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OPTRONICS

CCD VIDEO CAMERA SYSTEM

Instruction Manual

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CAUTIONS

Refer to Operating Manual for cleaning instructions.
Keep out of reach of patients.
Do not store liquids above unit.

Grounding reliability can only be achieved when equipment is connected to “Hospital Only” or “Hospital Grade” receptacle (i.e., approved for use in an operating room environment). Routinely inspect electrical plug and cord. Do not use if inspection reveals damage.

DANGER: Risk of explosion if used in the presence of flammable anesthetics.



CAUTION: To reduce the risk of electrical shock, do not remove cover. Refer servicing to qualified service personnel.



CAUTION: Before connecting read instructions.



Sales restrictions apply to medical device applications only.

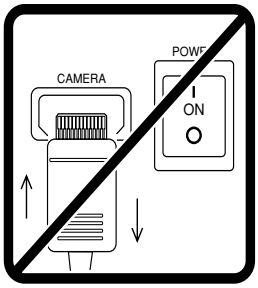
CAUTION: Federal law restricts this device to sale by or on the order of a physician.

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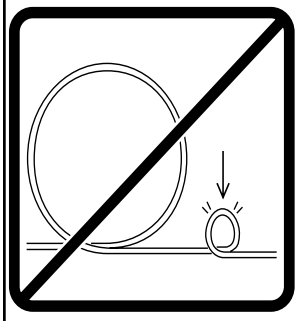
CARE AND HANDLING

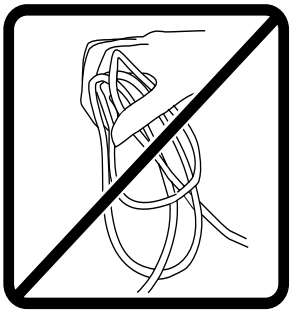
To maximize the longevity of the camera head, please follow the guidelines given below:

DO NOT PLUG OR UNPLUG THE CAMERA HEAD FROM THE PROCESSOR WHILE THE POWER IS ON.

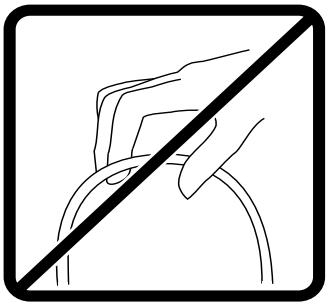


DO NOT STORE THE CAMERA WITH CABLE COILED TIGHTLY OR GATHERED INTO FOLDS. Always arrange the cable in loose coils of 6 inches (15.24 cm) or more in diameter.
DO NOT RAPIDLY PULL THE CABLE WHEN UNCOILING. Harmful “kinks” can result. Always allow the cable to uncoil gently and loosely.

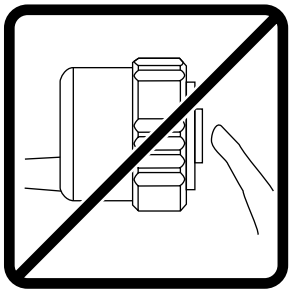




DO NOT PICK UP THE CAMERA HEAD ASSEMBLY BY ITS CABLE. Always pick up the assembly by the camera head first, then provide secondary support for the cable and connector. The cable is constructed of tiny electronic conductors and should be treated gently and carefully.

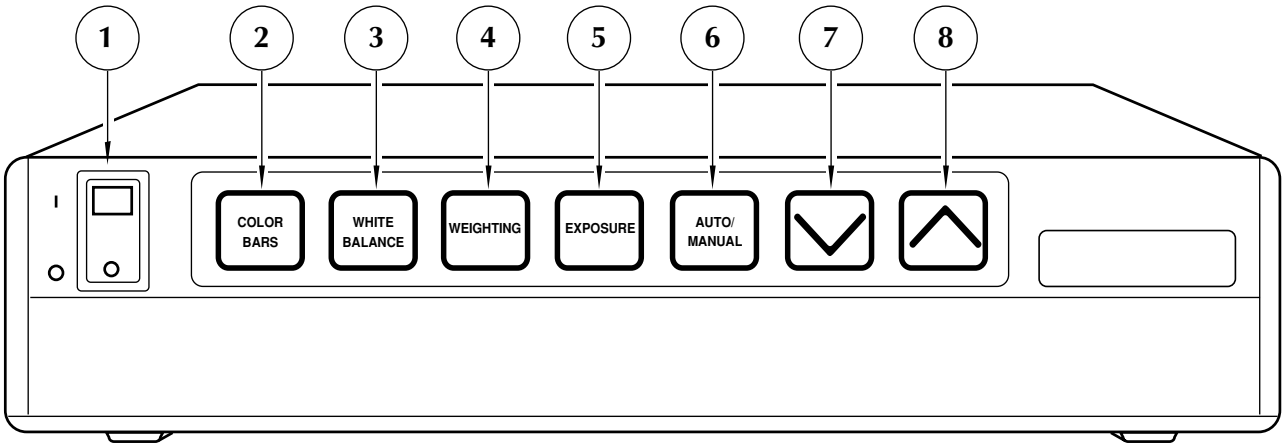


DO NOT TOUCH THE LENS ELEMENT ON THE CAMERA HEAD. This element should be cleaned only with lens tissue and lens cleaning fluid, if necessary.



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PROCESSOR (front view)



1. **Power Switch (ON/OFF)**
   Applies power to camera processor.

2. **Color Bars Button (ON/OFF)**
   Activates on/off SMPTE color bar pattern.

3. **White Balance Button**
   Activates automatic white balance function.

4. **Weighting Button**
   Activates weighting selection mode.

5. **Exposure Button (ON/OFF)**
   Activates on/off exposure mode display feature on monitor.

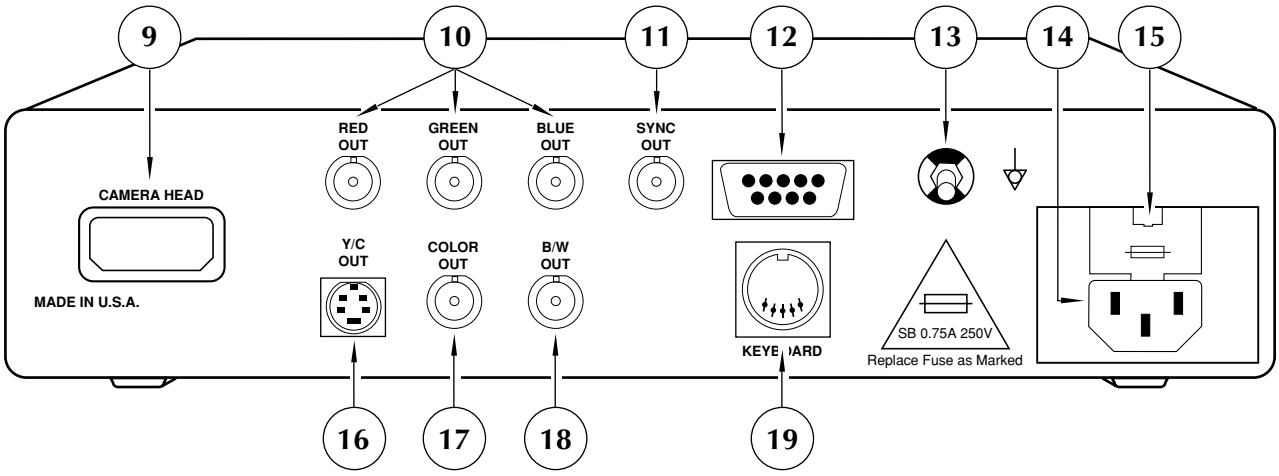
6. **Auto/Manual Button**
   Activates automatic exposure mode and manual exposure mode.

7. **Down Arrow**
   Decreases exposure by one stop, resulting in a darker image.

8. **Up Arrow**
   Increases exposure by one stop, resulting in a brighter image.

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PROCESSOR (rear view)



9. **Camera Head Receptacle**
   Accepts head cable connector (see ⑳ on following page).

10. **Red, Green, Blue Out Connectors**
    RGB video output

11. **Sync Out Connector**
    Composite Sync signal output.

12. **Serial Interface Connector (optional)**
    Computer control interface.

13. **Chassis Ground Connector (Potential Equalization)**
    For external connection of camera to ground.

14. **Power Input Receptacle**
    Accepts plug from power cord.

15. **Power Fuse Drawer**
    Contains AC power line fuses. Refer to “Specifications” for fuse type.

16. **Y/C Out Connector (S-video)**
    Output for Y/C signals.

