Installation/Operation

CC3701H-2 and CC3701H-2X
DSP Color Camera with EDR

C1937M-C (4/03)
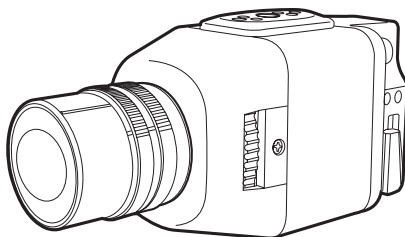
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IMPORTANT SAFEGUARDS AND WARNINGS

Prior to installation and use of this product, the following WARNINGS should be observed.

1. Read these instructions.

2. Keep these instructions.

3. Heed all warnings.

4. Follow all instructions.

5. Do not use this apparatus near water.

6. Clean only with dry cloth.

7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

8. Do not install near any heat sources, such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

9. Only use attachments/accessories specified by the manufacturer.

10. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

11. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, the apparatus does not operate normally, or the apparatus has been dropped.

12. Apparatus shall not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the apparatus.

13. **Warning:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

14. **Caution:** Danger of explosion if battery is replaced incorrectly. Replace only with the same or equivalent type.

15. To reduce the risk of shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

16. Use only installation methods and materials capable of supporting four times the maximum specified load.

17. Use only UL listed class 2 power supply.

The product and/or manual may bear the following marks:

This symbol indicates that dangerous voltage constituting a risk of electric shock is present within this unit.

This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.

CAUTION:
RISK OF ELECTRIC SHOCK. DO NOT OPEN.

Please thoroughly familiarize yourself with the information in this manual prior to installation and operation.

REGULATORY NOTICES

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and the receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

DESCRIPTION
The CC3701H-2 and CC3701H-2X are high resolution, color video cameras with a 1/3-inch CCD imager. The cameras feature an extended dynamic range (EDR) mode, a direct drive/auto iris lens connector, adjustable back focus, backlight compensation, automatic gain control, and an adjustable C/CS lens mount.

Models
CC3701H-2   High resolution, 480 TV lines, SuperHAD™ CCD, minimum illumination of 0.4 lux at f1.2 and 30 IRE, NTSC format
CC3701H-2X   High resolution, 470 TV lines, SuperHAD™ CCD, minimum illumination of 0.4 lux at f1.2 and 30 IRE, PAL
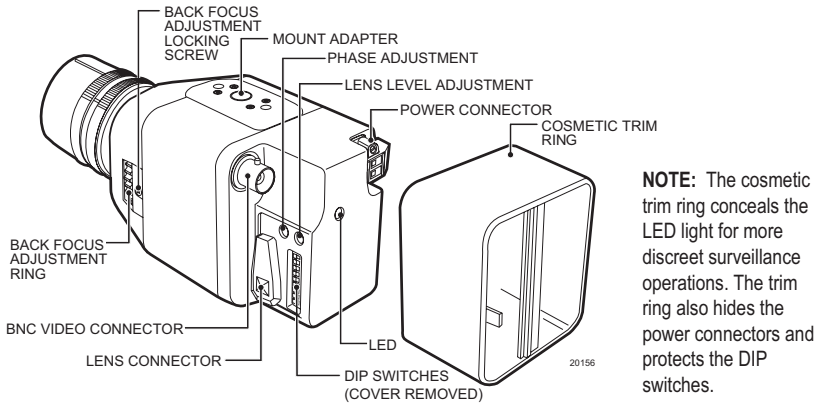
CAMERA LAYOUT

NOTE: The cosmetic trim ring conceals the LED light for more discreet surveillance operations. The trim ring also hides the power connectors and protects the DIP switches.

Figure 1. Camera Layout

INSTALLATION

Lens Mounting

The camera can use a fixed iris, manual iris or auto iris lens. The camera is factory set for a CS-mount lens, but is easily adjusted for a C-mount lens.

