



Version 7.0

Camera Guide: Sony DXC Color Cameras

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Introduction

The Sony® DXC series cameras (930, 950, 960, 970, 390) are medium resolution three-chip color video cameras. These cameras can be configured as any one of the following:

- a standard RGB color video camera
- a ‘special’ **MCID™ Elite** color video camera

Configuring a DXC series camera as a special **MCID Elite** imaging system camera allows **MCID Elite** to communicate with the camera via the serial port on your computer. This allows you to modify a number of camera settings (e.g., gain, offset, white balance) from within **MCID Elite**, and allows the camera to be used as an integrating device without having to use Sony’s optional Frame Memory Unit (MPU-F100A). With the DXC-930/960 cameras, communication is provided via an external Sony Interface box (SCI-537). With the DXC-390 and DXC-970/950, an RS-232C serial interface is integrated into the camera head. When configured as a standard RGB camera, the DXC will not integrate and all camera adjustments must be made externally.

This chapter describes the installation, use and adjustment of the Sony DXC-930/960, DXC 950/970 and DXC-390 color cameras. Most of the functions and features described here are exclusive to these cameras. **MCID Elite**, however, provides many other features related to camera-based image acquisition in general (e.g., frame averaging for noise reduction). These are described in the online *MCID Elite Reference Manual (Chapter 2: Acquiring Images)*.

Connecting the Camera Components

Input Cables

Configuring a DXC series camera as a special **MCID Elite** camera requires a custom integrating input cable (**M5 Sony Int Input**) from Imaging Research, which plugs directly into the Matrox Genesis imaging board. If you purchased a DXC-390, 970 or 950P from Imaging Research, this custom cable is included with the camera. A male DB9 connector is attached to one end of the cable, and a female 7W2 connector is attached to the other. The 7W2 end of the **M5 Sony Int Input** cable also contains two coaxial input lines, labeled **Line 0** (red) and **INT** (black). These are monochrome input lines, and they allow you to connect a monochrome camera to the Genesis board without first having to disconnect the **M5 Sony Int Input** cable (and vice versa).

Configuring a DXC camera as a standard RGB color video camera requires a standard **Sony RGB** cable, with separate output lines for Red, Green, Blue and Sync signals. This cable can be purchased from Sony. The cable has a DB9 connector on one end, and four color-coded coaxial cables with BNC connectors on the other end. This cable does not plug directly into the Genesis board. Rather, the BNC connectors attach to the corresponding, color-coded input coaxial cables in the **GEN-INPUT** (or **M5-INPUT**) cable as shown Table I below.

Table I: Connecting the Sony RGB input cable to the GEN-INPUT cable.

| GEN-INPUT Cable | Sony RGB Cable |
|-----------------|----------------|
| RED | Red |
| GREEN | Green |
| BLUE | Blue |
| BLACK | Sync |
| WHITE | Not applicable |
| YELLOW | Not applicable |

Note: The same GEN-INPUT cable is used to connect monochrome cameras to the Genesis board. Consequently, you will need to disconnect the monochrome camera to use the color camera (and vice versa).

Sony DXC-930/960

The Sony DXC-930 and DXC-960 consists of a camera head, a power supply (CMA-D2 Camera Adapter), a power supply cable, an input cable, and an AC power cord. The Sony Interface box (SCI-537) is supplied with a control cable and an SCI Serial Interface cable.

The power supply cable connects the CMA-D2 Camera Adapter to the camera head. The cable has a 12-pin male connector at one end and 12-pin female connector at the other. Connect the end with a yellow “CCU” label to the back of the power supply. Connect the other end of the cable to the “DC IN/Remote” socket on the rear of the camera. Plug the AC power cord into the “AC IN” socket of the power supply.

The 20-pin control cable is used to connect the Sony Interface box to the camera head. Connect one end of this cable to the Interface box and the other end to the “CCU” socket on the rear of the camera head. The SCI Serial Interface cable is used to connect the Interface box to a serial port on your computer. Plug the male DB9 connector into the Interface box and the female connector into the COM1 serial port.

If you are using the custom **M5 Sony Int Input** cable, plug the male DB9 connector into the “RGB/SYNC” socket on the rear of the camera head, and plug the female 7W2 end directly into the Genesis board. The 7W2 end of the cable also contains two monochrome input lines, labeled **Line 0** (red) and **INT** (black). If you have an analog monochrome camera, connect it to **Line 0**. If the camera integrates, connect its GATE output to the **INT** input line. When installing the monochrome camera in software, be sure to specify **Line 0** as the input line.

