

COHU, INC.

Electronics Division

Installation and Operation Instructions Model 3810 Camera

Technical Manual 6X-1003

GENERAL DESCRIPTION

The 3810 series camera provides a high performance color camera with a very powerful optical zoom lens in a very small package.

The camera includes features such as auto/manual focus, variable speed zoom and focus control, 64 zoom and focus preset positions, back light compensation. The built-in zoom lens provides a 22:1 optical zoom ratio with a focal length of 3.9 mm to 85.8 mm. A digital zoom range of up to 8X provides an effective zoom ratio of 176:1, and an effective focal length of 3.9 mm to 686.4mm.

The 3810 series camera uses the newest 1/4" format "super" on-chip microlens sensor technology for significantly improved sensitivity, saturation, signal to noise performance and 460 TV lines (450 PAL) of horizontal resolution. Integration for up to 1/4 of a second with frame store video output provides full color, continuous video at very low light levels. All camera functions are operable from a PC via RS-232 serial communications.

The video output is available as composite video output via a BNC connector, and as Y-C or "S" video via a "S" video connector.



GRAPHICAL USER INTERFACE (GUI)

A Windows 9x based GUI is provided for PC control of the camera features. Any PC or laptop that is capable of running Windows 95 or Windows 98 is capable of running the 3810 GUI program, providing that a COM port is available. The default COM port is COM1, but COM2, COM3, or COM4 can also be used.

To install the GUI, open the "3810 GUI" folder on the 3.5" floppy provided with the camera. Double click on the "setup.exe" and follow the install instructions.

To use COM 2, COM 3, or COM 4, install the GUI as described and run program. Open the "PC COMM Setup" window and select the desired COM port. Close

MODEL 3810 SPECIFICATIONS

ELECTRICAL	
Image Area	3.6 mm x 2.7 mm (1/4 inch format)
Active Picture Elements	NTSC: 768 (H) x 494 (V) PAL: 752 (H) x 582 (V)
Imager Type	Interline transfer microlens CCD with mosaic-type color compensating filter
Cell Size	NTSC: 4.75 μm (H) x 5.55 μm (V) PAL: 4.85 μm (H) x 4.65 μm (V)
Resolution (Tv lines)	NTSC: 460 (H); 250 (V) PAL: 450 (H); 415 (V)
Sensitivity	See sensitivity table
Electronic Shutter	1/60 (1/50 PAL), 1/100 (1/120 PAL), 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000 second
Integration	1/4, 1/8, 1/15 1/30 (1/25 PAL) second. Frame store video output provides continuous video output, updated at the integration rate.
Video output	NTSC or PAL, 1 Vp-p at 75 ohms unbalanced. Y: 1 Vp-p at 75 ohms; C: 0.286 Vp-p
Gamma	0.45
AGC	0 dB to 16 dB
S/N Ratio	56 dB
Sync	Crystal lock
Optical Zoom Range	22X (3.9 mm to 85.8 mm)
Digital Zoom Range	1X (off) through 8X
Horizontal Angle of View	Optical: 48.94° to 2.51°
Optical Zoom Speed	Seven speeds possible; three speeds provided by GUI Slow: End-to-end travel time about 21.5 seconds Medium: End-to-end travel time about 7.0 seconds Fast: End-to-end travel about 3.5 seconds
Auto Focus Range	M.O.D. to Infinity Video output level must be above 30 percent for auto focus
Manual Focus Speed	Three speeds possible: Slow: End-to-end travel time about 22.0 seconds Medium: End-to-end travel time about 6.5 seconds Fast: End-to-end travel time about 3.0 seconds
Minimum Object Distance (M.O.D.)	At wide angle: 0.7 inch At narrow angle: 29.5 inch
Zoom and Focus Presets	64 preset positions available (zoom and focus only)
Maximum Lens Aperture	At wide angle: f/1.6 At narrow angle: f/3.7
Auto White Balance	3200 K through 5100 K
Camera Control	RS-232C Serial Communications
Input Power	6 V dc to 12 V dc: About 2 watt (auto focus Off)

Continued on next page

MODEL 3810 SPECIFICATIONS (Continued)

MECHANICAL	
Dimensions	2.479 inch (W) x 2.63 inch (H) x 5.25 inch (L)
Weight	1.2 pounds (544 grams)
Camera Mount	1/4-20 threaded holes top (1) and bottom (2)
ENVIRONMENTAL	
Ambient Temperature Limits	Operating: -5° C to 60° C (23° F to 140° F) Storage: -30° C to 70° C (-22° F to 157° F)
Relative Humidity	Up to 95 percent, non-condensing

Model 3810 Sensitivity Specifications (3200 K)

VIDEO LEVEL	GAIN	SHUTTER	IRIS	SCENE ILLUM	FACEPLATE ILLUM
Full	Min	Auto	f/32	>100,000 lux	19.5 lux
Full	Min	1/60	f/22	43,500 lux	8.5 lux
Full	Min	1/60	f/1.6	110 lux	8.5 lux
Full	Max	1/60	f/1.6	10 lux	0.8 lux
80 %	Max	1/60	f/1.6	2 lux	0.16 lux
30 %	Max	1/4	f/1.6	0.125 lux	0.01 lux
<i>Note: Scene illumination is based on 100 percent reflectance.</i>					

and restart the program to enable the new Comm port selection.