1. **C-Mount Lens Only -** Rotate the back focus adjustment fully counterclockwise before installing the C-mount lens (refer to the section on *Back Focus Adjustment*).

2. Remove the cosmetic trim ring from the back of the camera (refer to Figure 1). Set the lens mode selector switch on the side of the camera to AIV (auto iris video drive lens) or AID (auto iris DC drive lens). Refer to the *Switch Settings* section. Switch setting is determined by the type of lens used.

3. Screw the lens onto the lens mount. Be careful to prevent dust from entering the space between the lens and the CCD element. If necessary, use clean, compressed air to remove any foreign matter.

4. Thread the lens cable through the cosmetic trim ring.

5. Connect the auto iris lens to the four-pin connector located on the side of the camera. Pin connections for the iris drive connector are as follows:

PIN	DC (AID) AUTO IRIS LENS	VIDEO (AIV) AUTO IRIS LENS
1	Control coil negative (-)	Lens positive supply
2	Control coil positive (+)	Not used
3	Drive coil positive (+)	Video drive signal
4	Drive coil negative (-)	Ground

Figure 2. Lens Connections

Camera Mounting

Use a standard 1/4-20 screw (provided) with a maximum thread length of 3/8-inch (10 mm) for top or bottom camera mounting. The mount adapter may be fitted to the top or bottom of the camera. The camera is shipped with the mount adapter located on the top of the camera.

To change the mount adapter position:

1 Remove the four screws from the mount adapter located on the top of the camera.

2 Remove the trim cover from the bottom of the camera by prying it loose. Place the trim cover on the top of the camera where the mount adapter was removed. Press into place.

3 Install the mount adapter to the bottom of the camera. Secure with the four screws removed in step 1.
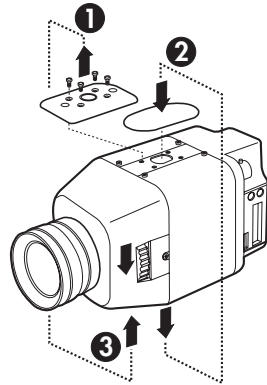

Figure 3. Camera Mounting

Power and Video Connections

The camera is designed to operate from a 12 VDC or 24 VAC power supply. The power supply connections are shown in Figure 1. The LED on the back panel of the camera indicates that power is connected. Use only a Class 2 isolated power supply. See Specifications for power consumption.
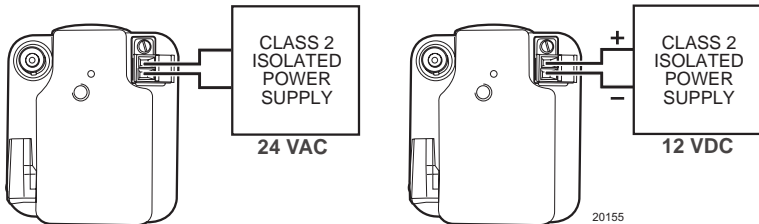

Figure 4. Power Supply Connections

To connect the camera power and video:

1. Remove the cosmetic trim ring from the camera (refer to Figure 1). Thread cabling through the rear cover.

2. Connect the power cable to the two-pin power connector on the back of the camera using the terminal block connector (provided). Refer to Table A for the recommend wire gauge and wiring distances.

3. Connect a video cable to the SIGNAL OUT connector (BNC) on the back of the camera. Refer to Table B for the type of video coaxial cable to use.

4. Reattach the cosmetic trim ring to the back of the camera.

AC operation only - If you are wiring more than one camera to the same transformer, connect one side of the transformer to the same terminal on all cameras, and connect the other side of the transformer to the remaining terminal on all cameras. Failure to connect all of the cameras the same way will cause the cameras to be out of phase with each other and may produce a vertical roll when switching between cameras.