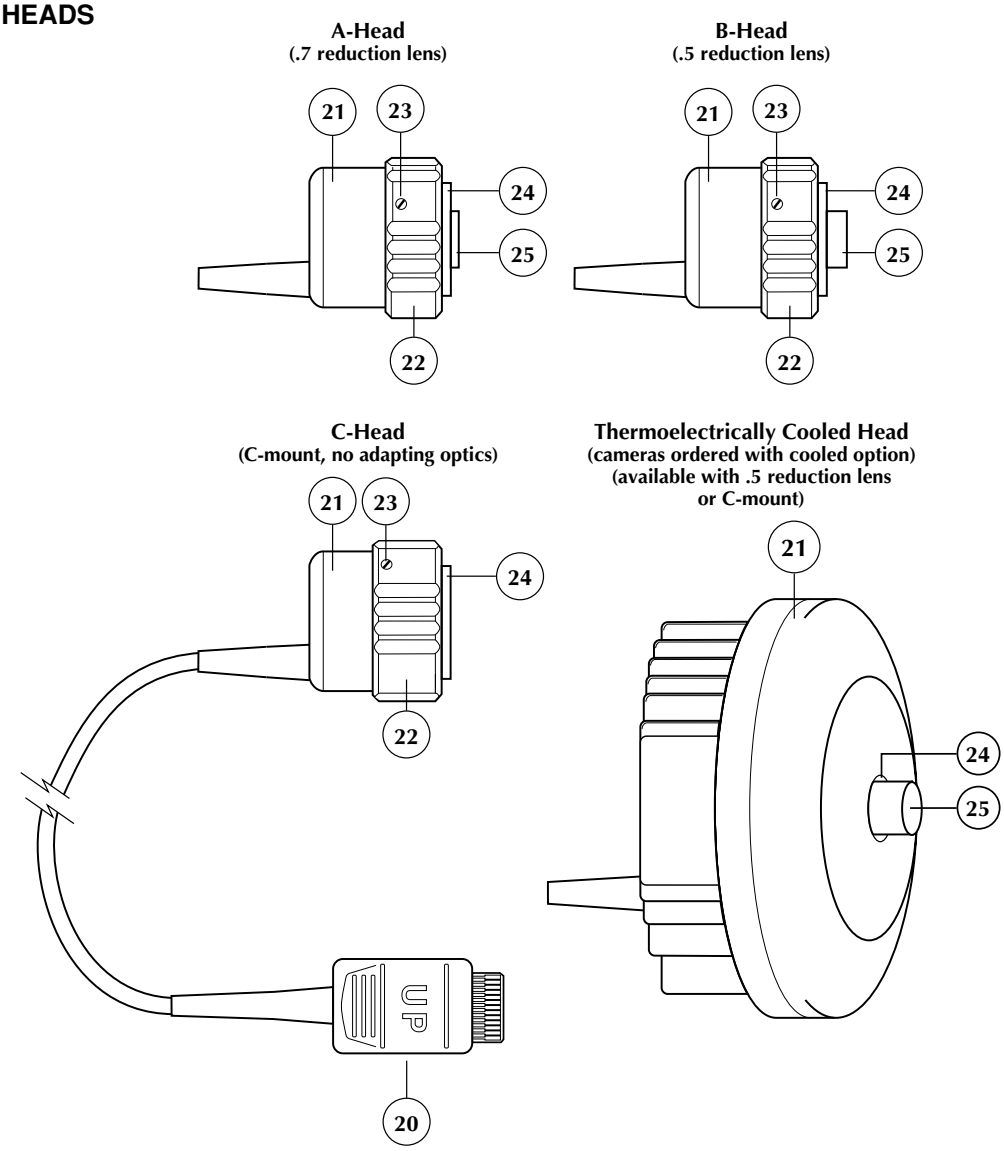
17. **Color Out Connector**
    Output for Composite Color Video.

18. **B/W Out Connector**
    Output for Composite Monochrome (black and white).

19. **Keyboard Connector**
    For external keyboard.

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CAMERA HEADS



20. Head Cable Connector
Plugs into receptacle on camera processor (see ⑨ on previous page).

21. Camera Head

22. Adjustable Backfocus Ring
Sets backfocus of head for parfocality adjustments (be sure locking screw is loose before adjusting – see ㉓ above).

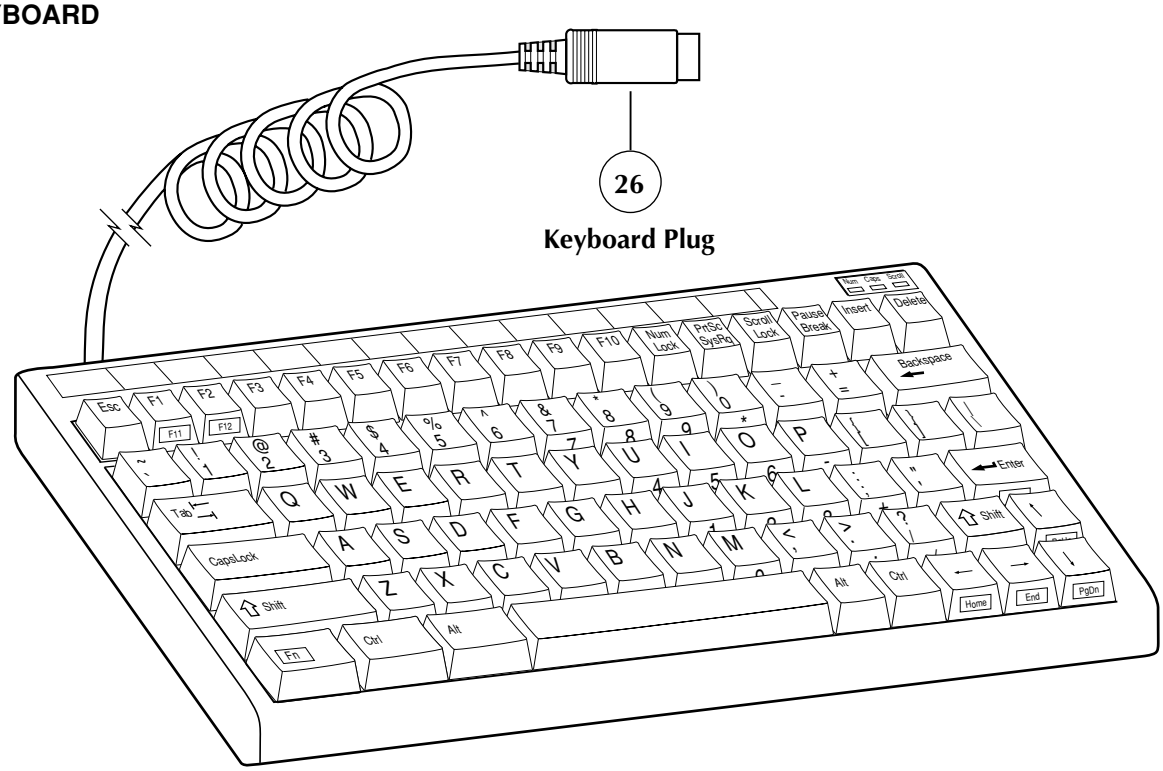
23. Backfocus Ring Locking Screw
Locks Backfocus Ring.

24. C-Mount Ring
Threads onto microscope C-mount adaptor.

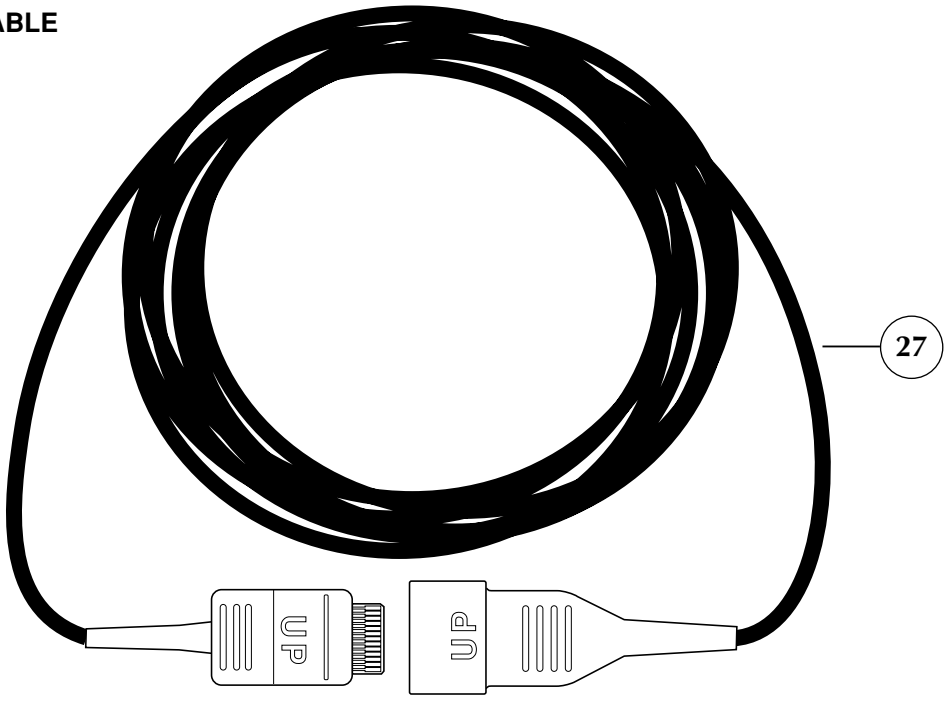
25. Adapting Optics
Adapts image format to increase field of view (be careful not to touch or scratch the outer optical surface. Clean only with lens tissue and lens cleaning fluid, if necessary).

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KEYBOARD



EXTENSION CABLE



26. Keyboard Plug
Connects with keyboard connector (see ⑲ on page 7).

27. 20 Foot Extension Cable
(offered only with specific models)

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GENERAL INSTALLATION

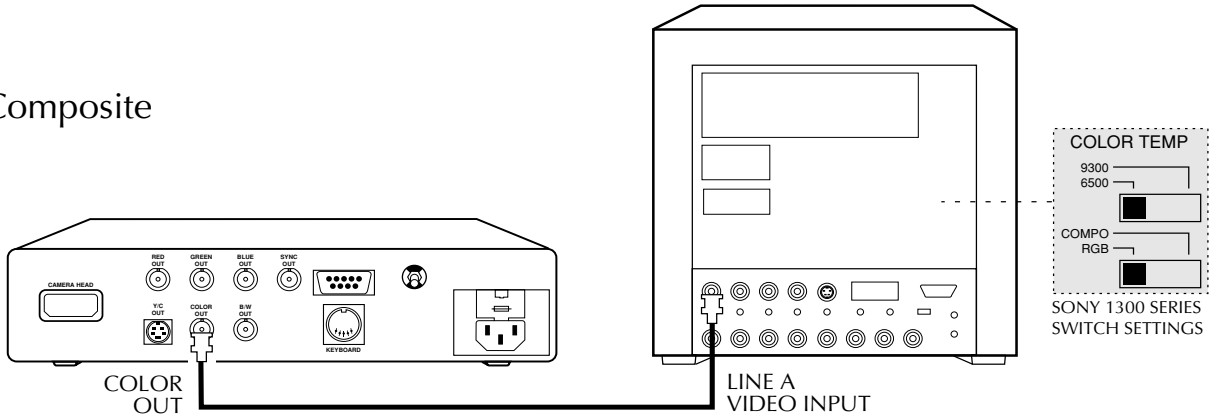
1. With power off, insert the head cable connector ⑳ with key up, into the camera head receptacle ⑨.

