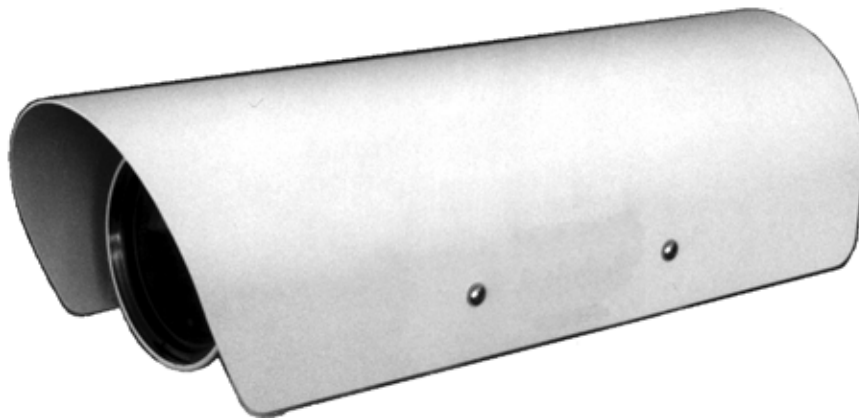


# **3230 SERIES ANALOG ENVIRONMENTAL CAMERA INSTALLATION MANUAL**

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**RS-232  
RS-422**

**Figure 1. Model 3230 NTSC or PAL Camera**

**Two other manuals related to this camera are available:**

- 1. Manual 6X-1084. The setup GUI - for configuring camera characteristics**
- 2. Manual 6X-1085. The protocol - for use by programmers to write software for controlling camera functions**

**CAUTION**

**Do not power the 24 V ac version of this camera directly from a Variac. It will blow up the power supply.**

## 1.0 GENERAL DESCRIPTION

This introduction briefly describes overall characteristics of the Model 3230 Camera (figure 1) related to its installation. Specifications can be found on the CD supplied with this camera.

### 1.1 Electrical Characteristics

The 3230 provides a highly sensitive CCD camera in an environmental housing.

This camera is available with either NTSC or PAL video output, depending on the model. Operating power is either 12 V dc, 24 V dc/ac, or 115 V ac — again depending on the model.

An integrated camera module provides a 3.3 to 99 mm zoom lens.

Data communications with the camera can be either RS-232 or RS-422 for control of DSP functions.

It has 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.

A model number interpretation diagram appears in figure 2. That diagram shows the various basic configurations of the 3230.

#### 1.1.1 Initial Setup Software

Graphical User Interface (GUI) software is available for setting the address and performing field tests and setups for each camera. This is included on a CD provided with the camera.

Technical manual 6X-1084, also included on the CD, is the reference manual for this GUI.

#### 1.1.2 Camera Firmware Protocol

Technical manual 6X-1085 provides the protocol details for develop software for controlling the camera. This document is available on the CD provided with the camera.

### 1.2 Mechanical Characteristics

Dimensions are shown in figure 5. The 3230 consists of an IP67 environmentally sealed and pressurized camera module. Dry nitrogen is used

for the pressurization. Dry desiccant packs are placed inside the camera during the sealing process.

An integral sun shield over the camera housing minimizes heat build up from sun light.

The mounting base (figure 5) for the 3230 has a five-hole in-line 1/4/20 pattern for attachment to a suitable base.

A 3230 can be mounted on any one of five mechanical configurations. The model number defines any mounting equipment that was supplied with the camera. Table 1 lists the mounting items supplied for each of the mounting configurations available with a 3230.

A Schrader valve (figure 7 — the car tire type air valve on the left) on the rear panel provides for pressurizing the housing with the dry nitrogen.

The pressure relief valve, on the right, 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.

## 2.0 INSTALLATION

This section covers the general requirements of installing the 3230 including cabling and power requirements. Section 5, toward the rear of this manual, covers several other items including static discharge protection and proper shipping and handling of the 3230. Figure 4 shows a typical interconnection diagram using RS-422 connections on the camera.

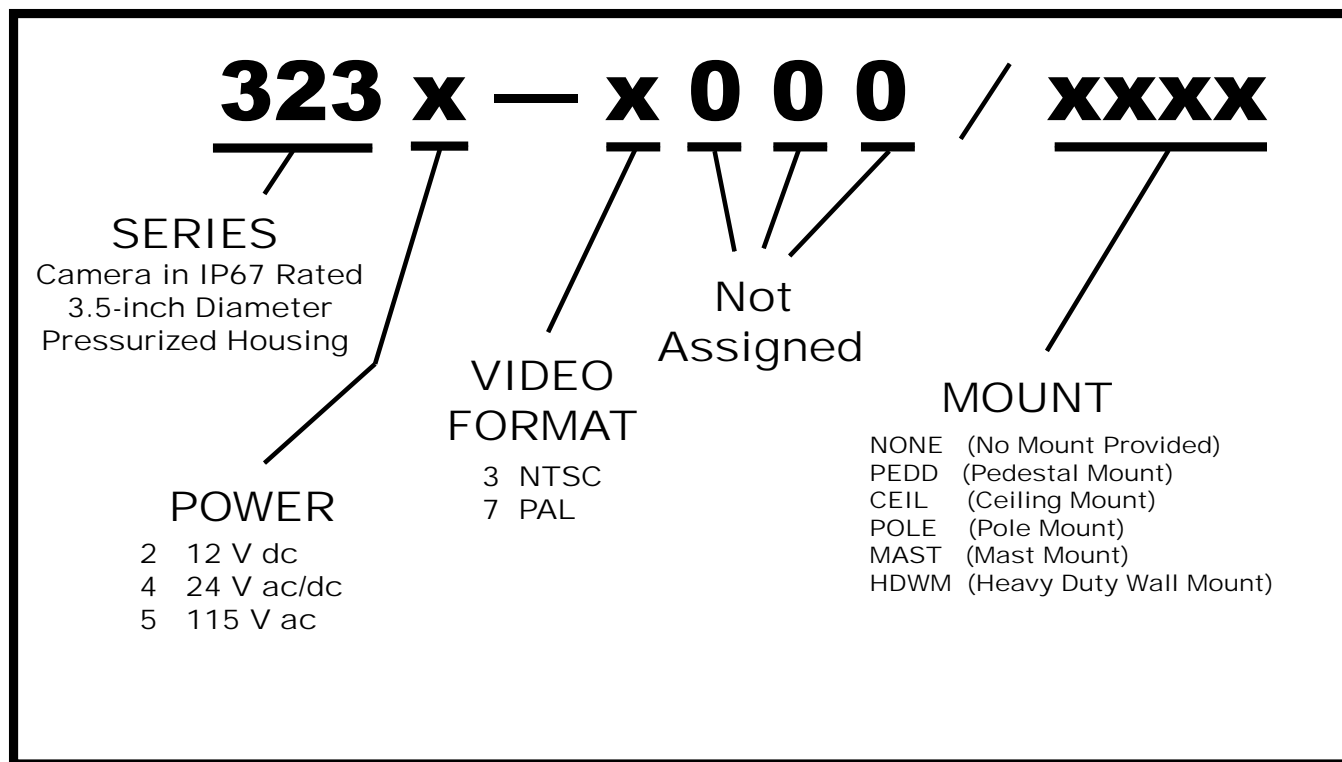
### 2.3 Equipment Supplied

The most basic configuration of the camera consists of only the camera, its sunshield, and a mating connector kit. This connector kit builds the system cable plug which connects to the camera 18 pin MS type connector.

Figure 3 shows the five optional mounts that can be ordered with the camera. The mount supplied with the camera will be reflected in the camera model number.

### 2.4 Equipment Required but Not Supplied

As a minimum the 3230 requires a source of operating power, a monitor on which to view the



**Figure 2. Model Number Interpretation Diagram**

scene, an interconnection cable, and a computer running Graphical User Interface (GUI) software for setup and control of the 3230. Setup GUI software and the camera protocol are included on the CD supplied with the camera.

During maintenance and setup operations using either a laptop or desktop PC it is likely that a USB to RS-232 converter will be required.

Typically PC's have had only an RS-232 port — and rarely an RS-422 port.

However, newer PC's and laptops no longer have an RS-232 port and instead rely on USB and other newer type ports.

With these computers, a USB to RS-232 converter will be required. Be aware that some of these converters do not provide reliable RS-232 communications. If problems are experienced determine whether it is the converter.

If it is desired to use the RS-422 feature of the camera it will then be necessary to add an RS-232 to RS-422 converter.

Or a USB to RS-422 converter could be used directly but these are not common devices.

## 2.5 RS-422 and RS-232 Wiring

Cable diagrams in this manual show pin functions for both RS-232 and RS-422 connections. Only one of these communications methods can be used at any one time.

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-.

To add to the confusion Tx and Rx are not universally used notations for the same functions. Sometimes Command Out is used for Tx and Command In for Rx. Other naming conventions are also used among different equipment manufacturers and their cables. TD is sometimes used — the "D" indicating that it is a data line not a line for some other function.