If you are using Sony’s standard RGB input cable, plug the male DB9 connector into the “RGB/SYNC” socket on the rear of the camera head, and connect the color-coded BNC connectors to the **GEN-INPUT** cable as described above in Table I. Plug the female 7W2 end of the **GEN-INPUT** cable directly into the Genesis board.

Sony DXC-970/950 and DXC-390

The Sony DXC-970, DXC-950 and DXC-390 consists of a compact camera module, a power supply (CMA-D2 Camera Adapter), a power supply cable, an input cable, a serial interface cable, and an AC power cord.

The power supply cable connects the power supply to the camera head. The cable has a 4-pin DIN male connector at one end and 12-pin female connector at the other. Connect the 4-pin DIN male connector to the back of the power supply. Connect the other end of the cable to the “DC IN/Remote” socket on the rear of the camera. Plug the AC power cord into the “AC IN” socket of the power supply.

The serial interface cable connects the camera head to a serial port on your computer. The cable has a round 8-pin male connector at one end and a female DB9 connector at the other. Plug the DB9 connector into the COM1 serial port and the 8-pin connector into the “REMOTE” socket on the back of the camera.

If you are using the custom **M5 Sony Int Input** cable, plug the male DB9 connector into the “RGB/SYNC” socket on the rear of the camera head, and plug the female 7W2 end directly into the Genesis board. The 7W2 end of the cable also contains two monochrome input lines, labeled **Line 0** (red) and **INT** (black). If you have an analog monochrome camera, connect it to **Line 0**. If the camera integrates, connect its GATE output to the **INT** input line. When installing the monochrome camera in software, be sure to specify **Line 0** as the input line.

If you are using Sony’s standard RGB input cable, plug the male DB9 connector into the “RGB/SYNC” socket on the rear of the camera head, and connect the color-coded BNC connectors to the **GEN-INPUT** cable as described in Table I. Plug the female 7W2 end of the **GEN-INPUT** cable directly into the Genesis board.

Mounting Onto Microscopes

The DXC-930/960 and 970/950 cameras attach to a microscope using an “ENG” mount. ENG mounts are available for both 1/2 inch and 2/3 inch camera formats. These models are 1/2 inch cameras, and you should ensure that your microscope ENG mount is appropriate for this format.

The DXC-390 uses a standard C-mount and is equipped with a 1/3 inch CCD chip.

Installing in MCID Elite

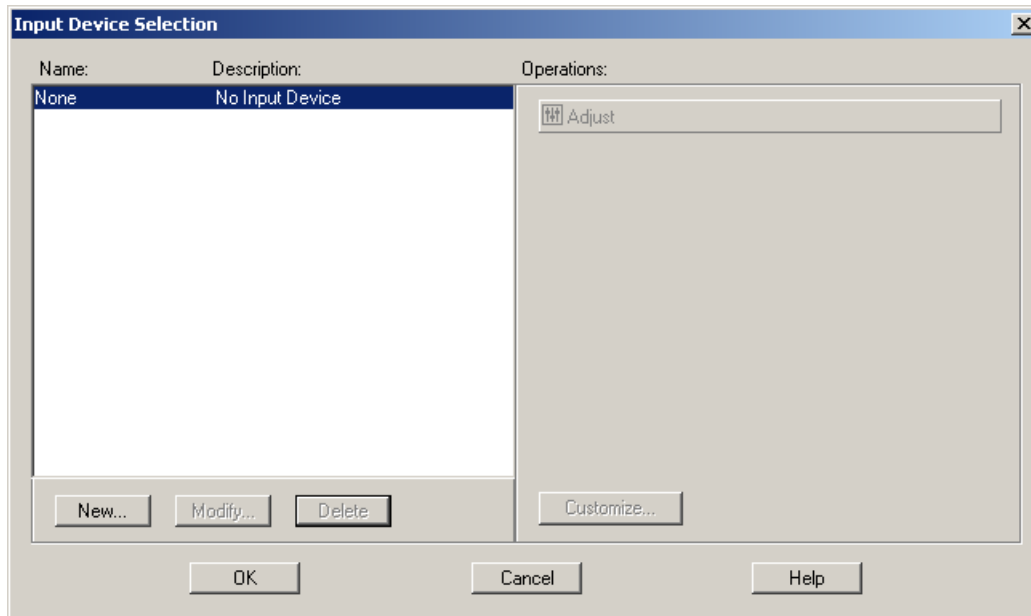
When all cables have been connected, you must then run **MCID Elite** and add the camera to its list of input devices.