CAUTION: NEVER PLUG OR UNPLUG HEAD CABLE CONNECTOR WHILE POWER IS ON.

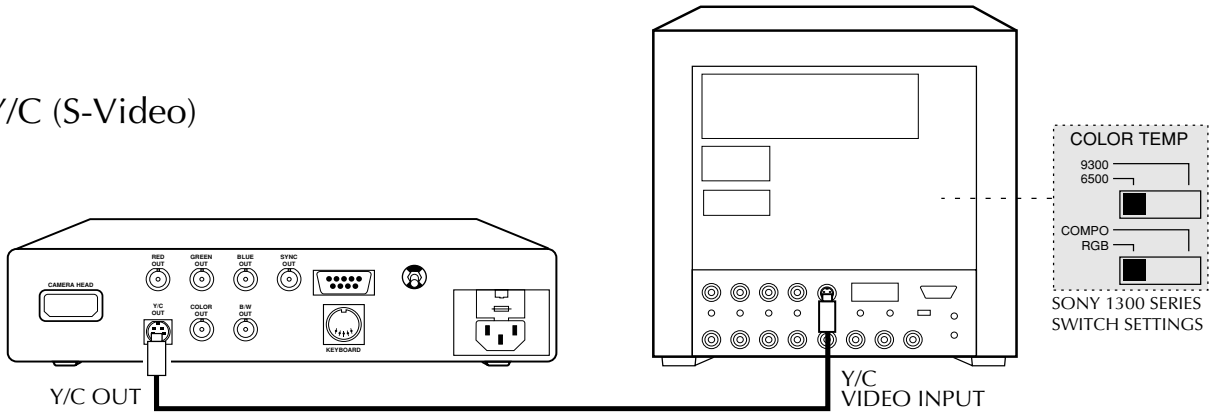
2. Connect appropriate processor outputs to monitor, based on monitor's requirements and signa preference, as shown in the figure below. To maximize the performance capabilities of the camera, RGB signal use is recommended.

NOTE: The camera will not produce a video image if the video cable is attached directly to the antenna leads of a standard video receiver.

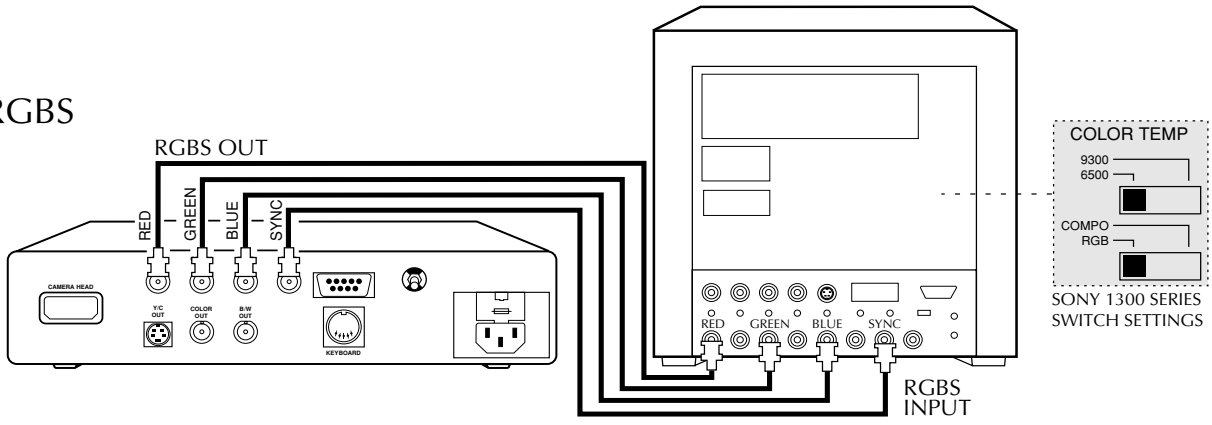
a. Composite



b. Y/C (S-Video)



c. RGBS



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GENERAL INSTALLATION (Continued)

3. Plug the power supply cord into the processor power input receptacle ⑭ and the other end into any standard 100-240 VAC, 50-60 Hz outlet. The camera automatically adjusts for power source.

4. Insert the keyboard plug ㉖ into keyboard connector ⑲ on the rear of the camera processor (refer to “Camera Operation” for keyboard operating instructions).

5. Attach the camera head to the microscope, threading clockwise until hand-tight.

6. Push the power switch on.

NOTE: Plug the keyboard in before turning the power on, otherwise the keyboard will not function.

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All camera functions are controlled from the keyboard. Some of the basic functions can be controlled from the camera controller front panel as well. Most of the keyboard functions can be found on the label above the top row of keys. In general, pressing one of these keys will enter the camera into the corresponding mode. The current function and its corresponding setting will be displayed on the monitor as a line of text along the bottom. Many of the functions have associated parameters or selections which can be changed using the up and down arrow keys in the lower right corner of the keyboard ([A], [B]), or the arrow keys on the camera processor front panel. To exit a function, press the same function key again, press [Alt] [SPACE], or press another function key.

Keyboard function keys are indicated in this document within brackets, such as: [EXPOSURE]

EXPOSURE CONTROL FUNCTIONS

The camera exposure functions determine how much light is recorded by the CCD, as well as the amount of that gain that is applied to the signal before it is displayed. There are two basic ways in which the camera exposure is set. In manual mode, the user manually sets the shutter speed. The gain is preset to a fixed level. In automatic mode, the camera analyzes the image and automatically finds the “best” combination of shutter speed and gain. The user can select from two weighting methods for the camera to use for determining the automatic exposure setting (see below). In automatic mode, the camera is constantly monitoring the scene content, and will quickly accommodate changes in scene illumination such as when switching from darkfield to brightfield.

Set Exposure [EXPOSURE]

The EXPOSURE key will enter the camera into the set exposure mode. The monitor will display the current exposure mode (auto or manual) along with the current shutter speed. The arrow keys have two effects, depending on whether the camera is in auto or manual exposure mode. In auto mode, the arrow keys will increase or decrease the exposure by one stop, resulting in a brightening or darkening of the image. The five auto settings are indicated on the monitor with “Auto,” “Auto –,” “Auto – –”, “Auto +”, and “Auto ++.” In manual mode, the arrow keys allow the user to select from any of the available shutter speeds. Press the arrow keys repeatedly until the desired shutter speed is selected.

Select Auto/Manual Exposure [AUTO/MANUAL]

The AUTO/MANUAL key toggles the exposure mode between auto and manual. After pressing the key, the current exposure mode and shutter speed will be displayed. The arrow keys can then be used to change the exposure.

Set Shutter Speed Limit [Alt] [L] *(Available on long integration models only)*

The Alt-L key combination enters the camera into the set shutter speed limit mode. This mode allows the user to change the longest allowed shutter speed when the camera is in auto exposure mode. While in this mode, the monitor will display the current limit, which can then be changed with the arrow keys.

Set Auto Exposure Weighting [Alt] [W]

The Alt-W key combination enters the camera into the set auto exposure weighting mode. This mode allows the user to change the method the camera uses to determine the best exposure in auto exposure mode. While in this mode, the monitor will display the current method, which can then be changed with the arrow keys.

- FULL SCREEN uses the average of the total screen content. This is the best for general use.
- WINDOW uses the average of a central area of the screen. This is useful if the outer boundary is either unimportant or obscured by the optical system.
- PEAK uses the brightest feature within the entire scene. This is useful when imaging small bright features such as fluorescent structures or reflective metal surfaces.

Set Gamma [Alt] [G]

The Alt-G key combination enters the camera into the set gamma mode. This mode allows the user to change the gamma curve used in the camera processor. While in this mode, the monitor will display the current gamma, which can then be changed with the arrow keys. A gamma of 1.0 gives the camera a linear response, which is useful for quantitative analysis. A gamma of 0.7 gives the camera the proper nonlinear response to correct for the non-linearity of the monitor. The 0.7 gamma should be used for most visual and qualitative work.

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WHITE BALANCE FUNCTIONS

Prior to using the camera, it is important to perform a white balance operation to ensure accurate color reproduction. Each component of a camera/microscope system can have a significant effect on the white balance. For this reason, it is recommended that the entire optical and illumination system be assembled before white balancing the camera. Be certain that no filters other than neutral density filters are in the optical path of the microscope prior to white balancing.

Automatic White Balance [WHITE BALANCE]

The WHITE BALANCE key initiates a white balance cycle in the camera. Before starting a white balance, set exposure mode to “Auto” (do not use Auto + or Auto -) and arrange a white, non-shiny object to fill most of the camera the field of view. This can be a blank place on a slide, a piece of white paper, gauze, etc. Next, press the white balance button. During the cycle the message “White Balancing...” will be displayed. If the white balance was successful, the message will change to “White Balance OK.”

If the white balance cycle fails, one of these messages will appear:

“White Bal Fail – Color” — This means that the color temperature of the light is out of the 2000K to 6000K range of the camera. Try turning up the illumination and check for colored filters in the optical path.

“White Bal Fail – Dark” — This means that the image is too dark for an accurate white balance. Try turning up the illumination, increasing the camera exposure time, opening an iris, or removing filters in the optical path.