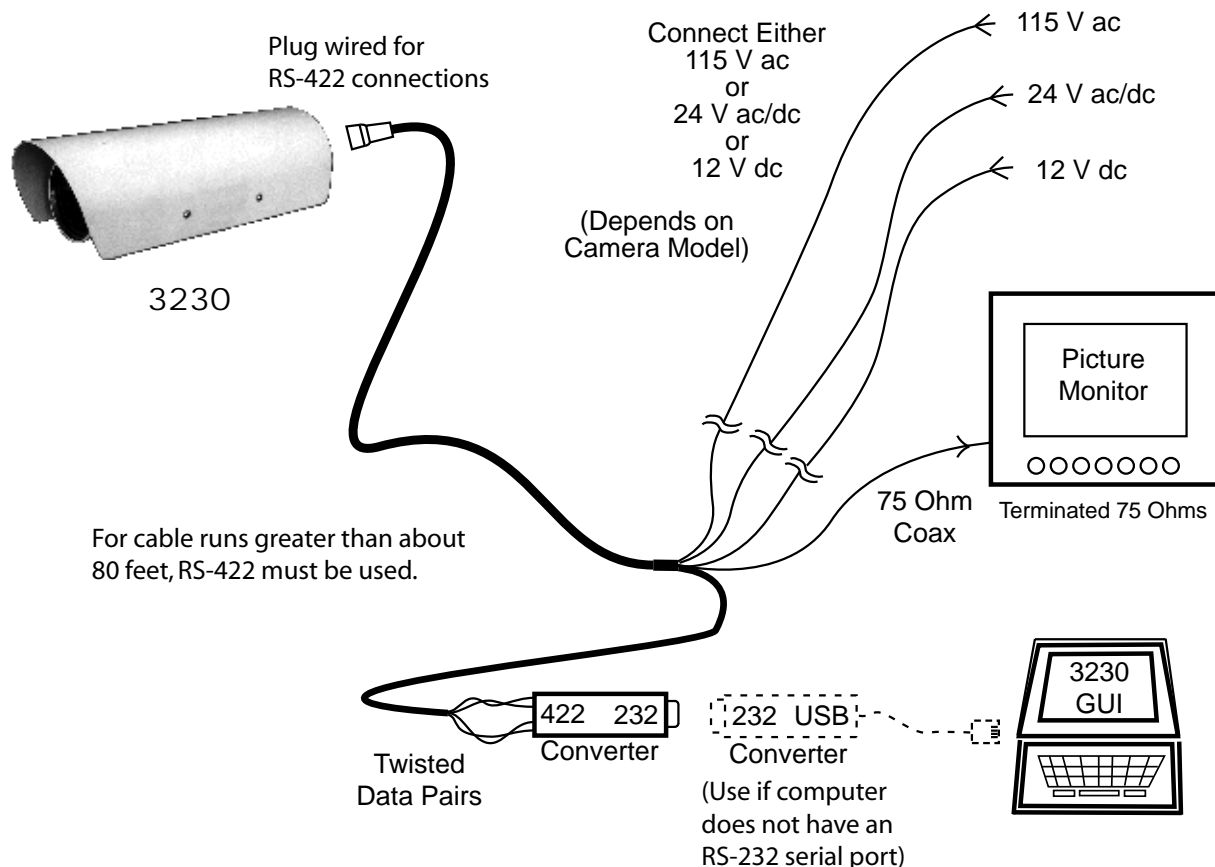
**Table 1. Mounting Configurations**

MOUNT DESIGNATION	MOUNT DESCRIPTION	ITEMS SUPPLIED					
		3230 CAMERA	PEDESTAL MOUNT	CEILING MOUNT	POLE MOUNT	MAST MOUNT	HEAVY DUTY WALL MOUNT
<b>NONE</b>	<b>None Supplied</b>	•					
<b>PEDD</b>	<b>Pedestal Mount</b>	•	•				
<b>CEIL</b>	<b>Ceiling Mount</b>	•		•			
<b>POLE</b>	<b>Pole Mount</b>	•			•		
<b>MAST</b>	<b>Mast Mount</b>	•				•	
<b>HDWM</b>	<b>Heavy Duty Wall Mount</b>	•					•

*Note: Read the table horizontally. A dot “•” designates an item supplied for each mounting configuration. As an example, for the CEIL (Ceiling Mount) two items are supplied: a 3230 camera and a ceiling mount.*



**Figure 3. Mounts**



**Figure 4. Typical Interconnection Diagram**

Since RS-422 provides bidirectional communications over the cable a connector can be an input at one moment and then an output milliseconds later (RS-422 half-duplex).

Identifying labels that connectors and wires are assigned can sometimes appear to be arbitrary to those not familiar with all the various subtleties involved in serial communications.

Wiring for RS-232 has the same situation. Tx typically goes to Rx and at the other end Rx to Tx.

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

**2.6 Cabling Requirements**

The system cable plugs into the 18 pin MS connector on the rear of the camera. Various pre-wired cables available for the camera are shown in figure 14 though figure 30. Note that these cables have different maximum lengths depending on the camera model and installation situation.

**2.6.1 Customer Supplied Cable**

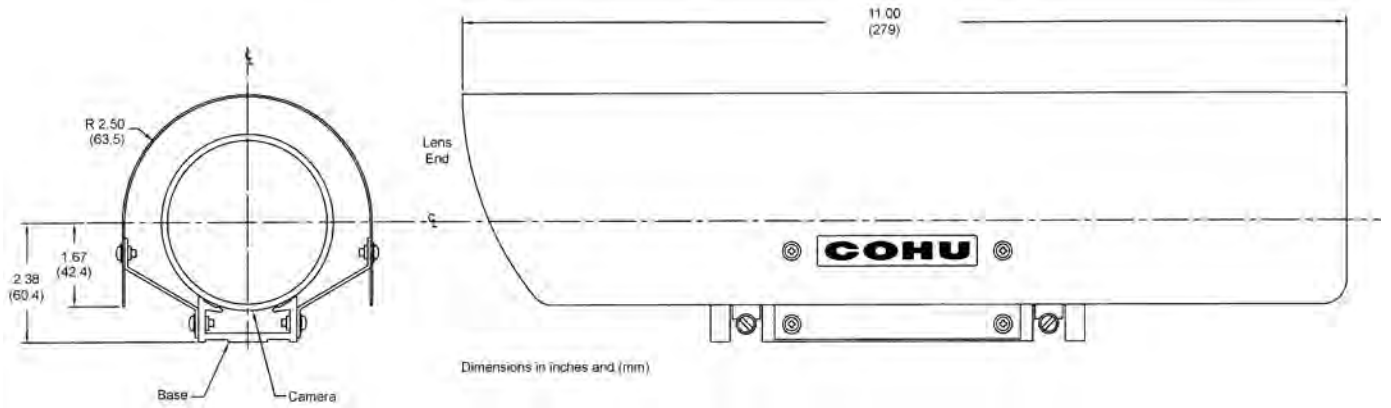
A high quality multiconductor shielded cable must be used with this camera both to minimize EMI radiation and to reduce susceptibility to interference.

The cable must have an overall shield with at least 95 percent coverage.

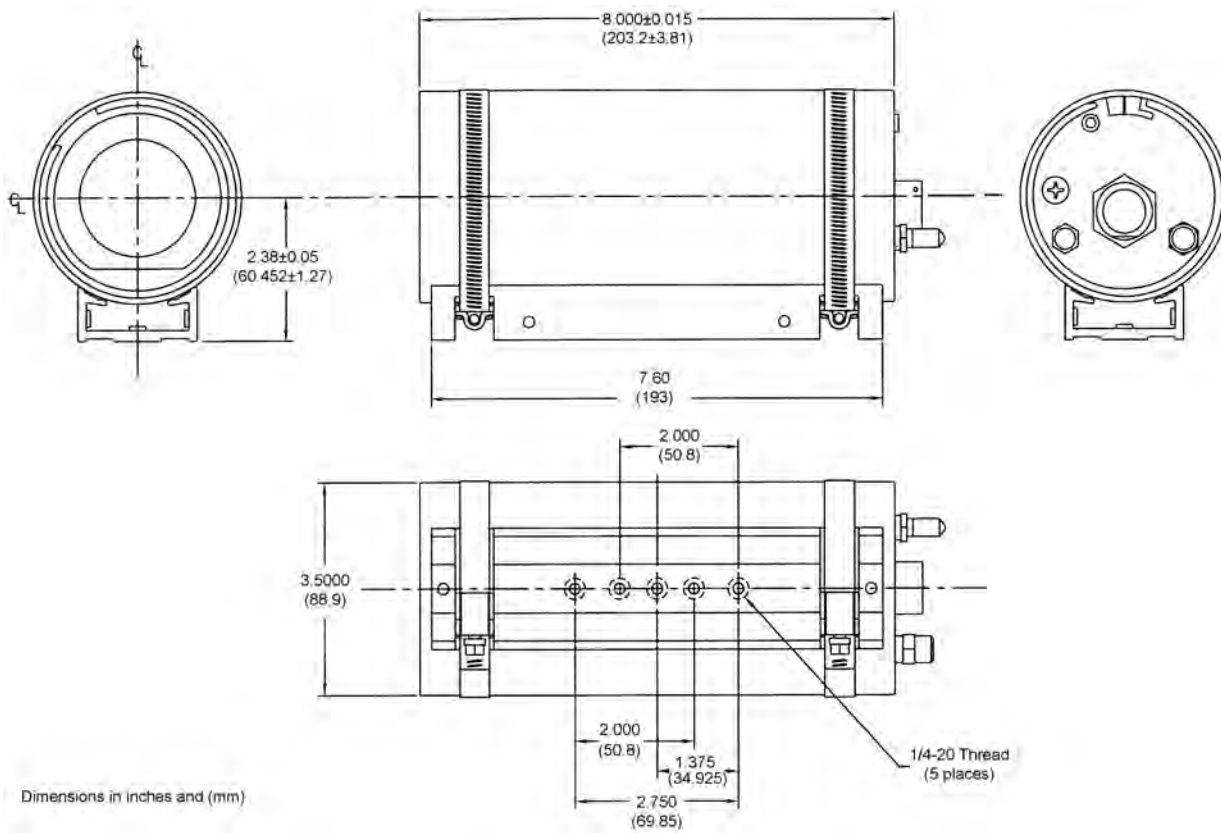
Data wiring must be twisted pairs similar to that used in CAT-5e cable. A data ground wire must be used.

Coaxial cable must be 75 ohm RG-59/U and not have any iron used in the conductors. Belden 8241F is a typical good coax.

Power wiring must be of sufficient size to maintain proper operating voltage at the camera. Power wires can be paralleled to reduce voltage drop. When calculating voltage drop remember to calculate the total length to the camera and also back to the power source. (A camera connected to a 100 foot cable has a total power run of 200 feet.)



**Camera Sunshield Dimensions**



**Figure 5. Dimensions, Model 3230 Camera**

**2.6.2 Camera Connector Pinout**

Table 4, table 5, and table 6 lists pin functions for the 12 V dc, 24 V ac/dc, and 115 V ac power input versions of the camera.

**2.6.3 System Interconnection Cables**

Seventeen system interconnection cables are available for use with the camera.

Table 8 lists these cables and describes their basic characteristics.

The major breakdown between cables types is whether they are for 12 V dc, 24 V ac/dc, or 115 V ac cameras.

Each of these two groups is then further subdivided into whether a camera is to use RS-232 or RS-422 communications.

The final determination is whether the cable should have stripped leads for all the field installation connections or whether certain connectors and/or data converters should be provided with the cable.