To add the camera to the **MCID Elite** input selection list:

1. Open the *Settings* menu and select *Display format*. Set the **Image Type** to **24 bit color**.
2. Open the *Settings* menu again and select *Input select*. The *Input Device Selection* dialog box appears (Figure 1), which lists every color camera that is currently installed in **MCID Elite**.

Click the **[New]** button. If another color camera has been installed already, a *Create Input Device* dialog box will appear. Select the **New input device** option and click **[OK]**. If no other cameras have been installed, the *Input Device Definition* dialog box appears (Figure 2).

Figure 1: The *Input Device Selection* Dialog box lists all of the cameras installed in MCID Elite, and it is used to select which camera to use when acquiring images. You can select, add, or delete any input from the list. You can also edit the definition of a specific input, and assign specific operations and settings to it.



3. Select the appropriate **Input sync**, using Table II, below, as a guide. If you are using an RGB or ‘special’ **Input sync** specify the **Sync line** that transmits the camera’s horizontal and vertical sync signal (i.e., composite sync), where applicable. The composite sync may be transmitted on a separate input line (**Line3/Black**) or integrated with the green input signal (**Line1/Green**).
4. Enter a unique **Name** and **Description** in the entry fields (e.g., “Color1”, “Sony”). Press **[OK]** to exit.
5. A *Customize* dialog box appears next (Figure 3), which allows you to assign various input device operations to this camera (e.g., frame averaging controls). You can select them now or assign them later (see *Chapter 2: Acquiring Images* for details). Click **[OK]** to exit.
6. If you are installing a DXC camera as a ‘special’ camera, a *Settings* dialog box will appear next (see Figure 7).
 - a) Click on the **[Port]** button and specify the serial port to which the camera (or Interface box) is connected (default = COM1).
 - b) If you are using an optional frame memory unit, check the **MPU F100A** checkbox.
 - c) If you wish to use the camera as an integrating device, check the **Frame integration** option.

Leave other adjustments for later. Press **[OK]** to add the camera to the list of input devices.

7. The camera is now installed in the list of input devices. When you exit the *Input Device Selection* dialog box, the camera (and all of the settings and operations associated with it) becomes the default input device. **MCID Elite** will automatically select this camera (and a 24-bit color display format) each time the program is started.

Table II: *MCID Elite Input Sync selections to use with various Sony color cameras. Models with a “P” suffix are European versions.*

| Camera Model | Special Input Sync* | RGB Input Sync** |
|-----------------------------|--------------------------|------------------|
| Sony DXC-930 | Not Applicable | RS170-HI-RGB |
| Sony DXC-930P | Not Applicable | CCIR-HI-RGB |
| Sony DXC-930 with SCI-537 | Sony930/960 RS170-HI-RGB | RS170-HI-RGB |
| Sony DXC-930P with SCI-537 | Sony930 CCIR-HI-RGB | CCIR-HI-RGB |
| Sony DXC-960MD | Not Applicable | RS170-HI-RGB |
| Sony DXC-960MD with SCI-537 | Sony970 RS170-HI-RGB | RS170-HI-RGB |
| Sony DXC-950P | Sony950 CCIR-HI-RGB | CCIR-HI-RGB |
| Sony DXC-970 | Sony970 RS170-HI-RGB | RS170-HI-RGB |
| Sony DXC-390 | Sony390 RS170-HI-RGB | RS170-HI-RGB |

* Requires custom M5 Sony Int Input cable

** Requires Sony RGB input cable

Figure 2: *The Input Device Definition dialog box is used to define a camera’s video signal and to indicate the input line to which it is connected.*