“White Bal Fail – Bright” — This means that the image is too bright for an accurate white balance. Try turning down the illumination, decreasing the camera exposure time, closing an iris, or adding neutral density filters to the optical path.

The white balance setting is stored in nonvolatile memory in the camera control unit. This means that the camera should not need to be re-white balanced when the camera is turned back on, provided nothing in the system has changed (light source, microscope, etc.).

Please note that most illuminator controls are electrical “dimmers,” and changing their settings has a significant effect on the illumination color temperature. Also, camera color accuracy is best when the illuminator color temperature is high. Therefore, it is recommended that the illuminator be set to maximum at all times. If the illuminator setting is changed, a new white balance operation is recommended.

NOTE: If the white balance function is activated when the camera is set for a long exposure time (1/4 second or more), a considerable amount of time may elapse before the cycle is complete. If necessary, the cycle can be aborted by turning the camera off, then on again.

Set White Balance to 2800K [Alt] [WHITE BALANCE]

The Alt-WHITE BALANCE key combination sets the camera to a default white balance of 2800K, which is an average color temperature for most incandescent illuminators. This function is useful when it is impossible to provide a white reference subject, such as in fluorescence microscopy.

Set Red, Blue Levels [RED], [BLUE]

These keys enter the camera into the set red or blue level modes. These modes allow the user to change the overall color bias of the image. While in these modes, the monitor will display the current setting, which can then be changed with the arrow keys. The normal setting is 0. The selected color can be increased in steps up to a setting of +31 or decreased to a setting of -32. Positive red settings will make the image appear more red, while negative red settings will make the image appear more green. Positive blue settings will make the image appear more blue, while negative blue settings will make the image appear more yellow.

Enhancement Reset [RESET]

This key sets the red offset and blue offset to their default settings (0). Repeated pressing of this key will restore the settings to their prior values. This function enables the user to quickly toggle between enhanced and unenhanced operation in order to better evaluate the effects of the enhancements.

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SPECIAL FEATURES — *(Available on long integration models only)*

FREEZE FRAME
Freeze frame can be used to capture transient events, or to minimize bleaching of fluorescent subjects. Frozen images can be subsequently modified with any of the enhancement functions: contrast, brightness, sharpness, red offset, blue offset.

Note: When using freeze frame, the subject must be stationary in order to obtain stable, flicker-free images.

Freeze Frame On/Off [FREEZE FRAME]
Pressing this button allows the user to “freeze” the displayed image on the monitor. Pressing the button again will restore the display to “live” video. When Freeze Frame is on, the letters “FF” will appear along with the current exposure when the Exposure function is turned on.

ENHANCEMENT FUNCTIONS
The enhancement functions are used to provide additional clarity to existing images. They are all digital processing functions, and can be applied to either live or frozen images.

Set Contrast [CONTRAST]
This key enters the camera into the set contrast mode. This mode allows the user to change the contrast slope of the image. While in this mode, the monitor will display the current contrast setting, which can then be changed with the arrow keys. The normal contrast setting is 0. The contrast can be increased in steps up to a setting of +16 or decreased to a setting of -15. Increased contrast is useful for improving visibility of details or contours. Decreased contrast is useful for subjects with excessive contrast, or as a means to accentuate color differences rather than brightness differences. In general, the contrast function will need to be used in conjunction with the brightness function to achieve the optimal image (see below).

Set Brightness [BRIGHTNESS]
This key enters the camera into the set brightness mode. This mode allows the user to change the overall brightness of the image. While in this mode, the monitor will display the current brightness setting, which can then be changed with the arrow keys. The normal contrast setting is 0. The brightness can be increased in steps up to a setting of +31 or decreased to a setting of -32. Increased brightness is useful for improving visibility of features in dark areas. Decreased brightness is useful for suppressing unimportant features in dark areas of the image. In general, the brightness function will need to be used in conjunction with the contrast function to achieve the optimal image (see above).

Set Sharpness [SHARPNESS]
This key enters the camera into the set sharpness mode. This mode allows the user to change the overall detail enhancement of the image. While in this mode, the monitor will display the current sharpness setting, which can then be changed with the arrow keys. The normal sharpness setting is 0. The sharpness can be increased in steps up to a setting of +20. Increased sharpness is useful for improving visibility of fine details and contours in the image.

Set Red, Blue Levels [RED], [BLUE]
These keys enter the camera into the set red or blue level modes. These modes allow the user to change the overall color bias of the image. While in these modes, the monitor will display the current setting, which can then be changed with the arrow keys. The normal setting is 0. The selected color can be increased in steps up to a setting of +31 or decreased to a setting of -32. Positive red settings will make the image appear more red, while negative red settings will make the image appear more green. Positive blue settings will make the image appear more blue, while negative blue settings will make the image appear more yellow.

Enhancement Reset [RESET]
This key sets the contrast, brightness, sharpness, red offset, and blue offset to their default settings (0). Repeated pressing of this key will restore the settings to their prior values. This function enables the user to quickly toggle between enhanced and unenhanced operation in order to better evaluate the effects of the enhancements.

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TITLING FUNCTIONS

The camera processor has a built-in titling generator, which allows the user to annotate images with alphanumeric text. When in the title edit mode, the keyboard is used as a typewriter to enter desired text. There are five “pages” of text which can be written to and displayed. Each page can hold 10 lines of text, 24 characters per line.

Title Edit/Title Display/Title Off [TITLE]

Pressing the TITLE key causes the camera to enter title edit mode, which allows the user to enter text into the current title page. When in title edit mode, the message “Title Edit” will appear at the bottom of the monitor along with the current page number. A flashing cursor will appear in the text area, indicating where the text will be placed. To enter text, simply type the desired message from the keyboard.

Pressing the TITLE key again switches the camera into title display mode, which only displays the current text and does not allow the text to be changed.

Pressing the TITLE key a third time turns the title display off.

Cursor Movement [A], [B], [C], [D]

In title edit mode, the four arrow keys in the lower right corner of the keyboard can be used to position the cursor anywhere in the text area.

Page Up/Page Down [Fn] [PgUp], [Fn] [PgDn]

The Fn-PgUp and Fn-PgDn key combinations increment or decrement the current page number when in title edit or title display mode. There are a total of five pages.

Note: The Fn key is in the lower left corner of the keyboard, and the PgUp and PgDn keys are also the up and down arrow keys in the lower right corner of the keyboard.

Replacement Mode/Insert Mode [Insert]

The Insert key toggles the text editor between replacement mode and insert mode when the camera is in title edit mode. In replacement mode, the cursor appears as a flashing white square, and typing a character simply replaces the character under the cursor with the new one. In insert mode, the cursor appears as a flashing underscore, and typing a character inserts the new character immediately to the left of the cursor and shifts the characters to the right of the insertion point.

Delete Current Character [Delete]

The Delete key causes the character under the cursor to be deleted when in title edit mode.

Delete Previous Character [Backspace]

The Backspace key causes the character to the right of the cursor to be deleted when in title edit mode.

Clear Current Page [Alt] [Delete]

The Alt-Delete key combination causes all text in the current page to be deleted when in title edit mode.

Clear All Pages [Ctrl] [Delete]

The Ctrl-Delete key combination causes all text in all pages to be deleted when in title edit mode.

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COLOR BARS
The camera control unit has a built in color bar generator. This is useful for adjusting the monitor (see “Adjusting Color Monitor” section in this manual), providing a leader for videotape recording, or for troubleshooting a video system. The pattern used is the SMPTE color bar pattern which includes bars of each primary and secondary color and a pluge signal, which is used to set the brightness level of the monitor.

Color Bars On/Off [COLOR BARS]
This key toggles the color bar test pattern on and off. When color bars are on, all camera functions are disabled except for titling.

CAMERA RESET
The camera reset function sets all camera parameters to default states. This provides a convenient way to put the camera into a known state if the settings are unknown.

Standard Reset [Alt] [RESET]
The Alt-RESET key combination initiates a standard reset. All enhancements are turned off, the camera is placed in auto exposure mode, the weighting is set to full screen, the white balance is set to 2800K, gamma is set to .7, the color bars are turned off, freeze frame is turned off, and titling is turned off. Standard reset can also be initiated by pressing the two arrow keys on the camera controller front panel simultaneously.

FUNCTION EXIT
A currently active function will be indicated along the bottom line of the monitor (“EXPOSURE,” “GAMMA,” etc.). A function can be exited by pressing its function key again, pressing another function key, or by using the general exit function.

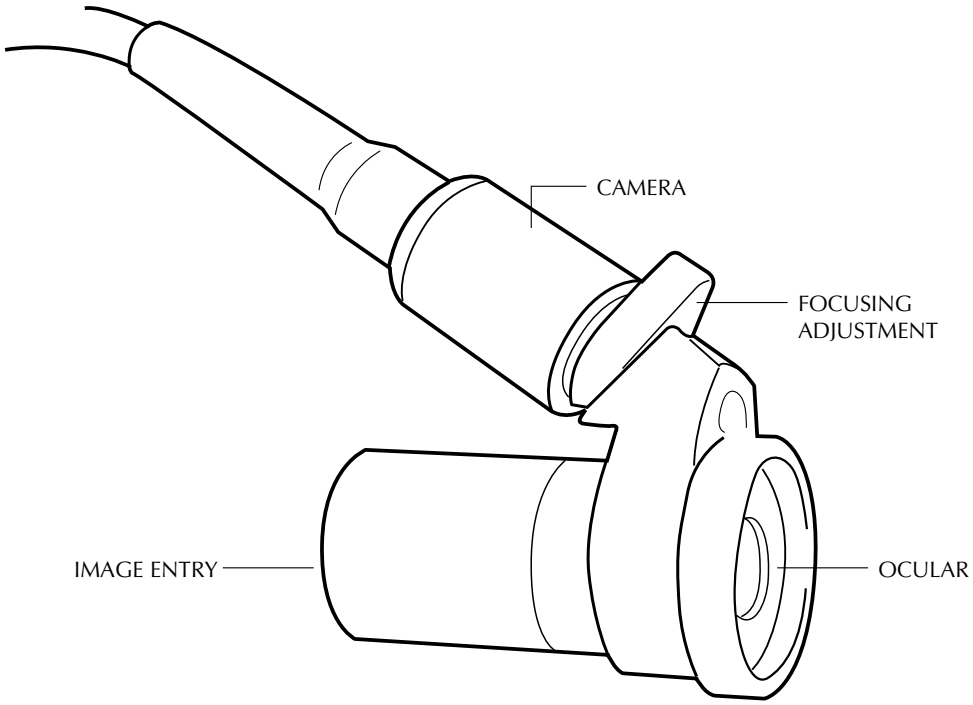
General Exit [Alt] [SPACE]
The Alt-SPACE key combination allows the user to quickly exit any function, and simultaneously clear the text at the bottom of the screen ([SPACE] is the spacebar at the bottom of the keyboard).