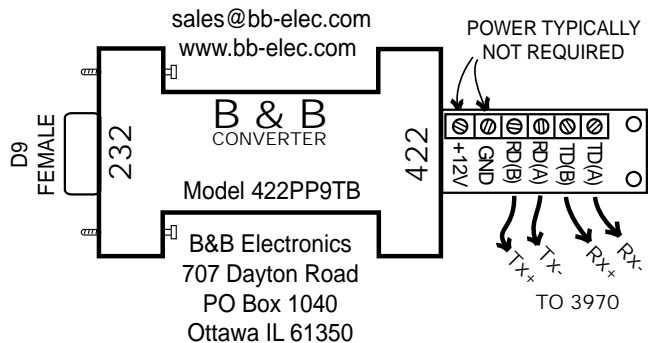
Cables can also be special ordered if none of these standard cables meet the requirements of an installation.

**2.7 Power Requirements**

Three versions of the 3230 are available in relation to power input requirements:

1. The model 3232 operates from 12 V dc +/- 10 percent;

(Available from Cohu as Part Number 3010100-001)



**Figure 6. Typical 232/422 Converter**



**Figure 7. Camera Rear View**

2. The model 3234 operates from either 24 V ac or 24 V dc +/- 10%.
3. The model 3235 operates from 115 V ac +/- 10%

Power consumption is less than 4 watts when the internal heater is off and less than 22 watts when the thermostat turns the heater on.

**CAUTION**

**Do not power the 24 V ac version of this camera directly from a Variac. It will blow up the power supply.**

**2.8 Mounting Requirements**

The dimensions shown in figure 5 relate to mounting the camera. It can be optioned to mount to five different mounting configurations:

1. Pedestal Mount (PEDD). Direct mounting of the camera to the top of a short pedestal (figure 3) or tall pole. The pedestal or pole must have a mounting hole pattern to which the camera can be secured. See section 4.1 for details about this standard mounting base.



**Table 2. Items Supplied**

ITEM	DESCRIPTION	CHARACTERISTICS
1	Camera with sun-shield	Model 3230 series
2.	Connector Kit	1310230-011
<i>Note: See figure 9 for the kit. This kit contains items to construct a cable plug that mates with the camera rear panel connector.</i>		

2. Ceiling mount (CEIL). This mounting arrangement uses a ceiling mount arm to which the camera is secured. See figure 3.

3. Pole Mount (POLE). When the camera must be mounted to a pole this option provides both a clamp to attach to the pole and also the heavy duty wall mount (HDWM) on which to fasten the camera (See figure 3).

4. Mast Mount (MAST). A mast mount attaches to a horizontal arm using stainless steel straps. (See figure 3.)

5. Heavy Duty Wall Mount (HDWM). This mounting arrangement uses a wall mount arm designed for rugged duty use (See figure 3).

The following paragraphs describe some of the features of the 3230 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 3230 is straightforward. It is only necessary to mount the 3230 to a suitable base, mate the cable connector to the system cable and apply power. (Or connect to the camera with an on-site cable.) 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.

**2.9.1 Camera Rear Panel Features**

Three features on the rear panel are of interest when installing the camera.

**Table 3. Items Typically Required but not Supplied**

ITEM	DESCRIPTION	CHARACTERISTICS
1	Support Base	See figure 5
2	Cable	Power, RS-232 or RS-422, 75-ohm Coax
3	Source of power	12 V dc, 24 V ac/dc, or 115 V ac, depending on model
4	TV Monitor	75 ohm, NTSC or PAL, as required
5	PC, Laptop, or other control method	RS-232, RS-422 Serial Output or converters
6	Serial Converter	232 / 422 converter (see figure 6)
- end table -		

**2.9.1.1 18-pin MS Connector**

An 18-Pin MS connector on the rear panel provides for all interconnections with the camera. A mating plug kit is supplied for the system cable connecting to this rear panel connector.

**2.9.1.2 Schrader Valve**

A Schrader valve (figure 7 — the car tire type air valve on the left) 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 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.)

**2.9.1.3 Pressure Relief Valve**

The pressure relief valve has a short piece of clear tubing slipped around it to prevent accidental movement of the pop out valve — which would release nitrogen from inside the valve.

During shipping, at which times high altitude might be encountered during aircraft transportation, a pressure relief valve on the rear panel (figure 7) may release some pressure. Back at low altitudes this would be experienced as a housing pressure below the standard 5 psig (34 kPa).

**Table 4. 12 V dc Pin Functions**

PIN	FUNCTION
A	Video Ground
B	no connection
C	no connection
D	RS-232 Tx
E	RS-232 Rx
F	no connection
G	ChassisGround
H	Power Ground
J	12 V ac High
K	no connection
L	Video
M	422 Rx +
N	422 Rx -
P	Data Ground
R	422 Tx -
S	422 Tx +
T	no connection
U	no connection
- end table -	

**Table 5. 24 V ac/dc Pin Functions**

PIN	FUNCTION
A	Video Ground
B	24 V ac High / +24 V dc
C	no connection
D	RS-232 Tx
E	RS-232 Rx
F	no connection
G	Chassis Ground
H	no connection
J	no connection
K	no connection
L	Video
M	422 Rx +
N	422 Rx -
P	Data Ground
R	422 Tx -
S	422 Tx +
T	24 V ac low / 24 V dc ground
U	no connection
- end table -	

Dry nitrogen should be added to bring the pressure back up to 5 psig (34 kPa).

During normal purging and pressurization, 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.

**2.9.1.3 18-pin MS (Metal) Connector**

This connector is on the bottom of the Camera. Tables 4, 5, and 6 list pin functions for the cable depending on which power input option is involved.

Figure 8 is the pin location diagram of this connector. It is a view from the mating side of the connector. This view can be used as a wiring view of the cable plug (supplied) for the system interconnection cable that connects with this 3230 connector.

**CAUTION**

**Do not power the 24 V ac version of this camera directly from a Variac. It will blow up the power supply.**

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 3230. (Or the cable could be pulled through conduit in the opposite direction if the other end has stripped leads.)

**2.10 Connector Sealing**

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

**Table 6. 115 V ac Pin Functions**

PIN	FUNCTION
A	Video Ground
B	no connection
C	no connection
D	RS-232 Tx
E	RS-232 Rx
F	no connection
G	115 V ac Ground
H	no connection
J	no connection
K	no connection
L	Video
M	422 Rx +
N	422 Rx -
P	Data Ground
R	422 Tx -
S	422 Tx +
T	115 V ac Neutral (low)
U	115 V ac Line (high/hot)
- end table -	

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 over-

**Table 7. 18-pin Camera Connector & Mating System Cable Plug**

CONNECTOR SOURCE	CAMERA CONNECTOR	MATING SYSTEM CABLE PLUG
Cohu P.N.	1310230-017	1310230-011
MS P.N.	MS3111F-124-18P	MS3116F-14-18S
Amp/Bendix P.N.	PT01E-14-18P(SR)	PT06E-14-18S(SR)
- end table -		

lap wrap up to the iDome 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.

**3.0 CAMERA SETUP**

A GUI specific to the model 3230 provides all setup communications.

A separate manual describes features of this GUI (Manual Number 6X-1083). This manual is provided on the CD supplied with the camera.

**3.1 GUI Installation Setup**

From the home window of the GUI other windows can be accessed to perform various setup and control functions.

The information here describes initial use of the GUI for use with the 3230. .

**3.2 Checkout Procedure**

After communications has been established with the 3230 various functions should be tested to verify proper operation. Use the GUI interface to perform tests and setups.

**4.0 MOUNTING METHODS**

Since installation of a 3230 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 3230. Each mounting site will



**Figure 8. Pin Location Diagram, Model 3232, Model 3234, and Model 3235 Cameras**

likely have its own unique requirements.

A 3230 can be ordered with any one of five mounting arrangements. One of these is related to direct base plate mounting for the 3230 and the remaining four use mounting arms and brackets for an installation.

Before preparing to mount a 3230 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 weatherproofing any through-wall holes.

Note that the Pedestal mount and the Ceiling mount are the same mechanical assembly. The only difference is in which direction they are mounted.

#### **4.1 Pedestal (PEDD) Mount (same as Ceiling mount)**

The pedestal mount (figure 10) has a round bottom plate with four mounting holes and a moveable head at the other end of a pedestal column. The head is adjustable for up/down and right/left.

The hole pattern on the moveable head aligns with the threaded holes on the bottom of the camera.

#### **4.2 Ceiling (CEIL) Mount (same as pedestal mount)**

The ceiling mount (figure 10) has a round plate for securing to the ceiling with four fasteners and a repositionable head at the bottom end to which the camera can be bolted for movement up/down and right/left.

#### **4.3 Pole Mount (POLE)**

The pole mount (figure 11) attaches to vertical poles using stainless steel straps. The curved arm projecting from the mounting plate has an adjustable head so that the mounted camera can be adjusted in azimuth and elevation to cover the scene of interest.

#### **4.4 Mast Mount**

The Mast mount (figure 12) straps to horizontal arms. Stainless steel straps are used to secure the mount to the arm. An adjustable head on the end of a short pedestal provides for moving the camera in azimuth and elevation for coverage of the scene of interest.

#### **4.5 Heavy Duty Wall Mount (HDWM)**

This heavy duty wall mount (figure 13) secures with two bolts. These holes are slotted so that final alignment can be done in the event that the bolt holes or studs are not perpendicular. A moveable assembly on the end provides for movement in azimuth and elevation.

### **5.0 Supplementary Information**

This section covers handling the shipping the camera.

#### **5.1 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.

**Connector (Plug) for the System Cable that Connects to Camera Connector**



**Kit as Typically Packaged**



**Front Side - Mating Sockets**



**Wiring Side - Solder Cups**



**Connector Kit Contents**

**Figure 9. Type 1310230-011 System Cable 18-pin MS Type Connector Kit**

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.

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.

## **5.2 Static Discharge Protection**

In the event that a disassembled 3230 is being handled, the following precautions should be followed:

### **CAUTION**

This 3230 contains sensitive devices that can be damaged by static discharge. Use appropriate static control methods when working inside the 3230.

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 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.

## **5.3 Preparation for Shipment and Storage**

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. 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 for a Return Authorization (RA) number before sending any shipments to the factory:

**cst@cohu.com**

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.