Table A. Recommended Wire Gauge and Wiring Distances

The following are the recommended maximum distances for 24 VAC applications and are calculated with a 10-percent voltage drop. (Ten percent is generally the maximum allowable voltage drop for AC-powered devices.)

Wire Gauge

Total vA	20 (0.5 mm2)	18 (1.0 mm2)	16 (1.5 mm2)	14 (2.5 mm2)	12 (4.0 mm2)	10 (6.0 mm2)
10	283 (86)	451 (137)	716 (218)	1142 (348)	1811 (551)	2880 (877)

Example: A camera that requires 10 vA and is installed 283 feet (86 m) from the transformer would require a minimum wire gauge of 20 AWG.

NOTE: Wire gauges are standard AWG or metric sizes. Distances are calculated in feet; values in parentheses are meters.

Table B. Video Coaxial Cable Requirements

Cable Type*	Maximum Distance
RG59/U	750 ft (229 m)
RG6/U	1,000 ft (305 m)
RG11/U	1,500 ft (457 m)

* Minimum cable requirements:
      75 ohms impedance
      All-copper center conductor
      All-copper braided shield with 95% braid coverage

LENS SETUP AND FOCUS PROCEDURES

Video Drive Auto Iris Lens

Set the lens mode selector switch to AIV. Switch the ESC and AGC OFF. Refer to the lens instructions and adjust the lens for the optimum picture (video output level of 1V peak-to-peak). To focus, fully open the iris by covering the lens with a suitable neutral density (ND*) filter. If the viewed scene is 6.5 feet (2 m) away or farther, set the lens focus to infinity (far). Use the back focus adjustment ring (refer to the Back Focus Adjustment section) and focus on the selected scene. Remove the ND filter and set the lens focus as required. Set the AGC switch to ON, as required. Most scenes benefit from AGC.

Direct Drive (DC) Auto Iris Lens

Set the lens mode selector switch to AID (default setting). Switch the ESC and AGC OFF. Use an appropriate screwdriver to turn the lens level potentiometer (refer to Figure 1) fully clockwise. Next, slowly adjust the potentiometer counterclockwise until the optimum picture is obtained (video output level of 1V peak-to-peak). To focus, fully open the iris by covering the lens with a suitable neutral density (ND*) filter. Select the scene to be viewed. If the viewed scene is 6.5 feet (2 m) away or farther, set the lens focus to infinity (far). Use the back focus adjustment ring (refer to the Back Focus Adjustment section) and focus on the selected scene. Remove the ND filter and set the lens focus as required. When finished, switch the ESC and AGC ON.

Fixed Lens - No Iris

Set the ESC and AGC switches ON (default settings). To focus, set the lens focus to infinity and view an image greater than 6.5 feet (2 m) away. Focus the image with the back focus adjustment ring (refer to the *Back Focus Adjustment* section). Set the lens focus as required.

Manual Iris Lens

Set the ESC and AGC switches ON (default settings). To focus, open the iris fully and set the lens focus to infinity. View an image greater than 6.5 feet (2 m) away. Focus the image with the back focus adjustment ring (refer to the *Back Focus Adjustment* section). Adjust the lens focus, set the iris (if equipped) for the best picture quality. The largest aperture gives the best light sensitivity, the smallest aperture the greatest depth of field.

Zoom Lens

Set the lens focus to infinity (far) and fully open the iris by covering the lens with a suitable neutral density (ND*) filter. Zoom out to the widest field of vision and view a distant object. Adjust the back focus adjustment ring until the object is in focus (refer to the Back Focus Adjustment section). Next, zoom fully in and adjust the lens focus until the object is again focused. Repeat these steps until the full zoom range may be viewed with the minimum loss of focus.

* **NOTE:** *For best results, outdoors, use an ND3 filter.*

BACK FOCUS ADJUSTMENT

The back focus adjustment is located at the front of the camera and is accessible from either side of the case.

