

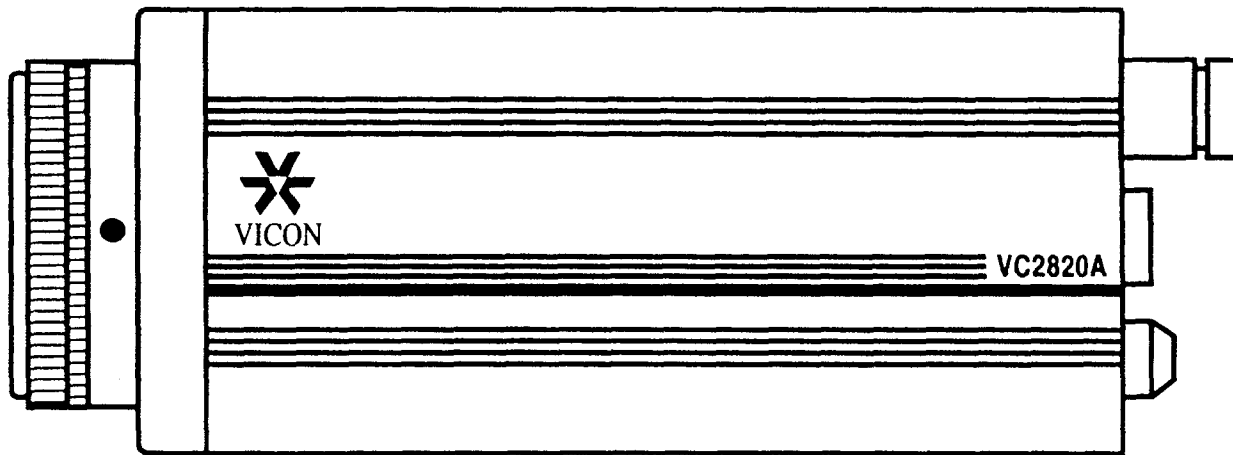


VICON

INSTRUCTIONS FOR  
INSTALLATION AND OPERATION

NOTES	SHEET	REV.	SEC.
	X866	195	2

# MODEL VC2820A-24 1/2-INCH HIGH-RESOLUTION COLOR CCD CAMERA



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**WARNING:**

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

**CAUTION:**

To prevent electric shock, do not open the unit. No user serviceable parts inside. Refer servicing to qualified service personnel.

**CAUTION:**

To prevent electric shocks and risk of fire hazards, do NOT use other than the specified power source.

This installation should be made by a qualified service person and should conform to all local codes.

Thank you for purchasing a VICON color video camera. To obtain the best results from your new camera, read this instruction manual carefully before use; retain the manual for future reference.

## CONTENTS

FEATURES .....	2
PRECAUTIONS IN USE .....	3
CONTROLS AND THEIR LOCATIONS .....	4
SHUTTER SPEED & GAMMA CONTROLS .....	10
LENS INSTALLATION .....	12
Mounting a lens .....	12
Back-focus adjustment .....	13
Lenses that can be used .....	14
CONNECTION EXAMPLES .....	15
CAMERA INSTALLATION .....	17
Installation .....	17
SPECIFICATIONS .....	17

## FEATURES

- 1/2-Inch CCD (charge-coupled device) image sensor. 380,000 image-forming pixels (410,000 pixels total) produce clear pictures without lag, burn-in, or geometric distortion.
- High-resolution, high-sensitivity design provides a horizontal resolution of 460 TV lines and a low-light sensitivity of 0.57 lux (scene illumination, lens at f/1.2, 89.9% highlight reflectance, 25 IRE video output).
- Through-the-lens automatic white balance with manual override. The manual override allows manual adjustment of the red and blue components.
- CS-mount with C-mount adapter permits the use of a wide range of lenses.
- Manually selectable electronic shutter provides nine shutter speeds.
- Automatic gain control (AGC) automatically increases the camera's sensitivity when the level of ambient light drops.
- Power lines phase locking (line locking) with  $\pm 90$  degrees of vertical phase adjustment.
- Galvanometric autoiris lens output for CS-G lenses.
- Output for video-drive (ES and AC) autoiris lenses.
- Operates on 24 VAC, 60 Hz power.

## PRECAUTIONS IN USE

While operating, if any abnormal condition (strange sound, smell or smoke) or a malfunction (no picture, etc.) is observed, stop using the camera immediately, turn the power off, then call your local dealer.