- end text-

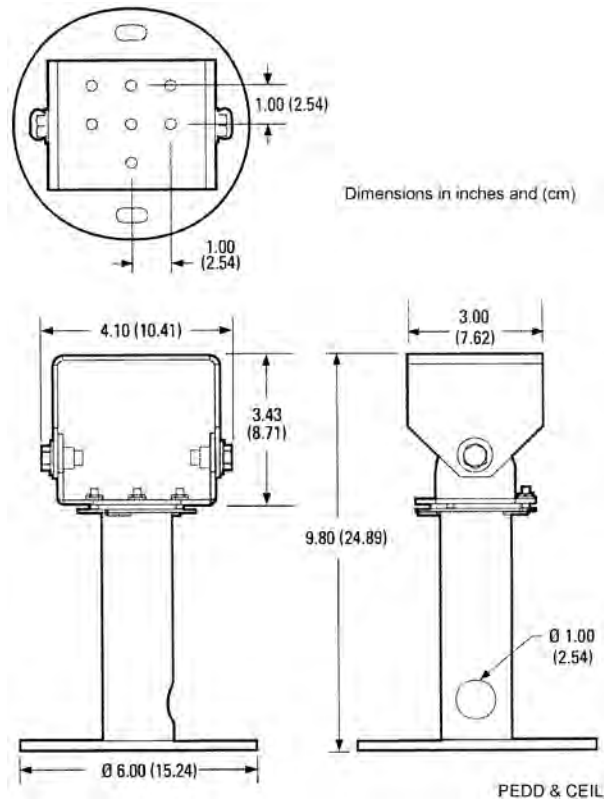


Figure 10. Dimensions, PEDD and CEIL Mounts

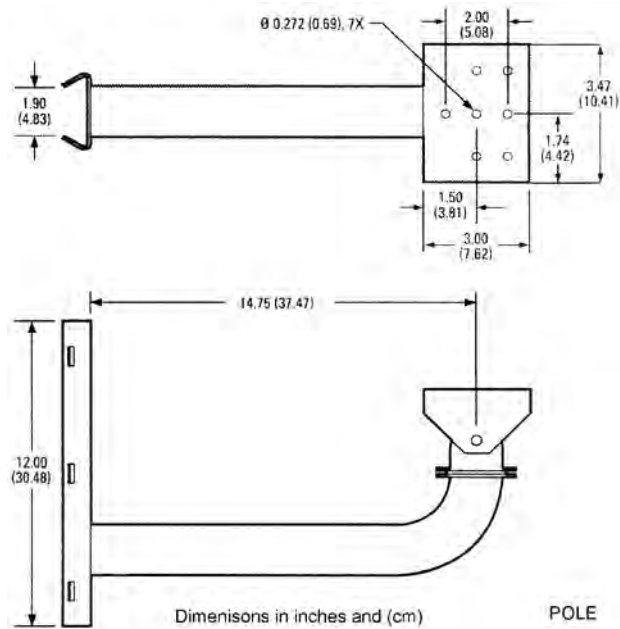


Figure 11. Dimensions, POLE Mount

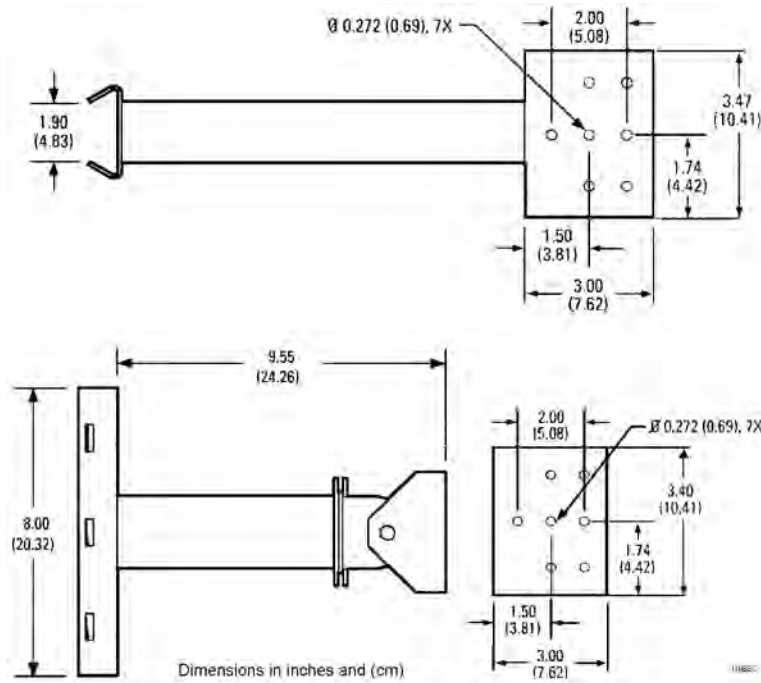


Figure 12. Dimensions, MAST Mount

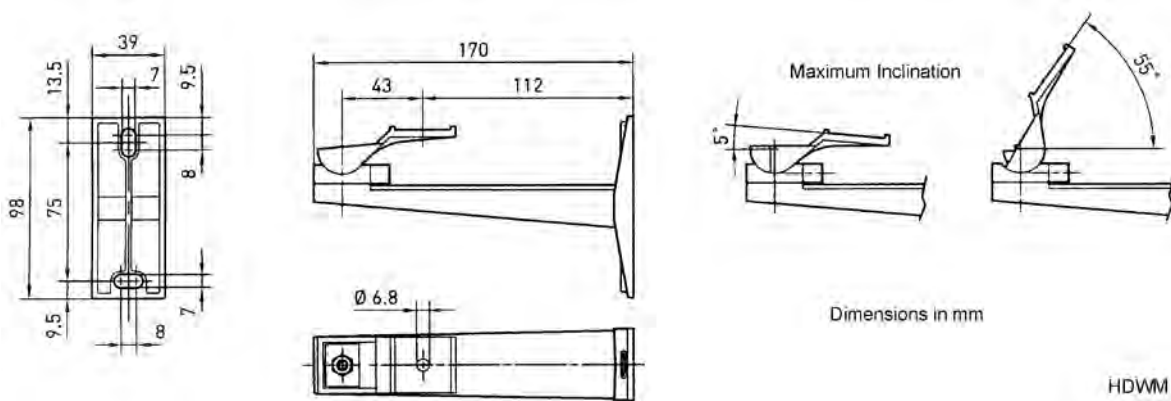


Figure 13. Dimensions, HDWM Mount



Table 8. System Interconnection Cable Characteristics					
FIGURE	CABLE TYPE	DATA TYPE	VIDEO CONNECTION	POWER CONNECTION	DATA CONNECTION
<b>12 V dc</b>					
14	CA-253A	RS-232	stripped leads	stripped leads	stripped leads
15	CA-253B		BNC	stripped leads	D9 female
16	CA-254A	RS-422	stripped leads	stripped leads	stripped leads
17	CA-254B		BNC	stripped leads	232/422 converter
18	CA-254M		BNC	stripped leads	RJ-45
<b>24 V AC/dc</b>					
19	CA-292A	RS-232	stripped leads	stripped leads	stripped leads
20	CA-292B		BNC	stripped leads	D9S
21	CA-293A	RS-422	stripped leads	stripped leads	stripped leads
22	CA-293B		BNC	stripped leads	232/422 converter
23	CA-293M		BNC	stripped leads	RJ-45
<b>115 V Ac</b>					
24	CA-295E	RS-422	stripped leads	stripped leads	stripped leads
25	CA-295F		BNC	115 plug	stripped leads
26	CA-295G		BNC	115 plug	232/422 converter
27	CA-295M		BNC	115 plug	RJ-45
28	CA-296A	RS-232	stripped leads	stripped leads	stripped leads
29	CA-296B		BNC	115 plug	stripped leads
30	CA-296C		BNC	115 plug	D9S