To adjust the back focus:

1. Loosen the two back focus locking screws (one on each side).

2. Turn the back focus ring until the object is in focus.

3. When the back focus adjustment is satisfactory, tighten the locking screws. Do not over tighten the locking screw or force the back focus adjustment ring.
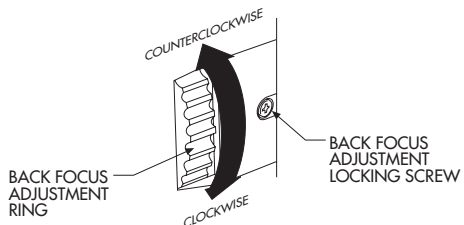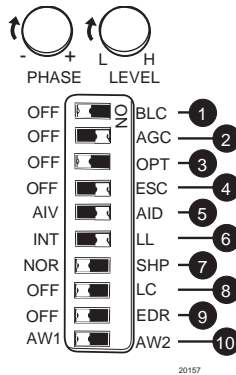

Figure 5. Back Focus Adjustment

SWITCH SETTINGS

Figure 6. DIP Switch Default Settings

Note: White indicates switch setting.

NOTE: *Under most conditions, no setting of switches will be required. Please read the details of each switch before making any adjustments.*

❶ BLC - Back Light Compensation
OFF (Default setting) - Disables the BLC mode.
BLC - Enables the BLC mode. If a bright backlight is present, the objects in the picture may appear dark or as a silhouette. BLC enhances objects in the center of the picture, and can be used to improve picture quality; in a fixed scene.

❷ AGC - Automatic Gain Control
OFF - Disables the AGC mode.
AGC (Default setting) - Enables the AGC mode. Automatically adjusts the image to compensate for changes in light levels. Most scenes benefit from AGC operation.

❸ OPT - Optima
OFF (Default setting)
OPT - Boosts the video by 3 dB. Only use if your video signal appears weak on your monitor.

❹ ESC - Electronic Shutter Control
OFF - Disables the ESC mode.
ESC (Default setting) - Enables the ESC mode. The ESC function automatically changes the sensitivity of the camera by varying the electronic shutter speed according to the amount of incident light. Electronic shutter speed range is 1/60 to 1/100,000. Should only be used with an AID or manual iris lenses. Do not use with an AIV type lens.

❺ AIV/AID - Auto Iris Lens Mode Selector
The switch setting is determined by the type of lens used:
AIV - Video controlled Auto Iris lens. Disable the ESC mode when using an AIV type lens.
AID (Default setting) - DC controlled Auto Iris lens.

❻ INT/LL - Internal/Line Lock
Line Lock (LL) (Default setting) - Locks the vertical frame to the power supply frequency. Eliminates vertical roll caused by multiple cameras connected to the same switching device.
Internal - Locks the vertical frame to the internal oscillator. Use with DC or unstable AC.

NOTE: *If DC power is applied when the INT/LL switch is in the LL position, the camera will not function. Switch the mode to INT.*

➐ NOR/SHP - Sharpness

NOR (Default setting) - Sets the camera to normal sharpness mode.
SHP - Enables the Sharpness mode. Enhances picture detail by increasing the aperture gain of the camera, sharpening the edges in the picture. In some scenes, the SHP mode will increase edge noise on your monitor.

➑ LC - Long Line Compensation

OFF (Default setting) - Disables the Long Line Compensation mode.
LC - Enables the Long Line Compensation mode. Boosts the video drive level to 1.25 Vp-p for long line transmission. Use only if your wiring is causing video signal deterioration.

➒ EDR - Extended Dynamic Range

OFF (Default setting) - Disables the EDR mode.
EDR - Enables the EDR mode to help balance a scene with a large dynamic range. Use this feature to improve the picture in washed-out areas. This feature adds 12X the dynamic range, but also increases dark area picture noise. See page 10 for further details.