The camera is intended to be controlled from the GUI provided. If a different method of camera control is required, contact the factory regarding other control options.

CAMERA & GUI OPERATION

DEFAULT START UP MODE

When the 3810 camera is turned on it will always start up in a default mode of Auto Shutter, Auto Iris, Auto Focus, Auto

White Balance, and Back Light Compensation Off.

STATUS REQUEST

When Status Request is selected the GUI will poll the camera to determine the current modes of operation. To insure that the GUI display always matches the camera mode, it is recommended that Status Request be the first option selected whenever the camera is turned on or when a new camera is connected to the Host PC.

SERVICE

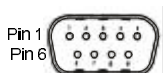
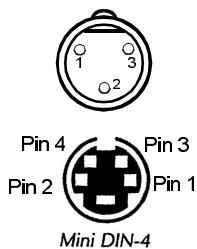
This selection is for use by factory personnel and service technicians. There are no user selectable features in this area.

Rear Panel Connectors

NAME	CAMERA REAR PANEL CONNECTOR		MATING CONNECTOR FOR CABLE	
	Cohu Part No.	Mfg Part No.	Cohu Part No.	Mfg part No.
Power (J1)	1310356-003	Switchcraft TB3M	1310356-103	Switchcraft TA3F
Y/C (J2)	1390465-001 4-pin mini DIN jack	Kycon KMDPL45100	Industry Standard S-video plug	—
Aux (J3)	1310136-003 D9 male plug	Standard D9 male plug	1310136-004 D9 female/socket	Standard D9 female/socket
Video (J4)	Standard BNC jack	Standard BNC jack	Standard BNC plug	Standard BNC plug

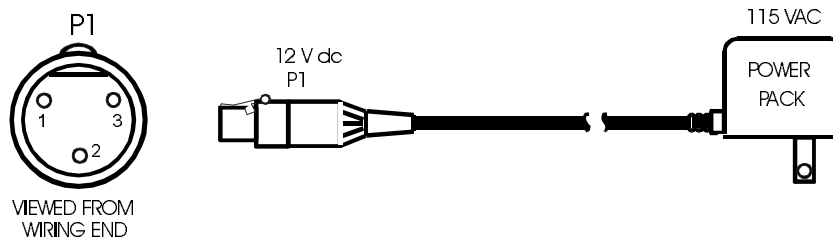
REAR PANEL CONNECTORS

Pinouts viewed looking at rear panel of camera. This is equivalent to the wiring view of the mating cable plugs



CONNECTOR	PIN	FUNCTION
Power (J1)	1	+12 V dc input
	2	Ground
	3	No connection
Y/C (J2)	1	Ground
	2	Ground
	3	Y-out
	4	C-out
Aux (J3)	1	Video out
	2	RS-232 in
	3	RS-232 out
	4	No connection
	5	Data ground
	6	No connection
	7	Video shield
	8	Ground
	9	+12 V dc input
Video (J4)	BNC	Video output

CAUTION: Power can be applied either to pin 1 of J1 (power) or pin 9 of J3 (aux) — but not both simultaneously



DIGITAL ZOOM RANGE

This function establishes the range of the digital zoom. The digital zoom is only available when the optical zoom has reached its maximum telephoto limit. Upon reaching the end of the optical zoom, the digital zoom will immediately begin magnifying the image until it reaches the limit established by the digital zoom range. The default digital zoom range is 8X. Because resolution decreases as the digital zoom increases, some applications may find it advantageous to limit the digital zoom range to a lower value.

Changing the digital zoom range will not result in any change in the image magnification until a "Zoom Tele" command is received.

SHUTTER SPEED AND INTEGRATION

The shutter speed control determines the duration of the sensor integration. The current shutter speed will be displayed in the shutter window.

The standard shutter speed is 1/60 second (1/50 second for PAL). Selecting a shutter speed faster than 1/60 second (1/50 for PAL) will result in the incoming light energy accumulating in the sensor for a shorter period of time, allowing the camera to produce normal video levels when viewing very bright scenes.