*Note: The Camera end of all these cables use an 18-pin MS connector*

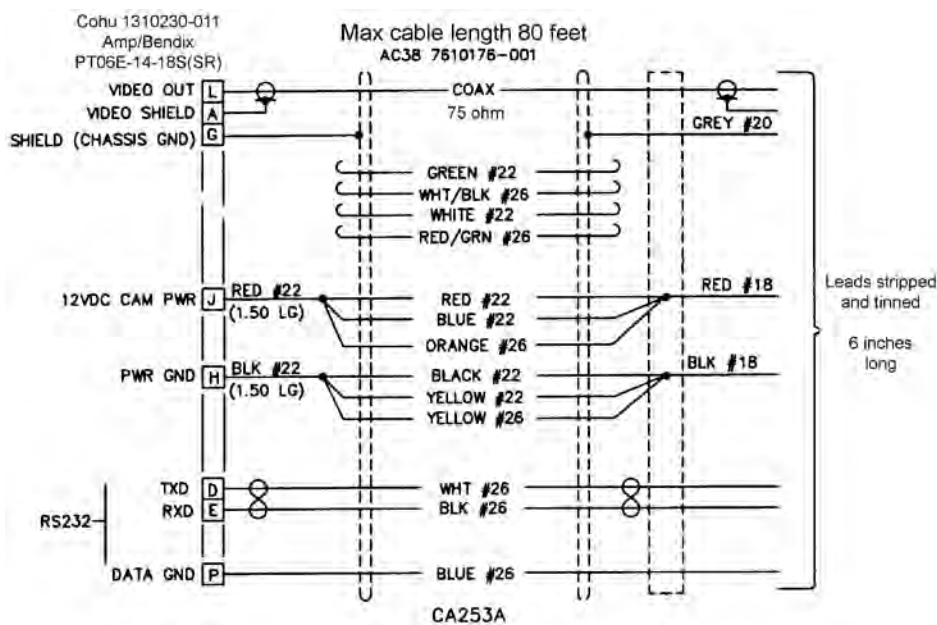


Figure 14. Type CA-253A System Interconnection Cable

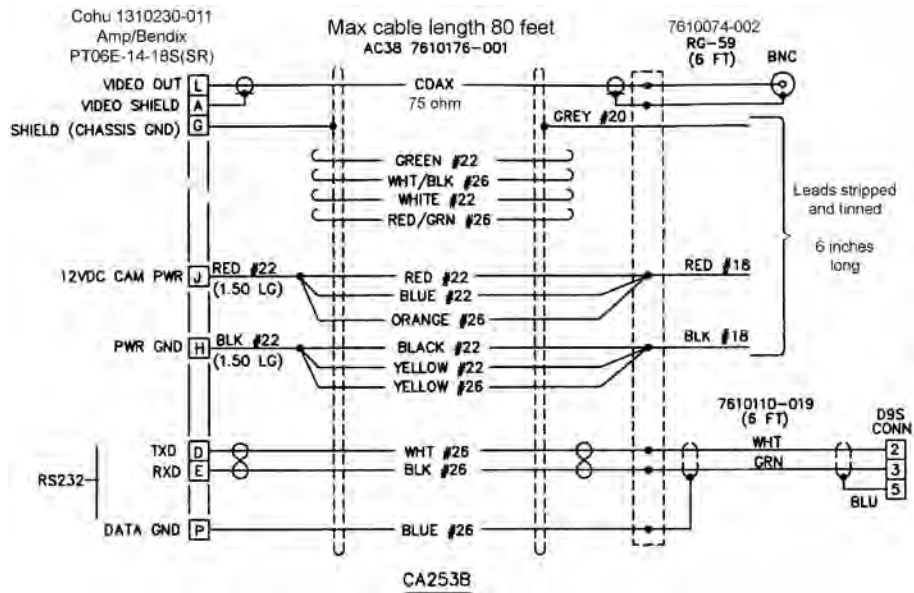


Figure 15. Type CA-253B System Interconnection Cable

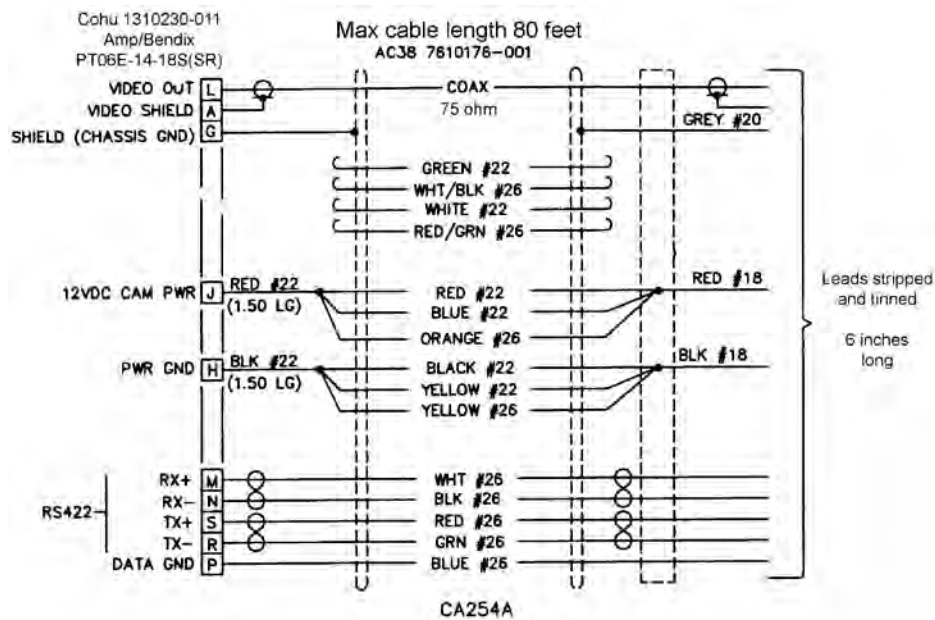


Figure 16. Type CA-254A System Interconnection Cable

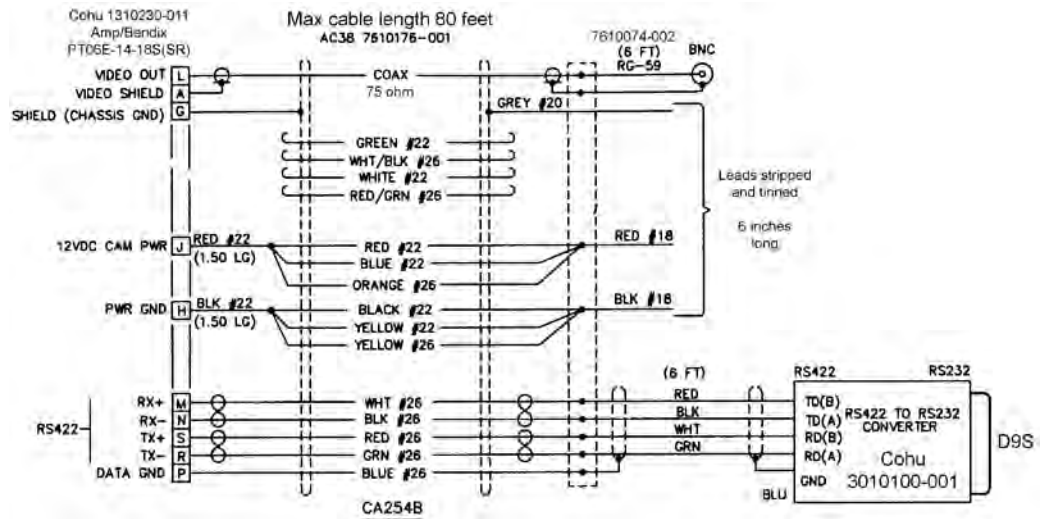


Figure 17. Type CA-254B System Interconnection Cable

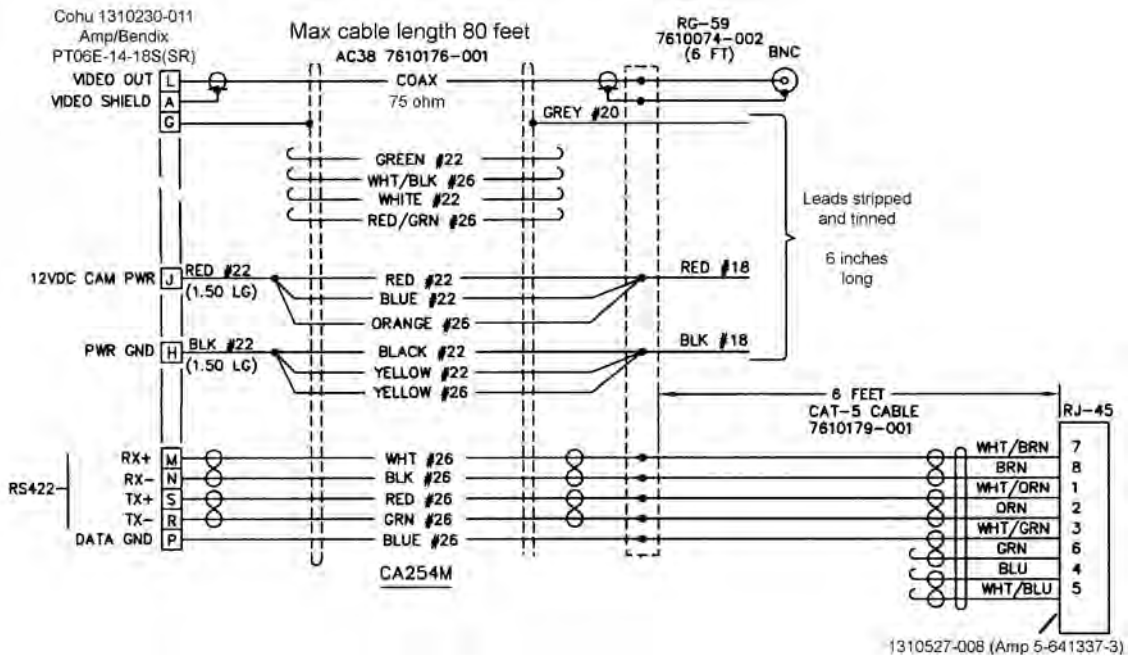


Figure 18. Type CA-254M System Interconnection Cable

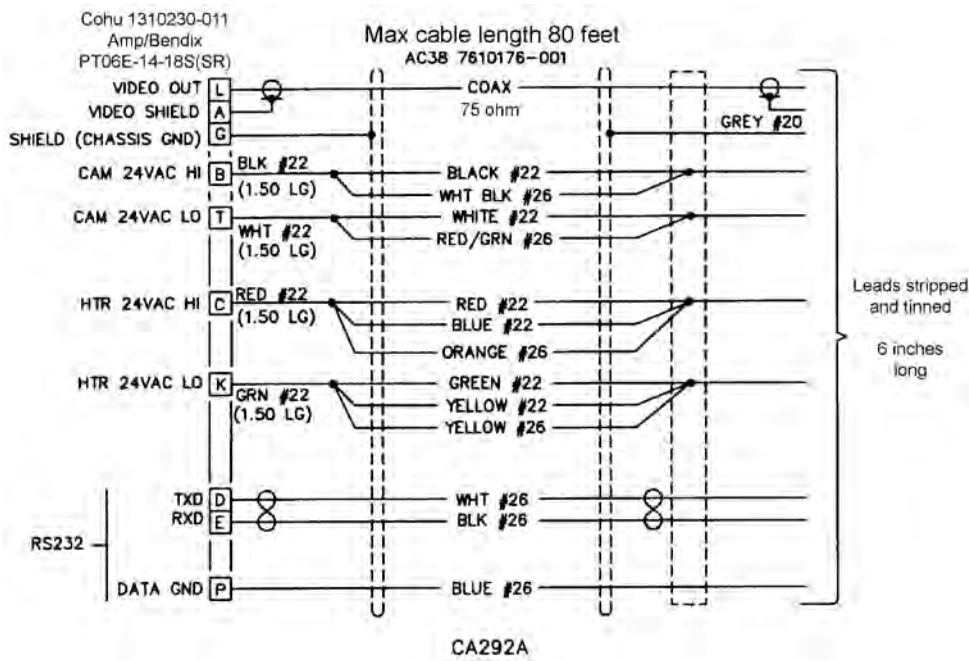


Figure 19. Type CA-292A System Interconnection Cable

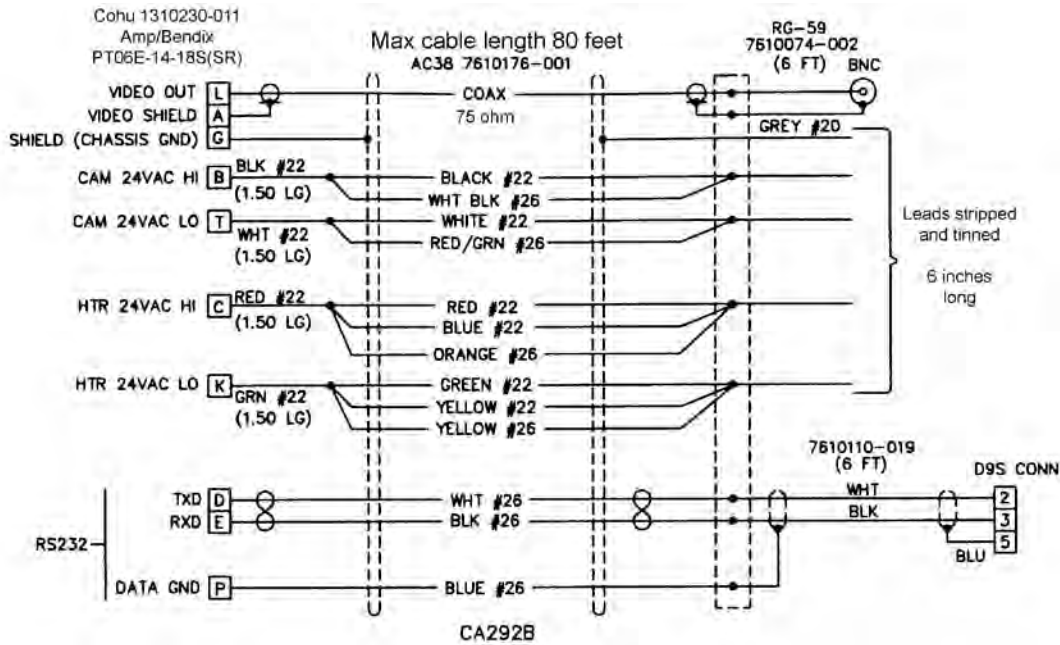


Figure 20. Type CA-292B System Interconnection Cable

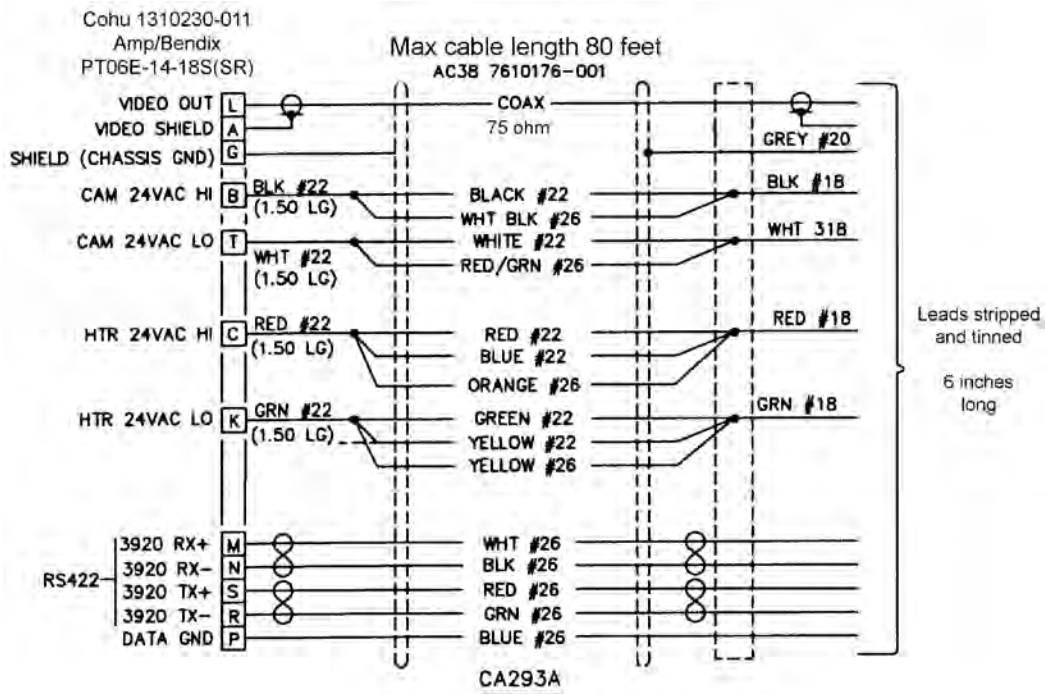


Figure 21. Type CA-293A System Interconnection Cable

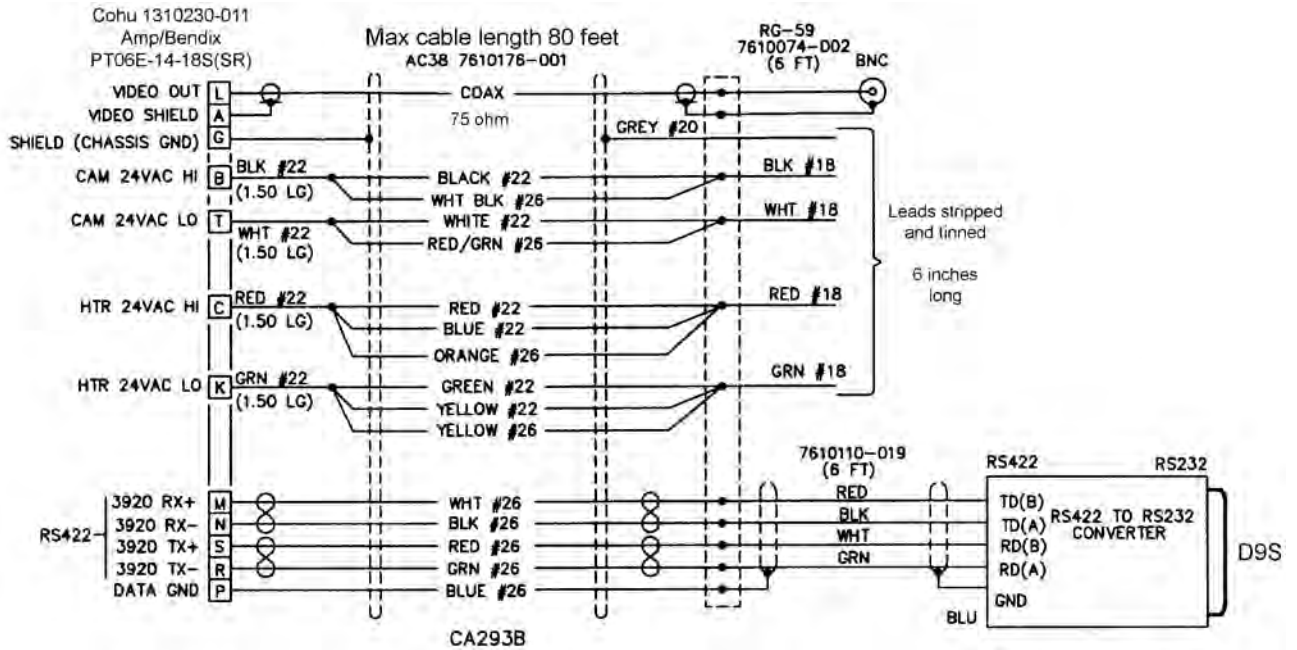


Figure 22. Type CA-293B System Interconnection Cable

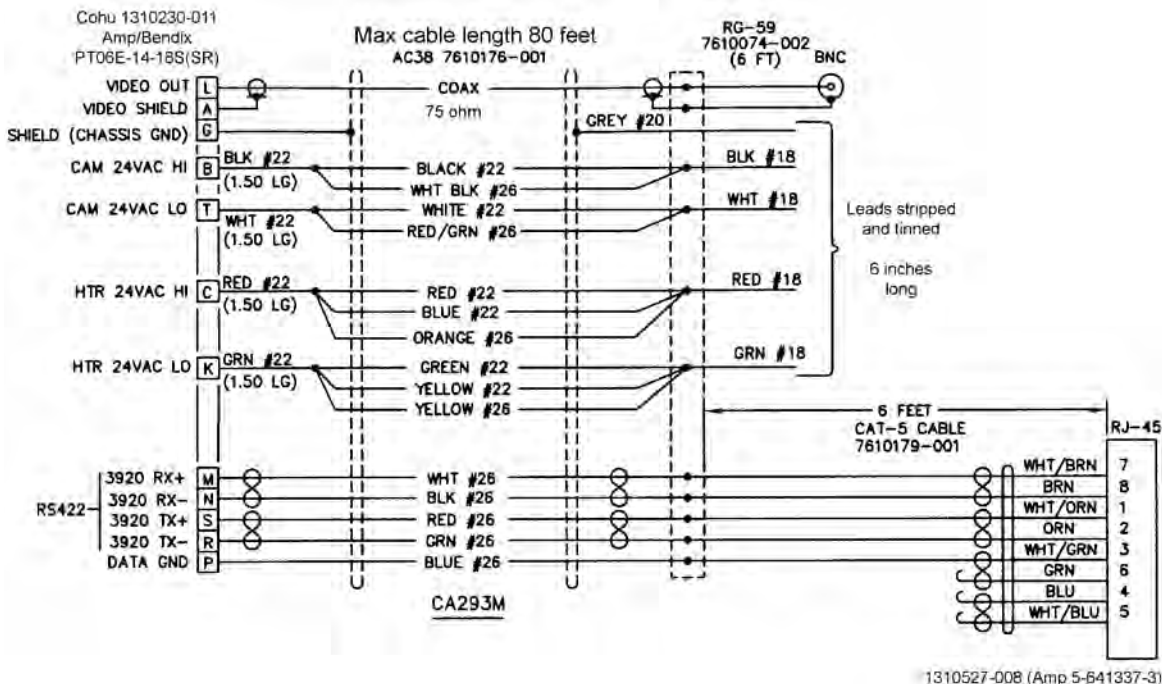


Figure 23. Type CA-293M System Interconnection Cable

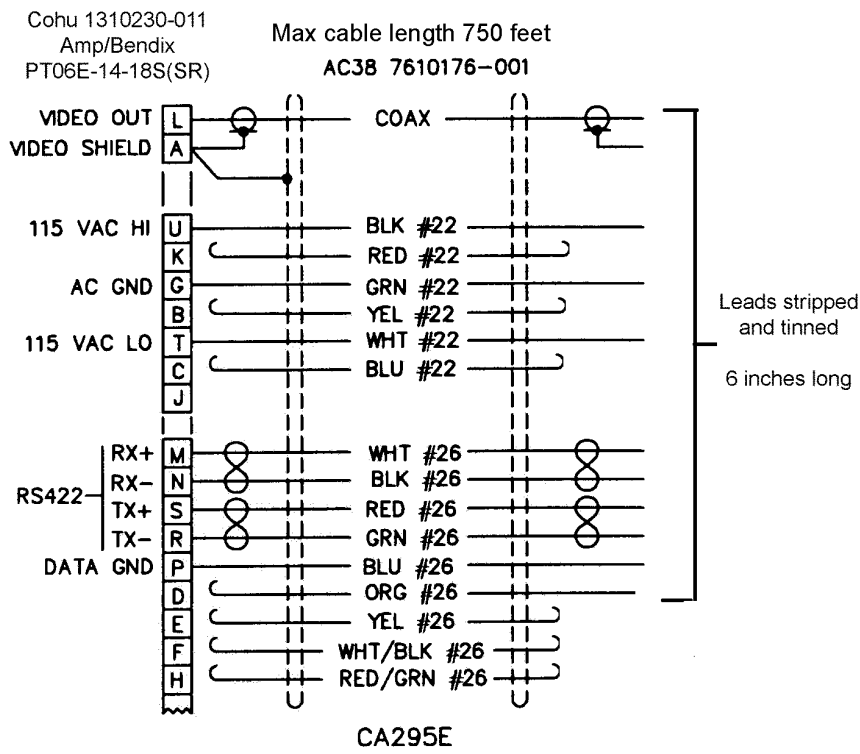


Figure 24. Type CA-295E System Interconnection Cable

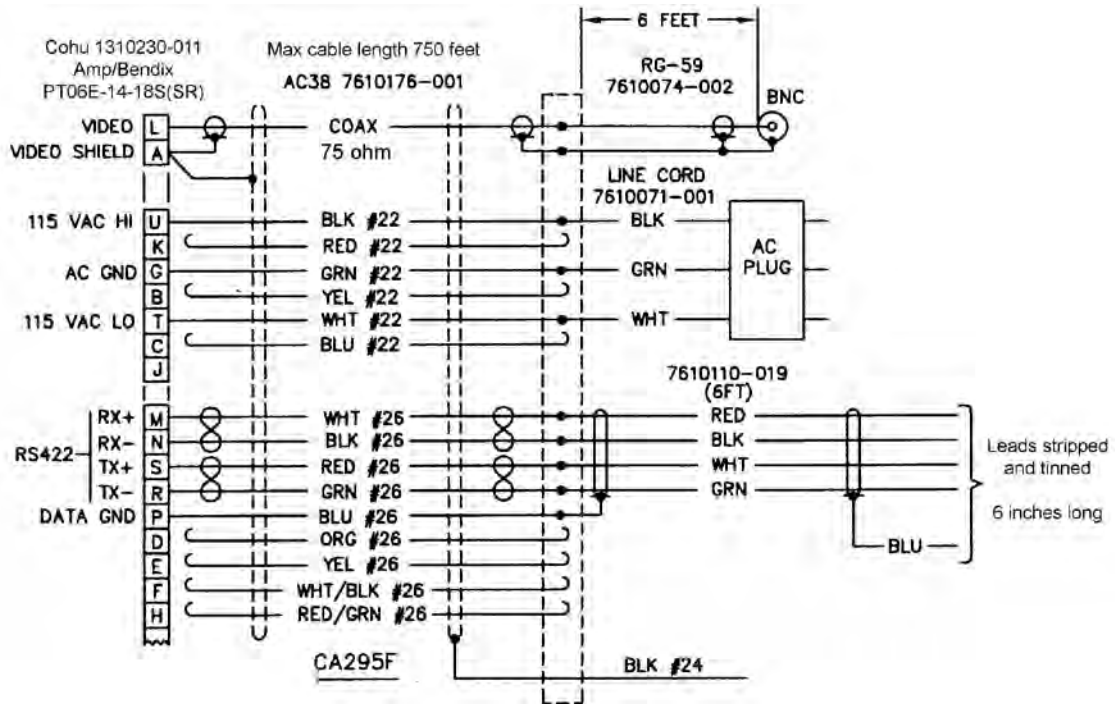


Figure 25. Type CA-295F System Interconnection Cable

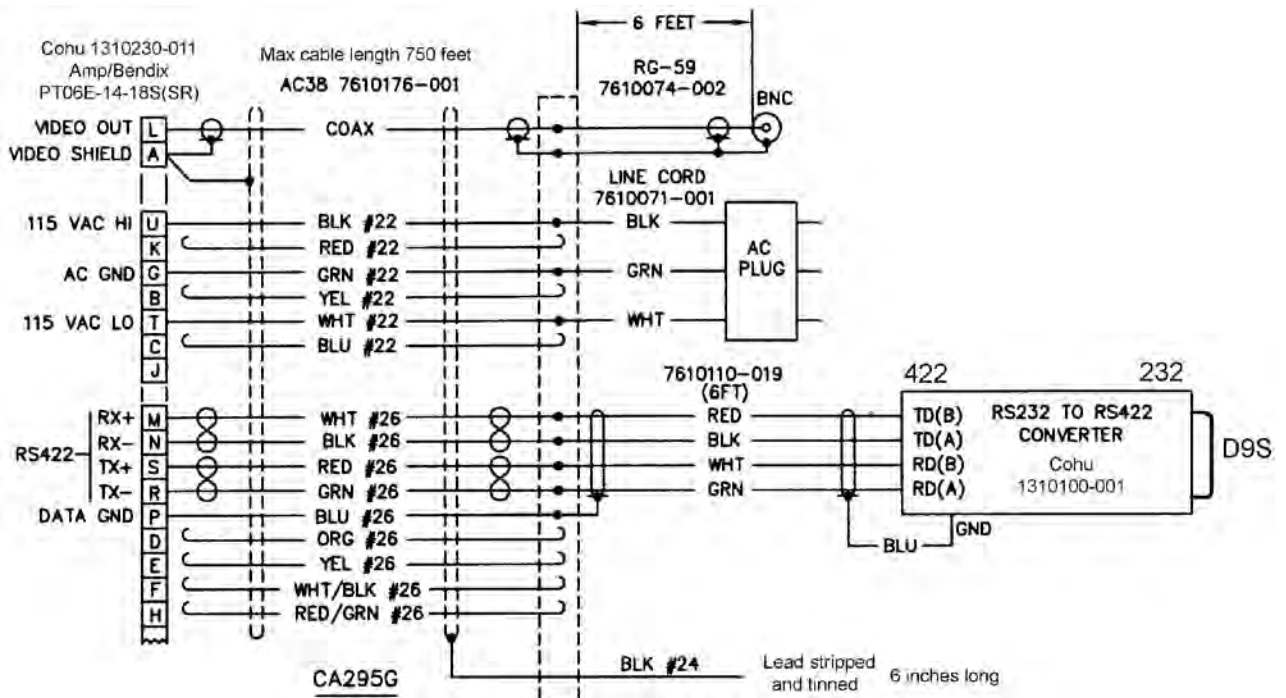


Figure 26. Type CA-295G System Interconnection Cable

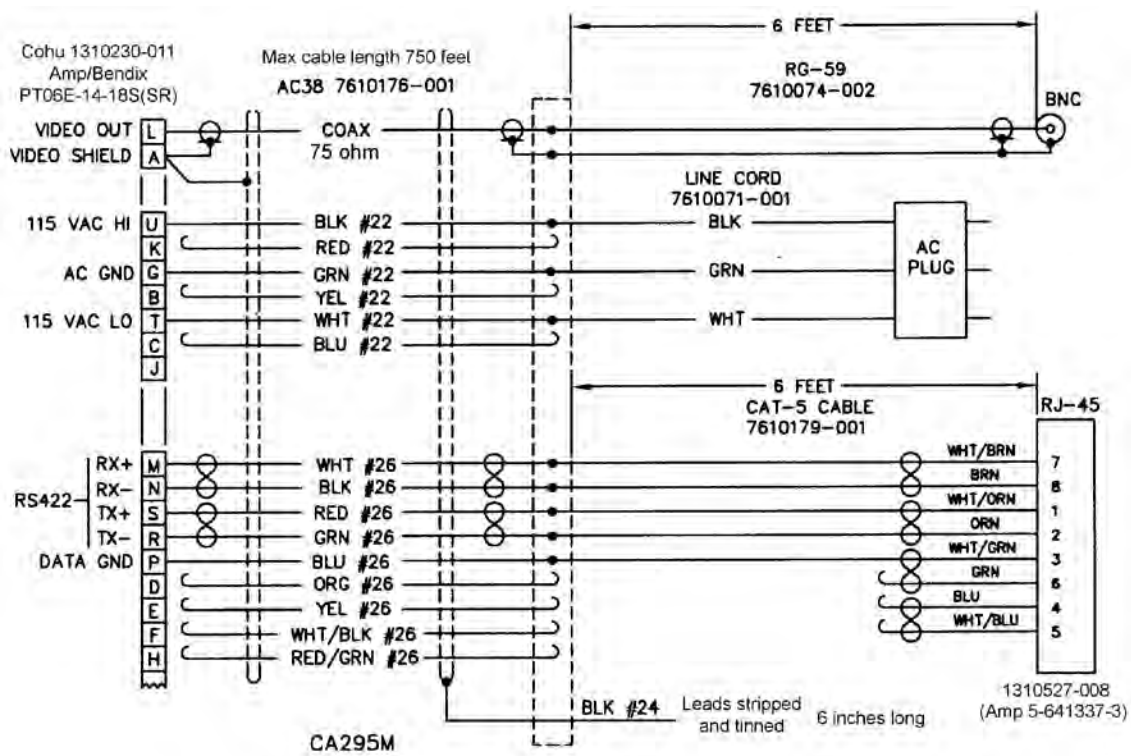


Figure 27. Type CA-295M System Interconnection Cable