### Cleaning

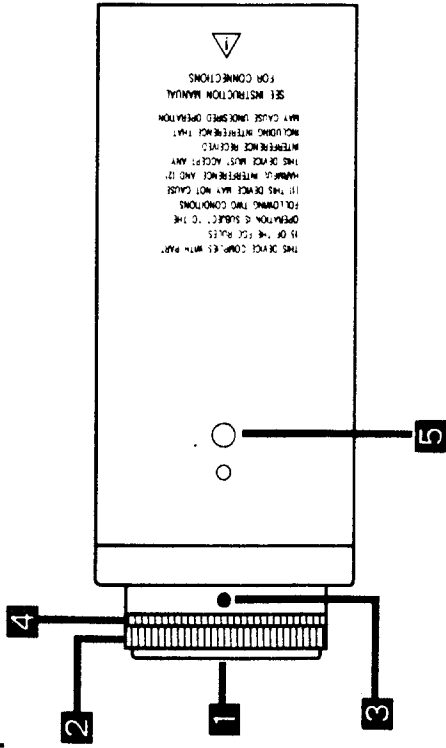
Turn the power off and wipe off the dirt with a dry soft cloth. If it is extremely dirty, use furniture cleaner to wipe it off. To clean the lens, use a blower or lens cleaning tissue (available from any camera dealer).

- **Do not point the camera at the sun.** This could damage the camera whether it is operating or not.
- **Do not shoot any source of bright light.** If the object contains very bright areas, bright vertical or horizontal lines may appear on the screen. This is called "smear", a phenomenon which occurs with solid-state pickups, and is not a malfunction.
- **Do not disassemble the camera** and never touch parts inside the camera as you could damage the camera.
- **Do not allow anything to get inside the camera.** If a metal or flammable object gets inside the camera, it may cause a malfunction.
- **Handle with care.** Do not drop the camera or subject it to shocks and vibrations to avoid possible damage.

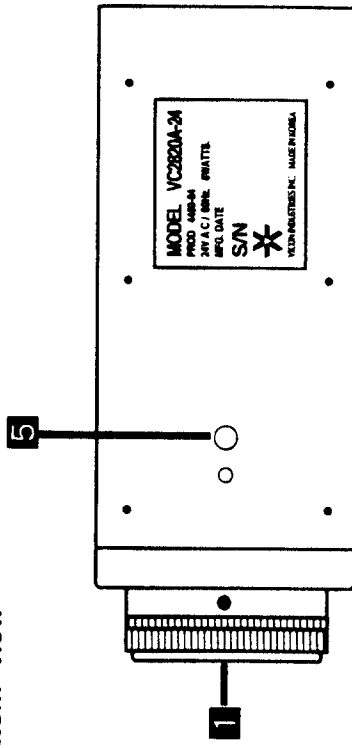
- \* Also read "Precautions (installation)" on page 15 carefully.
- **Do not install the camera where the temperature could exceed the allowable range.** If used at extremely low or high temperatures, the camera could be damaged. The allowable operating temperature range is 14 to 122°F(−10 to 50°C).
- **Avoid installing in a humid or dusty place.** This could damage the camera.
- **Avoid installing in places where there is radiation.** This could damage the CCD and other components and cause a malfunction.
- **Avoid installing in places where the camera would be subject to strong vibrations.** This could damage components and degrade the picture.
- **Daily check**  
Make a daily check for proper operation.  
In order to maintain normal operation, the output of camera should be checked by user every day for a clear and focused picture.
- **Never expose the camera to rain or water.**  
Water can cause malfunctions and ruin the camera.

# CONTROLS AND THEIR LOCATIONS

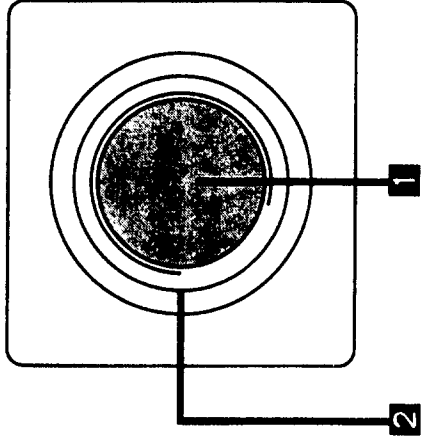
Top view



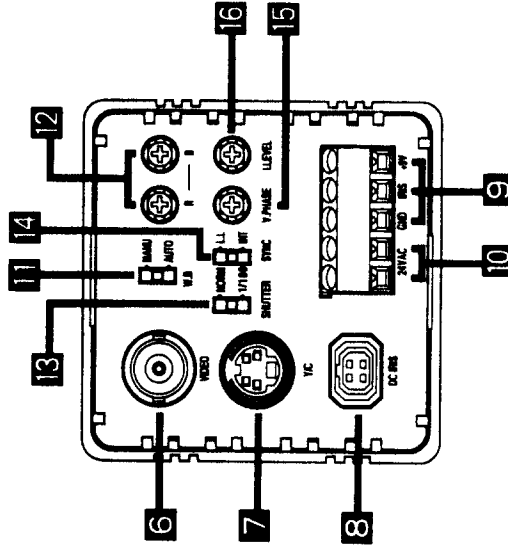
Bottom view



Front view



Rear view



**1 Lens mount cap**

Be sure to cap the lens mount when the lens is not mounted. Pull out the cap to remove.