➓ AW1/AW2 - Automatic White Balance

AW1 (Default Setting) - Automatically processes the viewed image to retain color balance over a wide color temperature range.
AW2 - Processes the viewed image to retain color balance in a restricted color temperature range. Use only when AW1 causes an unbalanced color picture.

CAMERA SYNCHRONIZATION (AC OPERATION ONLY)

When using more than one camera power supply, a brief vertical roll may occur on the monitor when a camera view is switched. To eliminate vertical roll, adjust the phase control by synchronizing, or line-locking, the cameras to one another. Use the phase potentiometer located on the side of the camera (refer to Figure 1) to make adjustments.

It may be necessary to have two people in communication when synchronizing the cameras: one person at the camera and another person at the monitor to observe the vertical roll and the effect of any adjustments made at the camera.

To synchronize the cameras do the following:

1. Choose a reference camera to which all other cameras will be phased.

2. Select a camera and synchronize it to the reference camera by turning the phase adjustment control clockwise and/or counterclockwise.

3. Each time an adjustment is made, switch back and forth between the camera you are adjusting and the reference camera. Repeat this process as many times as necessary, until the roll between the cameras is no longer noticeable.

4. Adjust the phase of all other cameras by repeating steps 2 through 3. Always adjust to the reference camera selected in step 1.

NOTE: *The preferred method for camera phase adjustment is to use a dual trace oscilloscope to align the vertical sync pulses of the reference camera to the selected camera(s).*

DYNAMIC RANGE AND THE EDR (EXTENDED DYNAMIC RANGE) FEATURE

Dynamic range is the ratio between the brightest and darkest parts of an image or scene. A scene that ranges from bright sunlight to deep shadows is said to have a high dynamic range, while indoor scenes with less contrast will have a low dynamic range.

The EDR feature will help capture the entire range of the scene. A 12 times improvement in dynamic range can be achieved with this feature. In scenes with very high dynamic range, the EDR feature will exhibit a higher noise level than when the feature is turned off. This is normal, and not a mal-function.

NOTE: *Depending on the scene contrast, it may or may not be possible to capture the entire range with any camera. Careful camera placement should be considered in extreme cases.*

SPECIFICATIONS

GENERAL

CCD Sensor:	1/3-inch interline transfer
Picture Elements	
CC3701H-2:	768 (H) x 494 (V)
CC3701H-2X:	752 (H) x 582 (V)
Sensing Area:	6 mm diagonally
Synchronize System:	INT/AC line lock
Horizontal Resolution	
CC3701H-2:	480 TV lines
CC3701H-2X:	480 TV lines
Iris Control:	Electronic/passive
Minimum Illumination:	0.4 lux at f1.2, 30 IRE
ESC:	1/60-1/100,000 second
Signal-to-Noise Ratio:	52 dB (AGC off)
Gain Control:	Automatic
Vertical Phase:	Adjustable 0° ± 120°
Backlight Compensation:	Selectable by DIP switch setting
Scanning System	
CC3701H-2:	525 lines, 2:1 interlace
CC3701H-2X:	625 lines, 2:1 interlace
Signal Processing:	DSP with microprocessor control
Auto Iris Lens Type:	DC/video control, selectable by DIP switch position
Video Output:	1 Vp-p, 75 ohms
	1.2 Vp-p for long-line transmission

ELECTRICAL

Power Requirements	
24 VAC:	18-30 VAC
12 VDC:	10-36 VDC
Power Consumption	3.3 watts maximum
	5.4 vA maximum
Power Connector	2-pin terminal strip, push-in type with screw fastener
Video Connector	BNC
Lens Jack	4-pin connector (miniature square)

MECHANICAL

Lens Mount	C/CS mount (adjustable)
Camera Mount	Use 1/4-20 screw, top or bottom of camera housing

ENVIRONMENTAL

Operating Temperature:	14° to 122°F (-10° to 50°C)
Storage Temperature:	14° to 158°F (-10° to 70°C)

PHYSICAL

Dimensions:	2.45 (W) x 2.65 (H) x 4.25 (D) inches (6.22 x 6.73 x 10.79 cm)
Weight (without lens):	0.77 lb (0.35 kg)

(Design and product specifications subject to change without notice.)