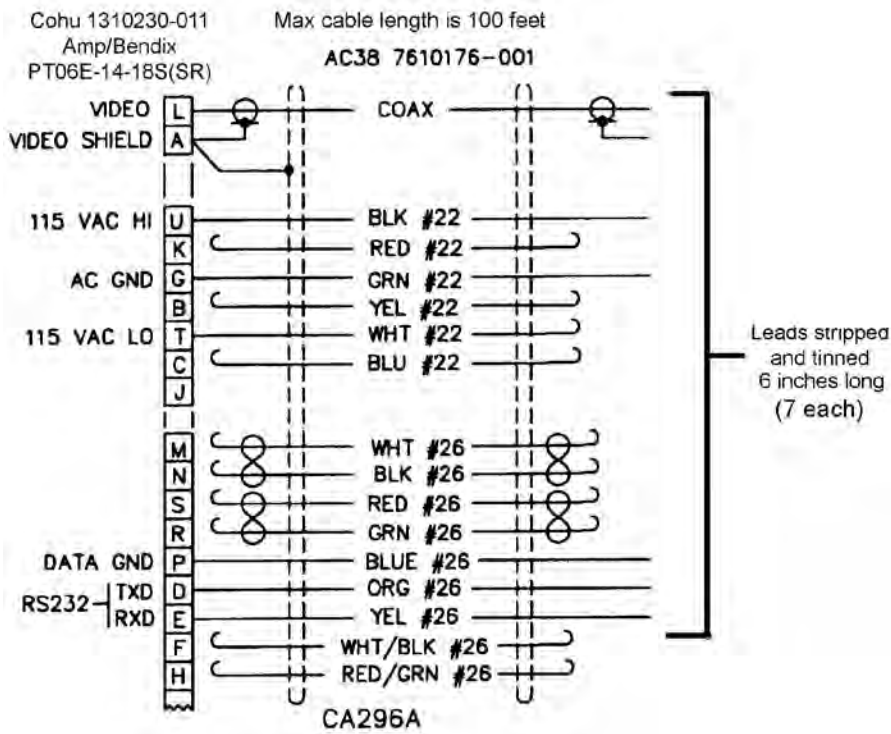


Figure 28. Type CA-296A System Interconnection Cable



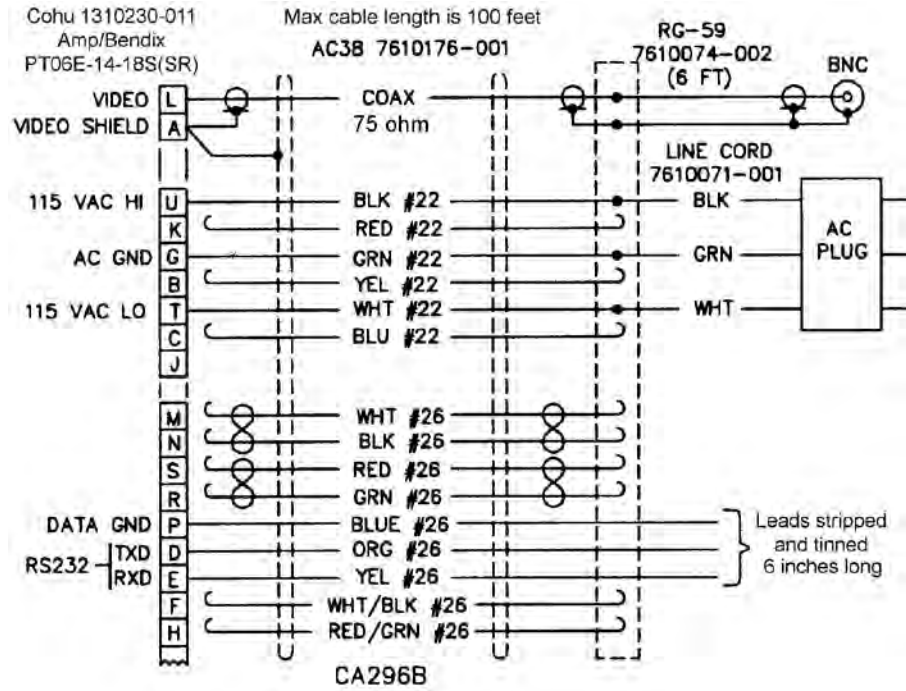


Figure 29. Type CA-296B System Interconnection Cable

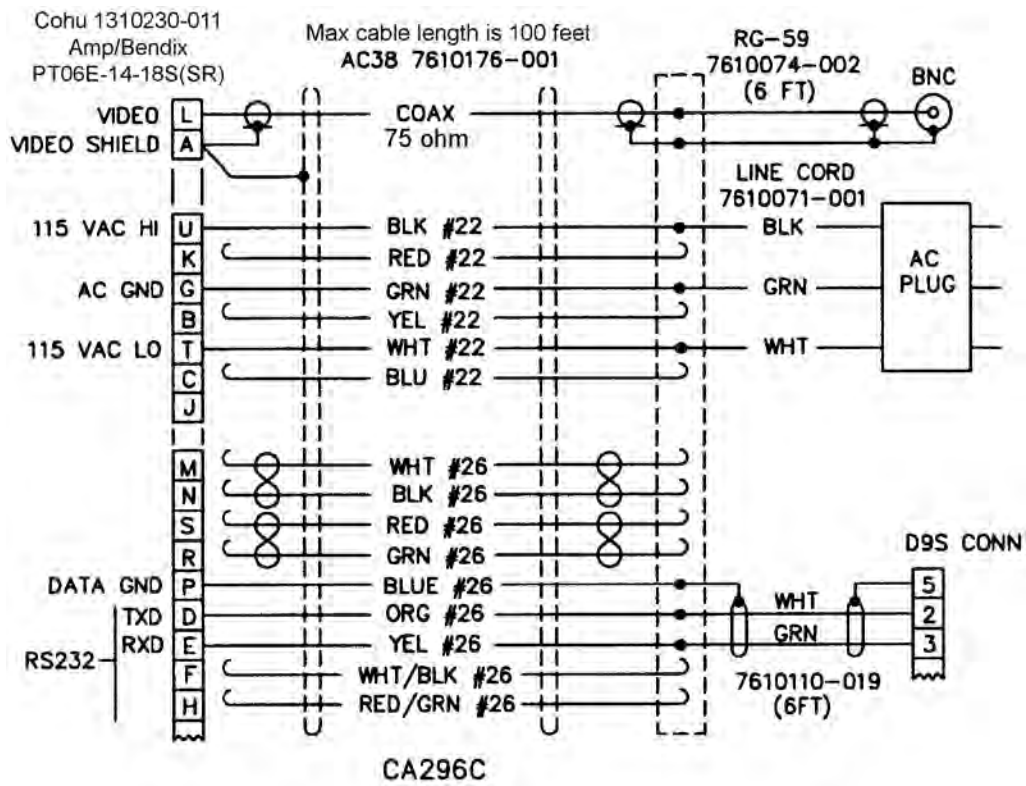


Figure 30. Type CA-296C System Interconnection Cable

**Table 9. Specifications**

<b>CAMERA</b>	
Image Sensor	1/4 inch Sony Super HAD
Total Pixels	NTSC: 811 X 508; PAL: 795 x 596
Resolution	480 tvl
Sync	Crystal
Sensitivity	1.0 lux at 1/60 shutter (day / color mode (30 IRE) 0.2 lux at 1/60 shutter (night / mono mode) (30 IRE) 0.001 lux at 2 second /128 fields integration (night / mono mode (30 IRE)
Video Output	1.0 V p-p, 75 ohms unbalanced
Integration	Maximum duration of automatic long term integration can be limited from 1/30 sec (1/25 PAL) (2 fields) up to 2 sec (128 fields). When long term integration is active, frame store provides continuous output at the normal 1/60 (1/50 PAL) rate.
Shutter Speed Settings	1/60, 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, and 1/10,000
Iris	Automatic / manual selectable
Gamma Setting	0.45
Signal to Noise	48 dB
<b>Lens</b>	
Zoom	30x optical zoom, 3.3 mm to 99 mm; f/1.6 to f/3.2
Lens Focus	Auto / manual selectable
Digital Zoom	Up to 10x with smooth transition produces effective digital focal length from 3.3 to 999 mm
<b>Operational</b>	
Day/Night Control	Auto, color, or monochrome