**2 C-mount adapter**

Used to mount a C-mount lens. Remove it to mount a CS-mount lens. Turn counterclockwise to remove.

**3 BACK FOCUS lock screw**

There are two backfocus lock screws. These must be loosened before the camera may be back focused. See page 12.

**4 Lens mount**

This is the mount for installing the lens; C-mount lenses can be used when the C-mount adapter is attached, and CS-mount lenses can be used when it is removed.

**5 Tripod mounting base**

This is the mounting base for installing the camera. See pages 11 and 16.

**6 VIDEO OUT connector**

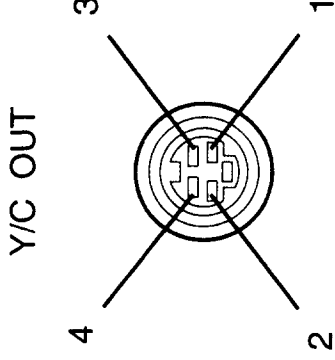
BNC connector that outputs a composite video signal. Connect to the video input connector of a monitor, switcher, etc.

- Use a coaxial cable for connection.

**7 Y/C OUT connector**

Output connector for separate Y/C video signals. Connect to the S-VIDEO input connector of a video monitor, etc. If the plug on the cable is of a different type, replace it with the 4-pin plug provided.

Pin assignment: Y/C OUT connector (4-pin)

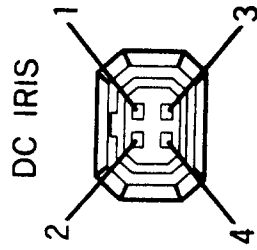


Pin No	Signal
1	GND
2	GND
3	Y (Luminance, 1 Vp-p, 75 ohms)
4	C (Chrominance, 0.3 Vp-p (burst), 75 ohms)

### 8 DC IRIS connector

Connect the iris cable of the galvanometric-iris CS-G lens. If the plug on the cable is of a different type, replace it with the provided 4-pin iris plug.

#### Pin assignment: DC IRIS connector (4-pin)



Pin No.	Signal
1	Control (-)
2	Control (+)
3	Drive (+)
4	Drive (-)

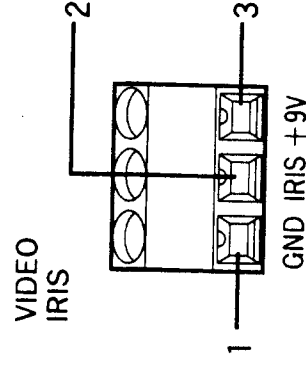
### 9 VIDEO IRIS connector

Connect the iris cable of a video-drive autoiris ES or AC lens.

#### Note:

- Use a video-drive autoiris lens that operates on 9 VDC and requires 50 mA or less.

#### Pin assignment: VIDEO IRIS connector (3-pin)

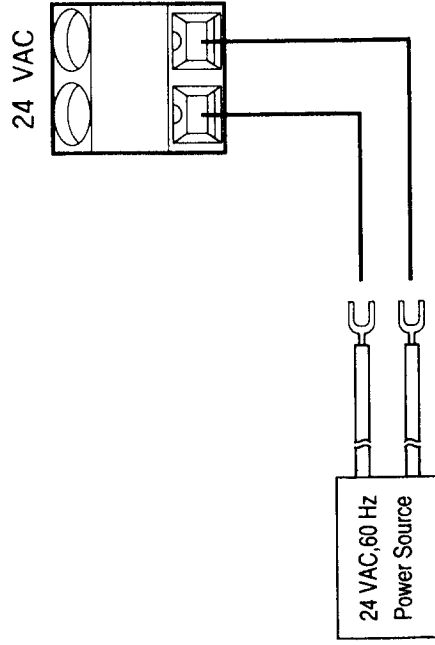


Pin No.	Signal
1	GND
2	Video (0.7 Vp-p high impedance, no sync)
3	9 VDC (50 mA max.)

