not been damaged or subjected to excessive moisture. For shipping to the factory by Common Carrier, use the following address:

**Cohu Electronics
3912 Calle Fortunada
San Diego, CA 92123-1827**

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

**cst@cohu.com
or
858-277-6700 extension 261**

Prominently display the RA number on the outside of the shipping container(s) and on paperwork contained inside. Give a brief description of

2750 AND 2790 CAMERAS

why the equipment is being returned and list the symptoms of any problems being experienced with the equipment.

3.0 OPERATION

After the Camera is installed, operation of the Camera requires minimum attention. Zoom in/out and focus may have to be changed in response to changing situations at the scene being viewed.

Selecting the manual iris mode also automatically selects the manual gain mode.

The ID generator messages and readout of internal housing pressure and temperature may be visible — or they can be turned on and off if the proper protocol messages have been implemented and RS-422 communications exists with the camera.

end text

COHU ELECTRONICS WARRANTY

Cohu, Inc., Electronics Division warrants equipment manufactured to be free from defects of material and workmanship. Any part or parts will be repaired or replaced when proven by Cohu examination to have been defective within two years from date of shipment to the original purchaser for standard CCD cameras and one year from date of shipment to the original purchaser for intensified CCD cameras and all other Cohu manufactured products.

Pressurized Housings: Pressurized camera products include a lifetime pressurization warranty. Cohu will re-pressurize at no charge returned environmental cameras not exhibiting evidence of physical damage due to misuse. All warranty repairs will be performed at the factory or as otherwise authorized by Cohu in writing. Purchaser shall prepay transportation charges to Cohu.

Extended IR Cameras: Cameras utilizing extended infrared (extended IR) sensors found to exceed acceptable white blemish specifications within one month of delivery shall be repaired without charge.

This warranty does not extend to Cohu equipment subjected to misuse, accident, neglect, improper application, or repaired or altered by other than Cohu or those authorized by Cohu in writing. Cameras utilizing extended IR sensors are not warranted for use in areas of elevated levels of cosmic radiation. Television image pickup tubes, image intensifiers, lenses, and products manufactured by companies other than Cohu are warranted by the original manufacturer.

This warranty is in lieu of all other warranties, express, implied, or statutory, including warranties of fitness for a particular purpose and merchantability, and set forth buyers sole remedy in connection with such warranties. Cohu, in no event, whether as a result of breach of contract or warranty, tort (including negligence) or otherwise, shall be liable for any penalties regardless of reason; collateral, consequential, incidental, or exemplary damages, including without limitation, any loss of profit or revenues, loss of use of any equipment or goods, or removal or re-installation of equipment without prior written approval.

A Return Authorization (RA) Number must be obtained from Cohu prior to returning any item for warranty repair or replacement.

4/03