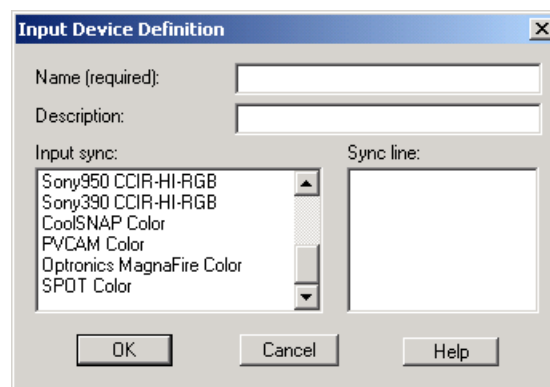
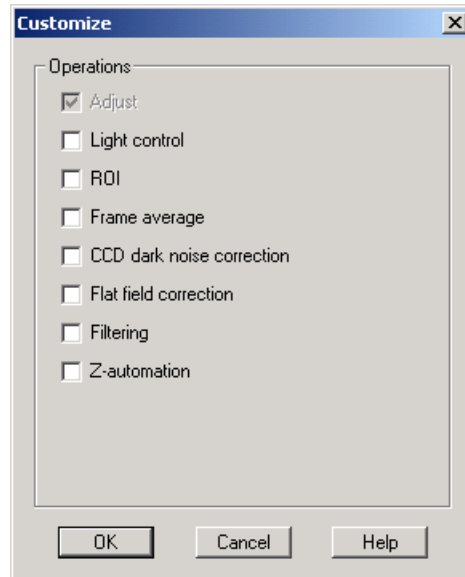


Figure 3: The *Customize Input Selection* dialog box is used to link controls for various camera operations to specific cameras.



Acquiring Images

Selecting the Camera

If the camera is not set up as the default input device, you must first set the display format to 24 bit color. Open the *Settings* menu and select *Display format*. Set the **Image Type** to **24 bit color**.

Once you have set the display format to 24-bit color, you can enable the camera. Open the *Settings* menu and choose *Input select*. The *Input Device Selection* dialog box appears (Figure 1). From the list of cameras, select the color camera you wish to use.

Digitizing

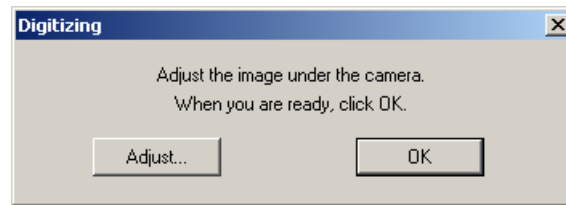


Click the **Digitize** icon (located in the **Application** toolbar) to initiate digitization or press **<Ctrl - D>**. A dialog box appears to indicate that **MCID Elite** is digitizing continuously and a live image appears on the image monitor.

Basic (Non-Integrating) Mode

If you are using the camera in non-integrating mode, **MCID Elite** will display a dialog box like the one shown in Figure 4. Video digitization occurs at 30 frames/sec (25/sec in Europe), so the digital image appears live. Position the specimen, focus the lens and adjust for optimal lighting, all while digitization continues. Note that, while **MCID Elite** is actively digitizing, no other operations are available. Press **<Enter>** to terminate digitization. The image is now frozen, and any of **MCID Elite**'s functions may be applied to it.

Figure 4: Clicking the “Digitize” icon initiates continuous digitization and displays a dialog box. This dialog box appears only when using a non-integrating video camera.

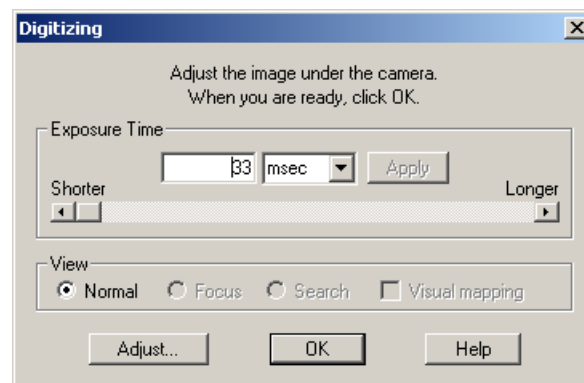


Integrating Mode

If you are using the camera in integrating mode, a dialog box like the one shown in Figure 5 will appear. Adjust the integration time using the **Exposure Time** control. Do not integrate if the image is bright. Just use a single frame. If the image is less bright, you will have to adjust the integration time. Once everything looks fine, click on [OK] (or press the <Enter> key) to freeze the image.

Note: If frame integration is not enabled, select *Settings > Input select* and click the [Adjust] button that appears in the *Input Device Selection* dialog box.

Figure 5: Clicking the “Digitize” icon initiates the digitization procedure and displays a dialog box. Move the slider along the Exposure Time bar to integrate over a number of frames. This dialog box appears only when using a DXC series camera in integrating mode.