### 10 Power input terminals

Connect to a 24 VAC, 60Hz power source.

Use a VC 24PS-1 power supply to connect the camera to a 120VAC outlet.



### Caution:

- Be sure not to connect the power source until all other connections are complete. Do not turn the power of any equipment on until connections are completed.
- The power voltage is specified as 24 VAC.

### 11 White balance switch

The white balance switch is used to select the method of color balancing. For the most accurate color, the VC2820A-24 uses a through-the-lens (TTL) measuring system.

**AUTO:** Automatically corrects for different types of lighting. The automatic correction range is from 2700 K to 9000 K.

### Notes:

- When using the camera under a fluorescent light with high shutter speed, the white balance may change periodically.
- The automatic tracking system may not function properly when shooting with non-standard lighting or lighting with a color temperature that exceeds the range of the camera. Because it uses a TTL system, if a colored object is shot (especially one with a single color) that fills most of the camera's field of view, the color temperature may be judged incorrectly and the correct white balance adjustment may not be possible. In these cases, set the switch to the MANU position and adjust the R and B potentiometers as described below.



## **12** White balance adjustment controls

When the white balance adjustment switch is set to "MANU", the white balance can be adjusted manually.

**R:** Turn the "R" potentiometer to increase the amount of red in the picture.

**B:** Turn the "B" potentiometer to increase the amount of blue in the picture.

## **13** SHUTTER switch

If the camera is used with fluorescent lighting, and there is flicker in the monitor, set the switch to 1/100. Otherwise it should be set at NORMAL.

## **14** Sync mode switch

The VC2820A-24 may be operated independently with its internal crystal control or it may be synchronized to other cameras by line locking. In the line-lock (L-LOCK) setting, the camera's vertical synchronization can be driven by the 60 Hz AC signal in the power lines. To select power lines phase locked sync, set the switch to the L-LOCK position.

## **15** Vertical phase adjustment

### Notes:

- In the line-lock sync mode, synchronization may not be correct for a few seconds after the power is turned on; this is not a malfunction.

If the camera is to be used in the line-lock mode, the vertical phase may require adjustment to synchronize the vertical phase of the camera with other cameras in the system. (Vertical phase is adjustable over the range of  $\pm 90^\circ$ .) Make this adjustment when the vertical phase of the camera does not match with other cameras (or systems). For correct adjustment, use a multichannel oscilloscope. This vertical phase adjustment can only be made when the camera is operating in the line-lock sync mode.

### Notes:

- Line-lock sync operation is possible only with an AC power source. (24 VAC, 60 Hz).
- When AC power line frequency is 50Hz, line-lock sync operation is not possible.
- To observe the 24 VAC waveform while adjusting the vertical phase, connect the positive pin of a probe to either of the power input connectors.
- In the line-lock sync mode, if horizontal lines rolling upward or downward are observed on the screen, reverse the polarity of the power cable connected to the power input connector.
- This adjustment is necessary only when line-lock sync operation is performed.

## **16 IRIS LEVEL control**

If the brightness control of the monitor picture does not operate correctly, adjust using the control. To adjust the IRIS LEVEL control.

<b>Monitor picture</b>	<b>Adjustment direction</b>
To make it brighter	Turn clockwise.
To make it darker	Turn counterclockwise.

### **Notes:**

- This function is activated when using the galvanometric-iris lens.
- Be careful not to turn the IRIS LEVEL control beyond its limits as this could cause a malfunction in the camera's autoiris control.

# SHUTTER SPEED & GAMMA CONTROLS

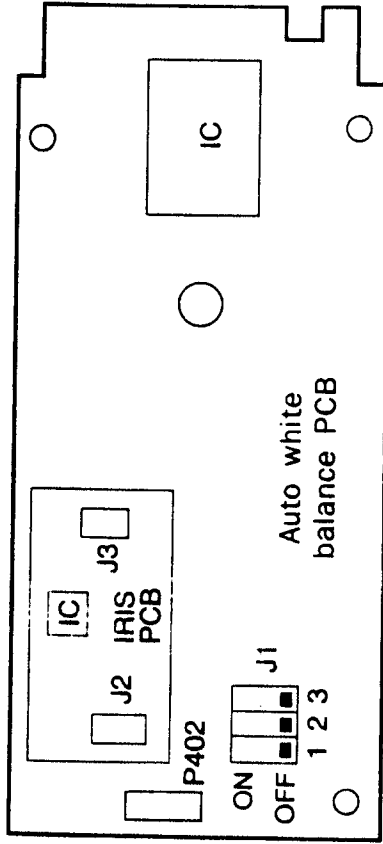
## 1 SHUTTER speed

This varies the shutter speed (the time the charge is stored). Normally, when a fast-moving object is being shot, pictures played back in slow motion or in the stillframe mode will be blurred. In this case, switching the shutter speed from the normal speed of 1/60 second to a faster speed allows each frame to be recorded with greater detail at the higher speed.