DEFAULT EXPOSURE MODE
If no text appears on the bottom of the monitor image, then the default is the exposure set mode. Pressing the up or down keys on either the keyboard or camera processor will change the exposure accordingly.

FRONT PANEL CONTROLS
The camera processor front panel has buttons for Color Bars, White Balance, Weighting, Exposure, Auto/Manual, Up Arrow, and Down Arrow which are functionally identical to their counterparts on the keyboard. These controls can be used if the keyboard is malfunctioning or missing. If the Exposure or Weighting functions are enabled, use the up and down arrow buttons on the front panel to change the settings. Press the up and down arrow buttons simultaneously to initiate a standard reset of the camera.

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CAMERA HEAD OPERATION AND SPECIFICATIONS



OPERATION

1. Remove slit lamp eyepiece.
2. Insert EPIC video/adaptor eyepiece.
3. Focus slit lamp eyepieces per slit lamp microscope instructions.
4. While looking at the monitor, adjust the EPIC focusing adjustment for the camera until the image on the monitor is focused.

SPECIFICATIONS

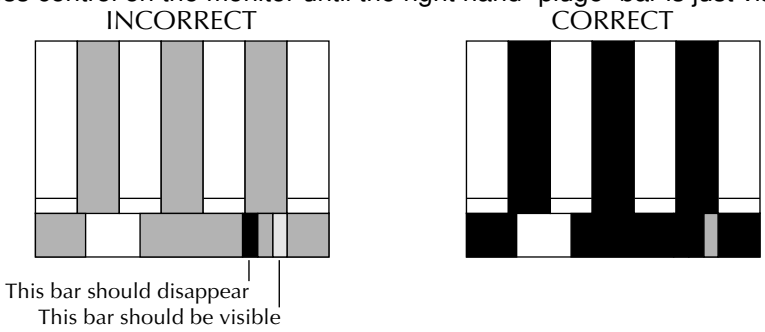
Imaging device	Sony ICX-068 AK, 1/4" optical format, Power-HAD™ micropackage	
Active area:	3.65mm (H) x 2.74mm (V) 768 (H) x 494 (V) effective pixels 811 (H) x 508 (V) total pixels Integral complimentary color mosaic filter	
Dimensions:	Size:	3.0 x 2.5 in (76 x 63mm)
	Weight:	0.6 lb
	Cable length:	10 ft (3m)
	Connector:	card-edge
	Finish/materials:	anodized aluminum

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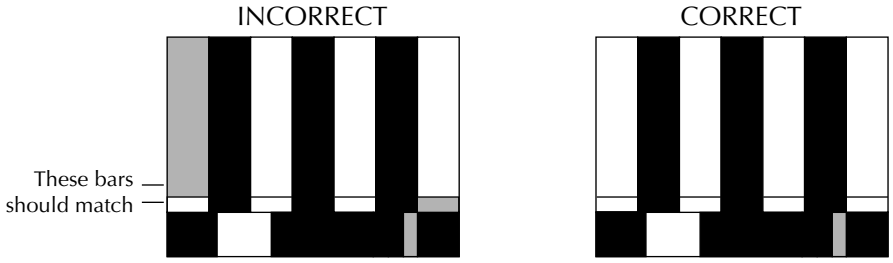
COLOR ADJUSTMENT USING SMPTE-TYPE COLOR BARS

NOTE: The adjustments below are for composite or Y/C video only. Most monitors in RGB mode have preset color by the manufacturer, and color intensity or hue cannot be manually adjusted. Only the BRIGHTNESS and CONTRAST adjustment can be performed in RGB mode.

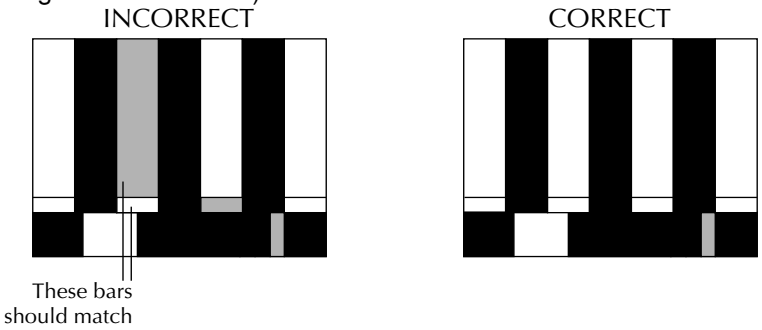
1. Activate the SMPTE-type color bar generator by pressing the COLOR BARS button on the front panel.
2. **Contrast Adjustment**
   Set contrast for brightest possible image without blooming or distortion.
3. **Brightness Adjustment**
   Set the brightness control on the monitor until the right hand "pluge" bar is just visible, as shown:



4. For the next two adjustments (chroma and phase), press the Blue Only button on the monitor, if so equipped. Otherwise, view the monitor through a blue Wratten #80A filter.
5. **Chroma (Color) Adjustment**
   Adjust the chroma (or color) control on the monitor until the indicated bars match in intensity (Blue Only on, or viewed through blue #80A filter).



6. **Phase (Hue, Tint) Adjustment**
   Adjust the phase (or hue, tint) control on the monitor until the indicated bars match in intensity (Blue Only on, or viewed through blue #80A filter).



7. When the correct results have been achieved, press the Blue Only button again (or set aside the blue filter). The colors should now be accurate.
8. Press the COLOR BARS button again to return to normal camera operation.

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CLEANING AND STORAGE AFTER USE

Camera Head

1. Clean the camera head with a damp cloth.
2. Dry thoroughly with a soft towel.
3. Replace the camera head into its protective storage case. Do not coil the camera cable tightly.

Camera Processor

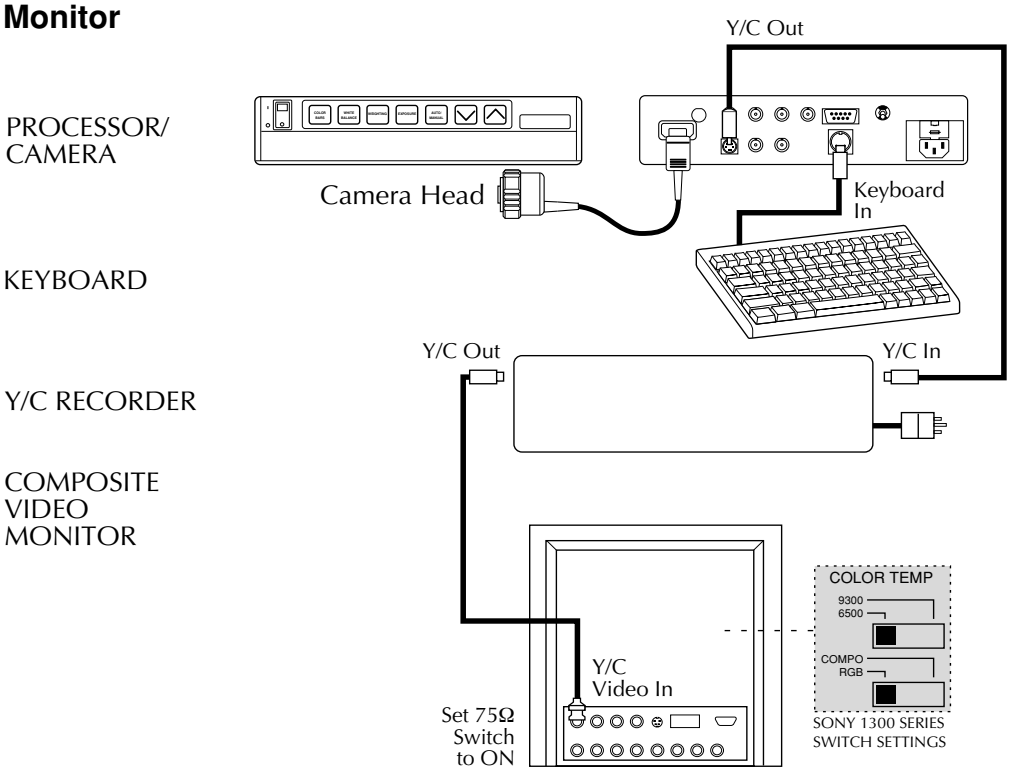
1. Clean the processor cover with a damp cloth.
2. Dry thoroughly with a soft towel.
3. Replace the camera processor into its protective storage case.

CAUTION: DO NOT STORE THE CAMERA, IN OR OUT OF ITS CASE, IN DIRECT SUNLIGHT OR EXCESSIVE HEAT.