Zoon Control	Zoom in / out; Len speed fast / slow setting; Zoom range setting (Start and End points)
Digital Zoom	Set maximum digital zoom range (Off, 2x, 5x, 10x)
Camera ID (Address)	256 programmable addresses, 000 to 255, with final address capability
Site Description ID	One line of up to 10 characters, lower left
Backlight Compensation	Normal (Off), Level 1 or Level 2 compensation modes, with 5 selectable compensation areas
White Balance Control	Auto, manual (blue and red), Indoor, Outdoor modes
Sharpness Control	Edge sharpness control (0 to 15) where lower numbers represent softer edges
Image Top/Bottom Flip	On/off. When on, flips image top / bottom (used when camera is mounted upside down)
<i>continued on next page</i>	

<b>Table 9. Specifications (continued)</b>	
<b>Mechanical</b>	
<b>Dimensions</b>	
Weight	5 lb (2.7 kg)
Camea Mount	Five 1/4-20 threaded holes
Connector	18 pin MS (PT-07C-14-18P) Mating plug included
<b>Electrical</b>	
Input Voltage	12 V dc; or 24 V ac/dc; or 115 V ac
Power	4 W (22 W heater on)
Communications	RS-422 4-wire half duplex; RS-232 half duplex
<b>Environmental</b>	
Temperature	Operating: -50 to 60 °C (-58 to 140 °F)
Protection Rating	Storage: -30 to 60 °C (-22 to 140 °F)
Humidity	Up to 100 percent relative
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-4-5400T, paragraph 3.2.24.7, 3.2.24.8, and 3.2.24.9
<b>Shipping Information</b>	
Weight	8 lb (3.6 kg)
Volume	18 x 12 x 12 inches (457 x 304 x 304 mm)
- end table -	

**COHU ELECTRONICS WARRANTY**

Cohu, Inc., Electronics Division warrants equipment manufactured to be free from defects of material and workmanship. Any such defective part or parts will be repaired or replaced when confirmed by Cohu examination to have become defective within two years from the date of shipment to the original purchaser for standard CCD, CMOS and uncooled thermal cameras and one year from date of shipment to the original purchaser for image intensified 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 Cohu 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 or replaced without charge.

This Warranty does not extend to Cohu equipment subjected to misuse, accident, neglect, improper application, or repaired or altered other than by Cohu, or unless 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 their original manufacturers. This Warranty is in lieu of all other warranties, express, implied, or statutory, including warranties of fitness for a particular purpose and merchantability, and this Warranty sets forth the purchaser's sole remedy in connection with such warranties. Whether as a result of breach of contract or warranty, tort (including negligence) or otherwise, Cohu shall not be liable for any penalties regardless of reason, including but not limited to 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.

11-06

**COHU**  
Cohu Inc., Electronics Division