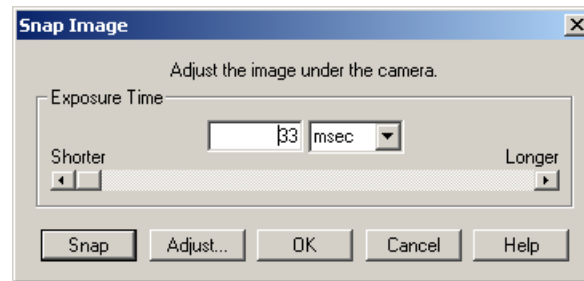
Snap Shots



Press the **Snap Shot** button to capture an image using a single exposure (i.e., without displaying a continuously ‘live’ image). If the camera is in non-integrating mode, **MCID Elite** will capture a single video frame. If the camera integrates, the image is automatically captured at the end of the specified exposure period. This function can be very useful if you are working with dim specimens and you have already chosen the correct exposure time. Clicking the **Snap Shot** icon will automatically capture a fresh image.

To adjust the exposure time, Ctrl-click on the **Snap Shot** icon to display the *Snap Image* dialog box. Move the slider control to increase or decrease the exposure time. Press the [Snap] button to test the exposure.

Figure 6: The Snap Image dialog box is used to control the Snap Shot exposure time.

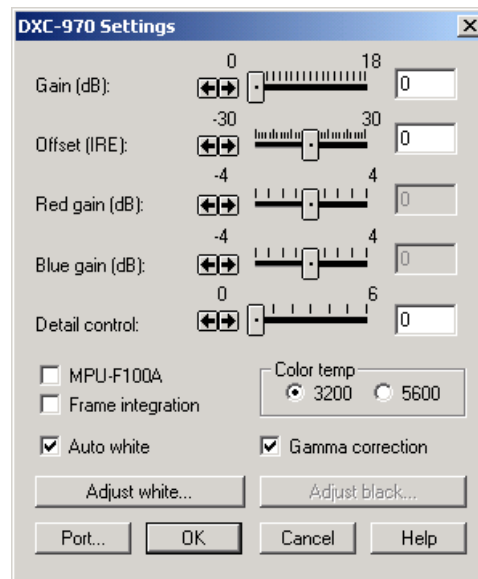


Adjusting the Camera Response

MCID Elite allows digital control over a number of DXC-970/950, DXC-930/960 and DXC-390 settings. To access these controls, press the **[Adjust]** button while digitization is occurring. MCID Elite will display a dialog box for camera adjustment (Figure 7).

Note: If your DXC camera is configured as a standard RGB camera, all camera adjustments must be performed externally. Press the **Menu** button on the rear of the camera head to access these controls.

Figure 7: The Settings dialog box for the Sony DXC-970/950 color camera.



Gain

Increases or decreases the camera output signal relative to the level of input illumination. Move the slider controls to adjust.

Offset

Move sliders to adjust the size of the no-light (black level) signal.

Red/Blue gain

Increases or decreases red and blue output signal relative to green output levels. Use these controls to manually adjust white balance (the controls are disabled when **Auto white** is turned on). To adjust white balance manually:

1. Clear the **Auto white** checkbox.
2. Present a white field of view.
3. Adjust Red and Blue gain until image appears white.

Detail control

Move slider controls to adjust image sharpness. Higher values enhance details, lower values reduce noise.

MPU-F100A

Enable this option if you are using Sony's optional Frame Memory Unit (MPU-F100A) with the camera.

Frame integration

Enable this option if you wish to control the camera exposure time. If this option is grayed out, select *Settings > Input select* and click the **[Adjust]** button that appears in the *Input Device Selection* dialog box.

Color temperature

Select the appropriate color temperature of the light source.

Gamma correction

Adjusts camera signal so that the camera is more sensitive to low levels of illumination than it is to high levels. If disabled, camera response to input illumination is linear.

Auto white

Allows automatic white balance adjustment (see instructions below). If disabled, white balance can be achieved by manually adjusting the **Red gain** and **Blue gain** controls.

Adjust white

Perform automatic white balance adjustment. The procedure is as follows:

1. Place a checkmark in the **Auto white** checkbox.
2. Present a white field of view.
3. Click on the **[Adjust white]** button.

The camera will automatically adjust the **Red** and **Blue gain** levels to set the white balance. When completed, "WHITE: OK" is displayed on the image monitor.

Adjust black

Perform automatic black balance (DXC-930/960 and DXC-390). To adjust black balance, present a black field of view, then click on the **[Adjust black]** button. The camera will

automatically set the black balance. When completed, “BLACK: OK” is displayed on the image monitor.

Port

Click to modify serial port characteristics (baud rate, parity, etc.), or to specify which serial port the camera is connected to during installation.

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