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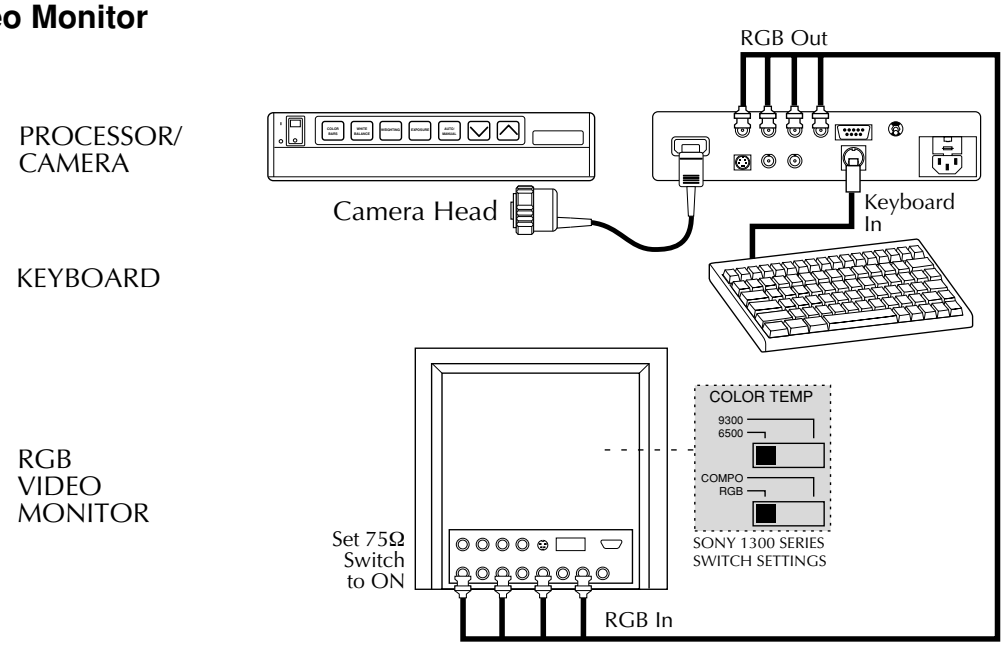
Video System
Keyboard
Y/C Recorder
Y/C Video Monitor

SYSTEM CONFIGURATION 1



Video System
Keyboard
RGB Video Monitor

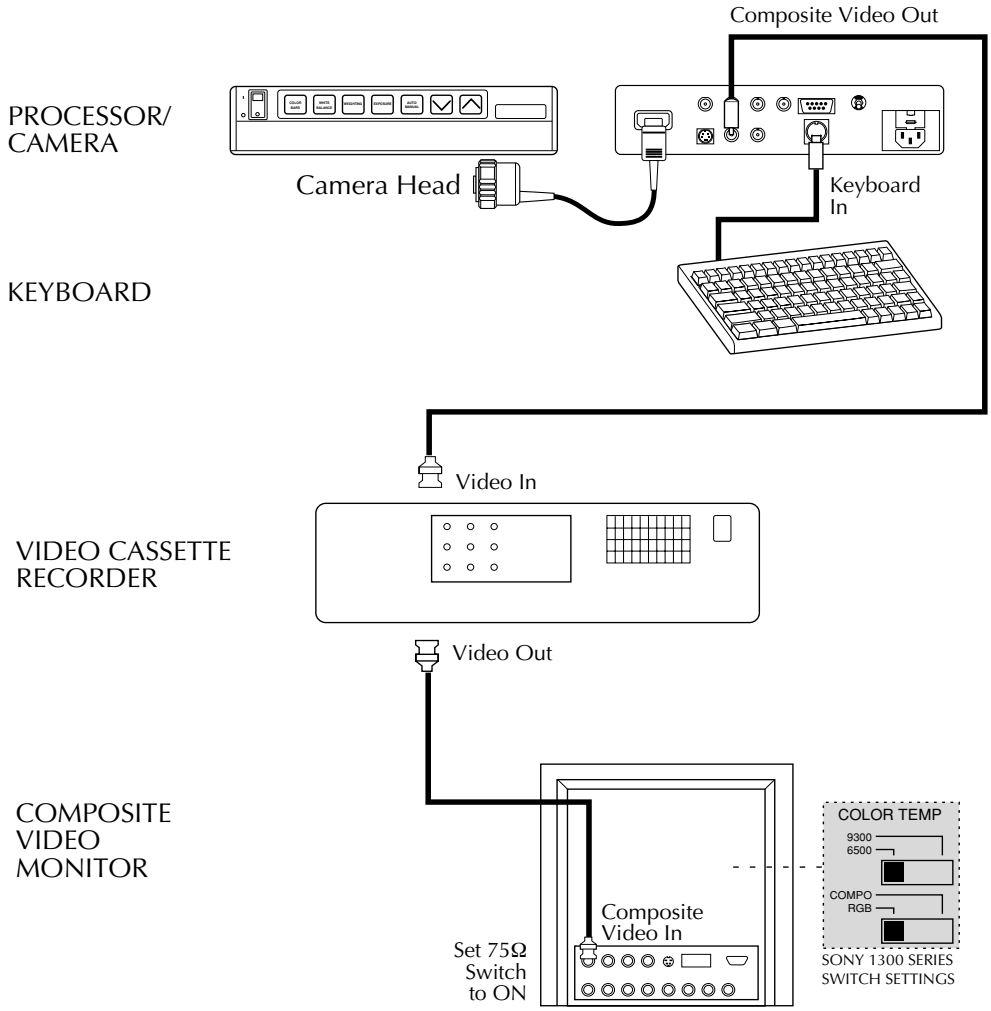
SYSTEM CONFIGURATION 2



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Video System
Keyboard
Video Cassette Recorder
Composite Video Monitor

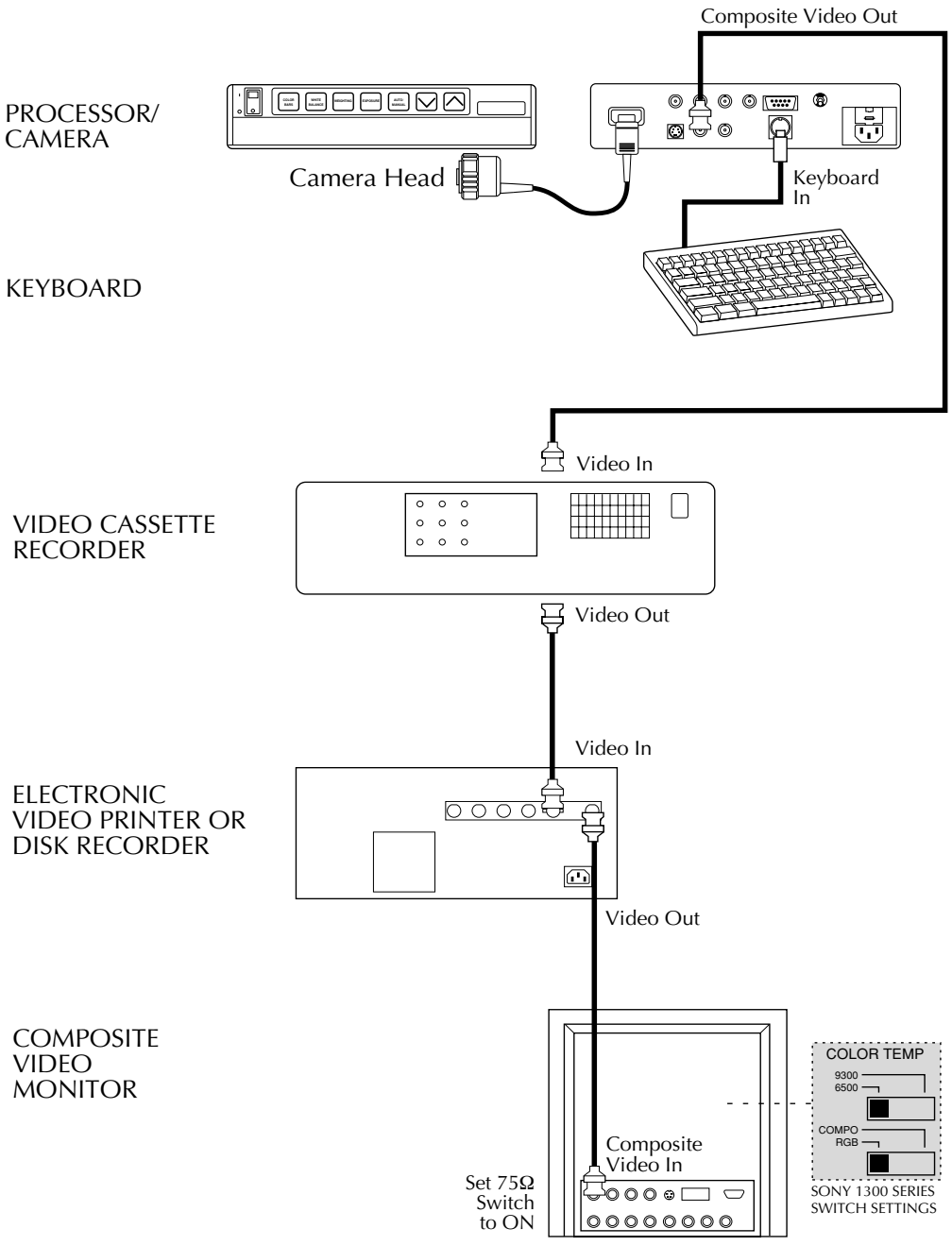
SYSTEM CONFIGURATION 3



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Video System
Keyboard
Video Cassette Recorder
Video Printer or Disk Recorder
Composite Video Monitor