WARRANTY AND RETURN INFORMATION

WARRANTY

Pelco will repair or replace, without charge, any merchandise proved defective in material or workmanship for a period of one year after the date of shipment. Exceptions to this warranty are as noted below:

- Five years on Pelco manufactured cameras (CC3500/CC3600/CC3700 and MC3500/MC3600 Series); two years on all other cameras.
- Three years on Genex® Series (multiplexers, server, and keyboard) and 090 Series Camclosure® Camera System.
- Two years on 100/150, 200, and 300 Series Camclosure Camera Systems.
- Two years on all standard motorized or fixed focal length lenses.
- Two years on Legacy®, CM6700/CM6800/CM6800E/CM8500/CM9500/CM9740/CM9760 Matrix, DF5 and DF8 Series Fixed Dome products.
- Two years on Spectra®, Esprit®, and PS20 Scanners, including when used in continuous motion applications.
- Two years on Esprit and WW5700 series window wiper (excluding wiper blades).
- Eighteen months on DX Series digital video recorders.
- One year (except video heads) on video cassette recorders (VCRs). Video heads will be covered for a period of six months.
- Six months on all pan and tilts, scanners or preset lenses used in continuous motion applications (that is, preset scan, tour and auto scan modes).

Pelco will warrant all replacement parts and repairs for 90 days from the date of Pelco shipment. All goods requiring warranty repair shall be sent freight prepaid to Pelco, Clovis, California. Repairs made necessary by reason of misuse, alteration, normal wear, or accident are not covered under this warranty.

Pelco assumes no risk and shall be subject to no liability for damages or loss resulting from the specific use or application made of the Products. Pelco's liability for any claim, whether based on breach of contract, negligence, infringement of any rights of any party or product liability, relating to the Products shall not exceed the price paid by the Dealer to Pelco for such Products. In no event will Pelco be liable for any special, incidental or consequential damages (including loss of use, loss of profit and claims of third parties) however caused, whether by the negligence of Pelco or otherwise.

The above warranty provides the Dealer with specific legal rights. The Dealer may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, the Dealer must contact Pelco at (800) 289-9100 or (559) 292-1981 to obtain a Repair Authorization number (RA), and provide the following information:

1. Model and serial number
2. Date of shipment, P.O. number, Sales Order number, or Pelco invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product which does not fall under the warranty conditions stated above, please include a written explanation with the product when returned.

Method of return shipment shall be the same or equal to the method by which the item was received by Pelco.

RETURNS

In order to expedite parts returned to the factory for repair or credit, please call the factory at (800) 289-9100 or (559) 292-1981 to obtain an authorization number (CA number if returned for credit, and RA number if returned for repair).

All merchandise returned for credit may be subject to a 20% restocking and refurbishing charge.

Goods returned for repair or credit should be clearly identified with the assigned CA or RA number and freight should be prepaid. Ship to the appropriate address below.

If you are located within the continental U.S., Alaska, Hawaii or Puerto Rico:

Service Department
Pelco
3500 Pelco Way
Clovis, CA 93612-5699

If you are located outside the continental U.S., Alaska, Hawaii or Puerto Rico:

Intermediate Consignee	*Ultimate Consignee*
American Overseas Air Freight	Pelco
320 Beach Road	3500 Pelco Way
Burlingame, CA 94010	Clovis, CA 93612-5699
USA	USA

REVISION HISTORY

Manual #	Date	Comments
C1937M	3/02	Original version.
C1937M-A	5/02	Revised the lens connector wiring chart.
C1937M-B	8/02	Added certifications. Revised *Important Safeguards and Warnings*.
C1937M-C	4/03	Added S-mark certification.

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