Selecting a faster shutter speed will also provide sharper images of objects that are moving through the scene.

Selecting a shutter speed slower than 1/60 second allows the incoming energy to accumulate on the sensor for a longer period of time, significantly increasing the low light sensitivity of the camera. The price to pay for this added sensitivity is the blurring of any objects moving through the scene.

Clicking on the shutter speed select arrow will display a pop-up window that is used to select the different shutter speeds.

Any shutter speed change will force the camera into the Auto Iris Mode. After making a shutter speed change, manual iris control is again available for any shutter speed except Auto Shutter.

AUTO SHUTTER / AUTO IRIS

The default shutter mode is "AUTOSHUTTER". In this mode, the shutter speed operates in conjunction with the AUTO IRIS to maintain constant video output when viewing very bright scenes.

There are two iris leaves that make up the iris system. A 0.8 N.D. filter is attached to one of these iris leaves. As the scene brightness increases, the iris begins to close, and the 0.8 N.D. filter begins to cover more of the iris opening. At f/5.6, the 0.8 N.D. fully covers the iris opening. The iris will continue to close until it reaches f/22. At this point, the iris stops closing, and the auto shutter begins to increase to compensate. When the shutter speed reaches 1/250 second, the auto iris will continue to close.

Selecting auto shutter mode forces the camera into the auto iris mode as well. Manual iris control is not available in auto shutter mode. Manual iris control is available with any other shutter speed selection.

MANUAL IRIS

The default auto/manual iris mode is auto iris. At times it may be advantageous to open the iris to be able to resolve greater detail in a darker area of the scene at the sacrifice of the brighter areas. Similarly, it may be advantageous to close the iris to be able to resolve details in the brighter areas of the scene at the sacrifice of the darker areas.

Selecting the manual iris mode provides this capability. The manual iris control will open or close the iris in small steps. There are a maximum of 11 steps toward open and 11 steps toward close. However, depending on the scene conditions present when manual iris was selected, not all 11 steps may be available.

The auto shutter mode requires the camera to operate in auto iris mode. Thus, selecting auto shutter will force the camera into the auto iris mode and will disable the ability to select manual iris.

Selecting manual iris mode also freezes the camera auto gain (AGC).

BACK LIGHT COMPENSATION

The automatic video level control of the camera operates on the average scene illumination of the central portion of the image. If this area of the scene is sufficiently bright enough the auto iris will close down to maintain the average video level output. This results in darker areas of the scene becoming even darker.

When the darker areas of the scene are more important than the brighter areas, the back light compensation feature increases the video level the auto iris is attempting to maintain. This may result in the brighter areas of the scene saturating, but it will allow the darker areas to be viewable.

Back light compensation works best when used with the camera in the auto iris mode.

WHITE BALANCE

The default white balance mode is Auto. In the auto tracking white balance mode, the camera will automatically compensate for changes in the color temperature of the scene being viewed. In this mode the camera uses factory defined white values as the white reference.

The "SET" mode is a "Sample/Hold" white balance mode. When the Set mode is selected, the camera will use the white in the scene as the white reference.

Selecting "LOCK" freezes the white balance parameters at the current values. Changes in the color temperature of the scene will no longer affect the automatic white balance.

Selecting "INDOOR" sets the white balance values to be consistent with 3200 K.

Selecting "OUTDOOR" sets the white balance values to be consistent with 5100 K.

Selecting "FLOURESCENT" sets the white balance values to be consistent with fluorescent lighting.

ZOOM

Three selectable speeds towards either TELE or WIDE. The camera is capable of seven different zoom speeds, but the GUI is designed to only offer three speeds.

FOCUS

Three selectable speeds towards either FAR or NEAR. Focus control is only available when Manual Focus is selected. In AUTO FOCUS the camera will automatically adjust the lens focus to maintain the sharpest image.

There may be situations where auto focus is not desirable, such as a low light scene or a scene with insufficient detail to provide the auto focus circuitry with a suitable reference. In situations such as these the camera may go in and out of focus while trying to achieve the optimum focus setting. If this should occur it may be necessary to disable auto focus.

ZOOM AND FOCUS PRESETS

There are 64 zoom and focus preset positions available. Clicking the Preset select arrow will display a pop-up window. The

desired preset position can be recalled by clicking on its name and then clicking on "RECALL."

A preset is stored by setting the zoom and focus for the desired settings, clicking on the preset select button, selecting a preset position and clicking on "STORE." The preset positions can be individually named as a reminder of the scene they will be looking at.

When a preset position is recalled the Auto focus feature is disabled and the camera is placed into the manual focus mode.

TEST PATTERN

The included test pattern is provided as a reference pattern to verify auto focus operation. It is also used for certain service related operations.

TEST PATTERN