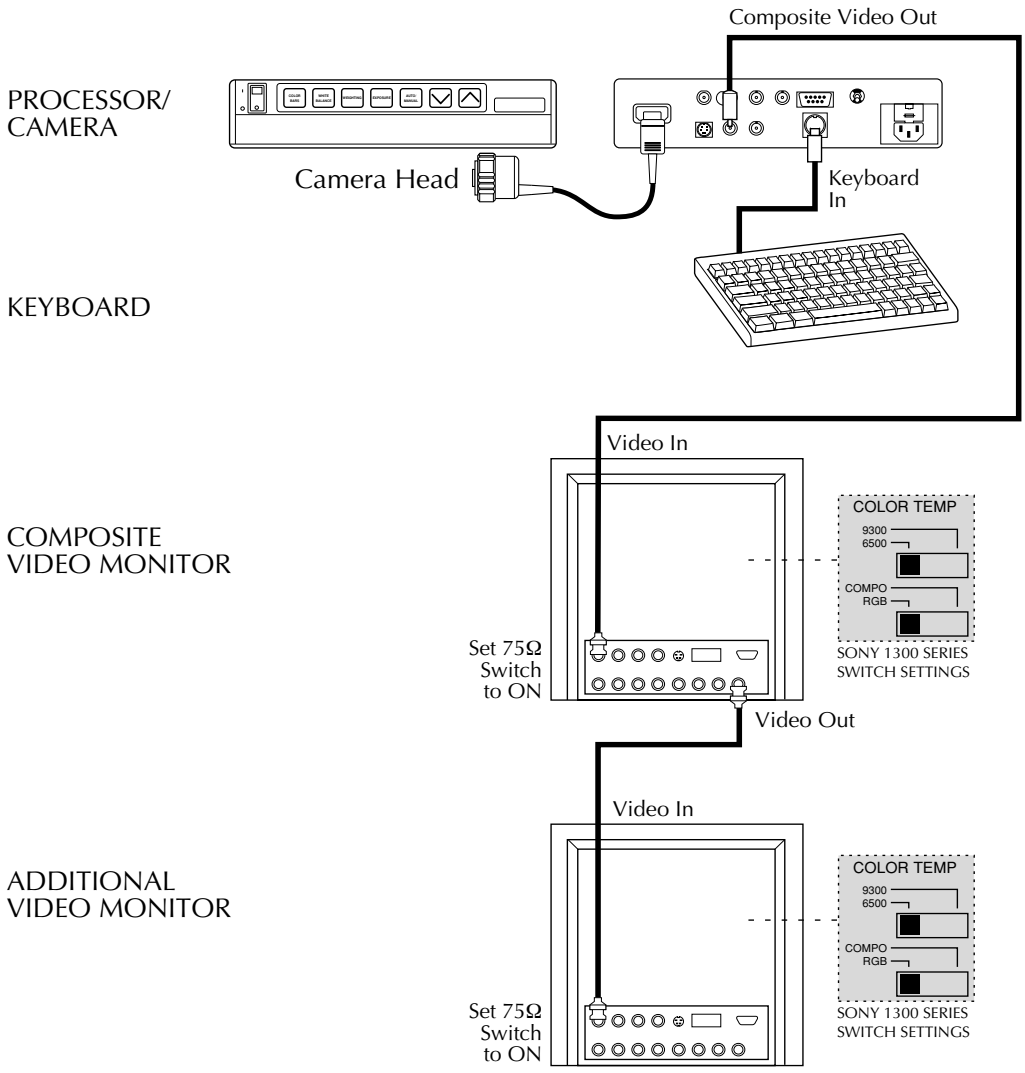
SYSTEM CONFIGURATION 4



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Video System
Keyboard
Composite Video Monitor
Additional Video Monitor

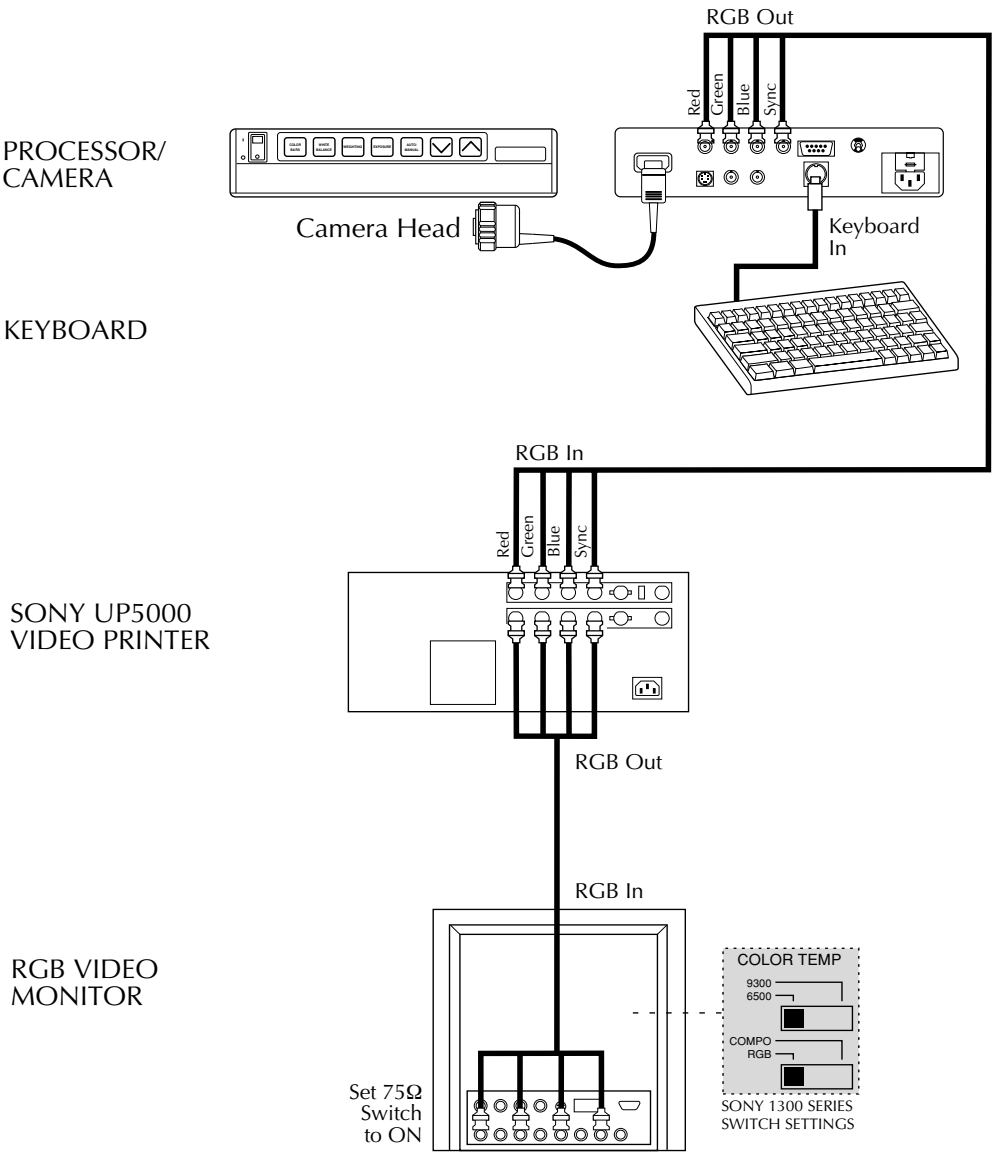
SYSTEM CONFIGURATION 5



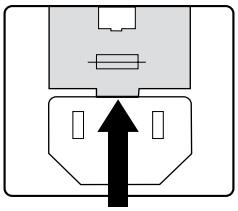
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Video System
Keyboard
Sony UP5000 Video Printer
RGBS Video Monitor

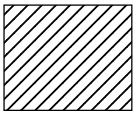
SYSTEM CONFIGURATION 6



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SYMPTOM	OPERATIONAL CHECKS/REMEDY
NO VIDEO – POWER LIGHT OFF	Is camera processor plugged in? Check wall receptacle. Is processor switch turned on? Check fuse at power cord module and replace if necessary. To change the fuse(s), remove power cord, remove fuse holder from power entry modules, and remove fuse(s). Replace with the same type of fuse. 
NO VIDEO – POWER LIGHT ON	Is monitor plugged in and turned on? Is video (Comp, Y/C, RGB) cable from camera processor to monitor connected? Is camera head plugged in? Is monitor appropriately switched (correct Video in channel or TV/line switch turned to “line”)? Are all accessories (VCR, video printer, etc.) turned on and switched to “line?” Is VCR record button on? Some VCRs require the record button to be depressed to operate. If using a TV receiver, is video cable from processor connected to “video” inputs (not antenna inputs)? Trace video cables through accessories, i.e., video out to video in, video out to video in, etc.
INTERMITTENT VIDEO	Check all connections: Camera head cable to processor and video cables to and from all accessory components. Wiggle camera head cable at processor and camera head — if picture flashes, refer to “Service and Warranty” for information on how to return a malfunctioning unit. Check video cables to determine if bad. See if problem exists with another video source (for example, remove camera from system and play back tape on VCR and monitor). Try to isolate problem by finding one component that works and testing all other components with it.
BAD COLOR	Repeat the white balance procedure with correct illumination, with complete system hooked up, pointing the camera at a white object. Adjust monitor, starting with controls in detent or center position. Terminate monitor if it is the last component in the system. If it is not the last component, leave the monitor unterminated and terminate the last component in line (refer to the next section, “Video Signal Termination”). Is processor on top of light source or in an unventilated area? If so remove to a cool, well-ventilated area. If no color, turn up color on monitor. If too much color (or color too intense), turn down color on monitor. The Sony UP5000 video printer can introduce color shifts to the system. See System Configuration 6 to isolate the camera from printer-related problems. Check rear panel switch settings on SONY 1300 series monitors. Switches should be set to "RGB" and "6500."

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SYMPTOM	OPERATIONAL CHECKS/REMEDY
ROLLING PICTURE	Adjust vertical or horizontal hold on the monitor. 
OCCASIONAL VIDEO DISTURBANCE OR INTERFERENCE	Is camera head cable connector inserted completely into processor receptacle? Does the interference change when the camera head cable is wiggled? If so, refer to “Service and Warranty” for information on how to return a malfunctioning unit. Try a different electrical outlet, preferably with no other equipment plugged into it. The Sony UP5000 video printer can introduce interference to the system. See System Configuration 6 to isolate the camera from printer-related problems.
GRAINY OR NOISY IMAGE	Increase intensity of light source. Adjust monitor, starting with controls in detent or center position.
SPOTS ON IMAGE	Clean optical surfaces of camera head and lens or adaptor.
PICTURE TOO DARK OR TOO BRIGHT	Adjust level of light source. Adjust monitor brightness. Adjust contrast, picture, or sharpness controls on monitor, starting with detent or center position. If desired, the automatic exposure system may be overridden by pressing the manual shutter button, and shuttering through the various speeds until desired exposure is achieved. The Sony UP5000 video printer can introduce interference to the system. See System Configuration 6 to isolate the camera from printer-related problems.
GENERAL	Try to isolate problem equipment (monitor, camera, VCR, etc.) before returning camera for abnormal image (noise, interference, bad color, etc.). If the camera does seem to be the problem, refer to “Service and Warranty” for information on how to return a malfunctioning unit. Video tape the problem and include the tape when returning the equipment for repair. Do not attempt to repair equipment. There are no user-serviceable parts inside the camera.

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VIDEO SIGNAL TERMINATION

In a video system, a signal is generated and transmitted through various electronic devices. This signal is always carried on a transmission wire (video coaxial cable) having a characteristic impedance of 75 ohms.

The end point of the transmitted video signal must be terminated, otherwise signal reflections may occur, causing incorrect brightness and/or ghosting effects to appear on the monitor image. Termination is accomplished by applying a 75 ohm resistance to the signal at its end point.

The monitor receives and *passively* generates video signal. It is terminated only when the monitor is the last device hooked up consecutively in a video system receiving the signal. Many devices such as VCRs and video printers receive as well as *actively* regenerate video signals. In these cases, the signal received by the device and the succeeding regenerated signal must both be terminated.

Termination is accomplished automatically through the device's internal circuitry or manually by flipping a rear switch on the device to the *Term* or *75 ohm* position.

To determine if a device in your video system requires manual termination, check the rear of the unit. If a termination switch exists, manual termination is indicated and a decision whether or not to terminate must be made. If a switch is not found, the device will automatically apply termination as needed.

MONITORS
Some monitors are automatically terminating, others are not. Check the rear of the monitor for a termination switch to verify. If a switch exists and the monitor is the last device hooked up to the system, set the switch to terminate. If the monitor is not last, the signal is being passively looped through and termination is not required. Set the switch to the unterminated position. NOTE: On automatically terminating monitors, the termination switch is located in the Video Input receptacles and activated when a coaxial cable plug is inserted. Alternatively, the Video Output receptacles deactivate termination when a plug is inserted. If termination is required, ensure that the connecting coaxial cable is plugged into the Video In receptacle and not the Video Out receptacle.

VIDEO CASSETTE RECORDERS/PRINTERS
Some video cassette recorders/printers are automatically terminating, others are not. Check the rear of the device for a termination switch to verify. If one exists, set the switch to terminate regardless of whether or not the VCR or Printer is the last device hooked up to the system. The only exception is if T-connectors are used to loop the signal through to a successive device. In this case, the signal is being passively generated or looped through and termination is not required. Set the switch to the unterminated position.

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SPECIFICATIONS

IMAGING DEVICE
Sony ICX038AK
1/2" interline transfer Power-HAD CCD
Complimentary color mosaic filter
768 (H) x 494 (V) active pixels (NTSC)
752 (H) x 582 (V) active pixels (PAL)
6.4mm x 4.8mm sensing area (equivalent to 1/2" optical format)

OPTICS
All heads have standard C-mount thread
Reduction lens options (no lens = C head, .7 lens = A head, .5 lens = B head)
Uncooled head: A, B, or C
Cooled Head (T): B or C

VIDEO SIGNAL SYSTEM
NTSC version:
EIA RS-170A standards, NTSC color system
2:1 interlaced, 525 lines, 30 frames/sec
15,734 Hz horizontal scan rate
59.94 Hz vertical scan rate
PAL version:
CCIR standards, PAL color system
2:1 interlaced, 625 lines, 25 frames/sec
15,625 Hz horizontal scan rate
50.00 Hz vertical scan rate

SHUTTER SPEEDS
Uncooled head:
1/10000, 1/4000, 1/2000, 1/1000, 1/500, 1/250, 1/125, 1/60, 1/30, 1/15, 1/8, 1/4, 1/2, 1, 2, 4
Cooled head(T):
1/10000, 1/4000, 1/2000, 1/1000, 1/500, 1/250, 1/125, 1/60, 1/30, 1/15, 1/8, 1/4, 1/2, 1, 2, 4, 8, 15, 30, 1 min, 2 min

AGC RANGE
0 dB to +12 dB

AUTO EXPOSURE
Microprocessor controlled, proprietary algorithm
Maximum response time: .5 seconds from 1/60 to 1/10000
Weighting: full frame, center window, peak

WHITE BALANCE
One switch, automatic, range: 2000K to 6500K, or 2800K preset

MEMORY RETENTION
Internal nonvolatile RAM retains settings for the following functions:

White Balance	Contrast
Exposure Mode (Auto/Manual)	Brightness
Exposure Mode setting	Sharpness
Auto Exposure Limit	Red/Blue Levels
Auto Exposure Weighting	Titling
Gamma	

ON SCREEN DISPLAY
Lines 1–10: not used
Line 11: status line
Line 12: command line (auto/manual and shutter speed)

REAR PANEL
Power input receptacle (IEC 320)

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CONNECTORS	POAG potential equalization connector (chassis ground) Head cable receptacle (card edge) Keyboard receptacle (5 pin DIN) Y/C output (4 pin DIN) Red, green, blue, color, B/W, sync output (BNC)	
CAMERA HEAD	Uncooled head:	
	Dimensions:	1.75 x 1.87 in (44 x 48 mm)
	Weight:	3.6 oz (102 g)
	Cable length:	10 ft (3 m)
	Connector:	card edge
	Finish/materials:	black anodized aluminum
	Cooled Head(T):	
	Dimensions:	3.0 x 5.5 in (76 x 140 mm)
	Weight:	3.0 lbs (1.4 kg)
	Cable length:	10 ft (3 m)
	Connector:	card edge
	Finish/materials:	black anodized aluminum
	CCD cooler:	2 stage thermoelectric (Peltier)
	Cooled temperature:	37°C below ambient
	Cable length:	10 ft (3 m)
PROCESSOR UNIT	Dimensions (lxwxh):	12.0 x 11.4 x 2.5 in (305 x 289 x 64 mm)
	Weight:	9.0 lbs (4.1 kg)
	Finish:	Apple platinum color paint
POWER REQUIREMENTS	100 to 240 V~, 50/60 Hz, 40 watts maximum	
FUSE TYPE	SB 0.75A 250V, 5 x 20 mm Slo Blo	
ENVIRONMENTAL	Operating temperature:	32°F to 131°F (0°C to 55°C)
	Storage temperature:	14°F to +140°F (-10°C to +60°C)
	Humidity:	0 to 80%, non-condensing
	Shock and vibration:	UPS ship test (ISTA 1A)
REGULATORY COMPLIANCE	Designed to meet, but not certified to: IEC 601-1 type B, class I; UL-544; FCC class A; VDE limit B	
SHIP KIT	Shipping container with foam Camera processor and head RGB video cable: 6 ft (1.8 m) Power Cord: NTSC: 6 ft (IEC 320 to NEMA 5-15P) PAL: 3 m (IEC 320 to CEE 7/7) S-video cable: 6 ft (1.8 m) BNC cable: 6 ft (1.8 m) Keyboard Instruction Manual	

Specifications subject to change without notification.

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SERVICE

Refer all servicing and adjustments to qualified service personnel. DO NOT open camera head or processor chassis as this will result in damage and VOIDING OF WARRANTY.

WARRANTY

The cameras are covered by a one year warranty applicable from the date of sale against defects in materials and workmanship or malfunctions under normal use and service. This warranty does not apply to any unit which has been subject to misuse, abuse, neglect, improper installation or operation or that has been altered, adjusted, or tampered with by any person other than authorized service personnel.

Should a malfunction occur, the unit must be returned to **Optronics** or to its authorized representative. Before returning the unit, the customer should first call **Optronics** to obtain a "Return Materials Authorization" number. **Optronics** will repair the unit and return it to the customer.

If, upon examination by authorized service personnel, it is determined that the malfunction is due to misuse or abuse, warranty provisions will not apply. An estimate of the cost of repair work will be given to the customer prior to servicing and repairing the unit.

Optronics is responsible for the effects on safety, reliability and performance of the equipment only if it is serviced by authorized personnel and used in accordance with the Instruction Manual.

Optronics
175 Cremona Drive
Goleta, CA 93117
Tel: (805) 968-3568
FAX: (805) 968-0933

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[Alt] [W]	Set Auto Exposure Weighting
[Alt] [L]	Set Auto Exposure Shutter Speed Limit
[Alt] [G]	Set Gamma
[Alt] [WHITE BALANCE]	Set White Balance to 2800K
[Alt] [DELETE]	Clear all text in current title page
[Ctrl] [DELETE]	Clear all text in all title pages
[Alt] [RESET]	Initiate standard reset of camera
[Alt] [SPACE]	Exit current function
[Ctrl] [Alt] [M]	Set archiving option
[Ctrl] [Alt] [F]	Toggle Field Mode on/off

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