The camera is provided with a 3-pole switch (J1) to select different shutter speeds.

The switch is preset at the factory for 1/60 sec with all poles in the OFF position.

To change the shutter speed, remove the camera case and refer to the location of the DIP switch (J1) on the auto white balance printed circuit board (PCB).



Set the shutter speed according to the following diagrams to obtain performance appropriate for the camera's intended use.

Switch position	Shutter speed						
<table border="1"> <tr><td>1</td><td>■</td></tr> <tr><td>2</td><td>■</td></tr> <tr><td>3</td><td>■</td></tr> </table>	1	■	2	■	3	■	1/60 second Normally, set to this position
1	■						
2	■						
3	■						
<table border="1"> <tr><td>1</td><td>■</td></tr> <tr><td>2</td><td>■</td></tr> <tr><td>3</td><td>■</td></tr> </table>	1	■	2	■	3	■	1/125 second
1	■						
2	■						
3	■						
<table border="1"> <tr><td>1</td><td>■</td></tr> <tr><td>2</td><td>■</td></tr> <tr><td>3</td><td>■</td></tr> </table>	1	■	2	■	3	■	1/250 second
1	■						
2	■						
3	■						
<table border="1"> <tr><td>1</td><td>■</td></tr> <tr><td>2</td><td>■</td></tr> <tr><td>3</td><td>■</td></tr> </table>	1	■	2	■	3	■	1/500 second
1	■						
2	■						
3	■						
<table border="1"> <tr><td>1</td><td>■</td></tr> <tr><td>2</td><td>■</td></tr> <tr><td>3</td><td>■</td></tr> </table>	1	■	2	■	3	■	1/1000 second
1	■						
2	■						
3	■						
<table border="1"> <tr><td>1</td><td>■</td></tr> <tr><td>2</td><td>■</td></tr> <tr><td>3</td><td>■</td></tr> </table>	1	■	2	■	3	■	1/2000 second
1	■						
2	■						
3	■						
<table border="1"> <tr><td>1</td><td>■</td></tr> <tr><td>2</td><td>■</td></tr> <tr><td>3</td><td>■</td></tr> </table>	1	■	2	■	3	■	1/4000 second
1	■						
2	■						
3	■						
<table border="1"> <tr><td>1</td><td>■</td></tr> <tr><td>2</td><td>■</td></tr> <tr><td>3</td><td>■</td></tr> </table>	1	■	2	■	3	■	1/10000 second
1	■						
2	■						
3	■						

**Cautions:**

- ① Outdoor illumination levels may exceed 150,000 lux, which is outside the range that can be controlled by the automatic linear shutter. The maximum scene illumination for correct linear shutter operation is 4,000 lux with an f/1.4 lens. If illumination levels exceed 4,000 lux, use either a CS-G or ES series autoiris lens.
- ② If any lens is used with the iris fully open, optical flare may reduce the quality of the monitor image. All lenses produce optimum performance when stopped down.

**② GAMMA**

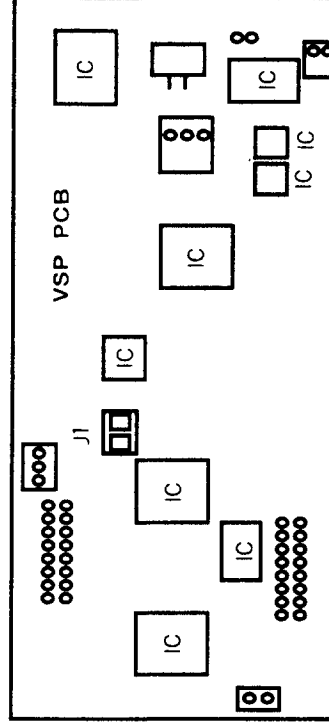
The CAMERA has a jumper-selectable gamma correction. The two settings are 0.45 and 1. The normal setting which is preset at the factory is 0.45.

If it is necessary to set the gamma correction to 1, the soldering pad (J1) on the PCB must be shorted.

To change the jumper setting, first remove the camera case. Refer to the location of the soldering pad (J1) on the video signal processor printed circuit board (PCB). When soldering pad (J1) is open, gamma correction is set to 0.45.

**Notes:**

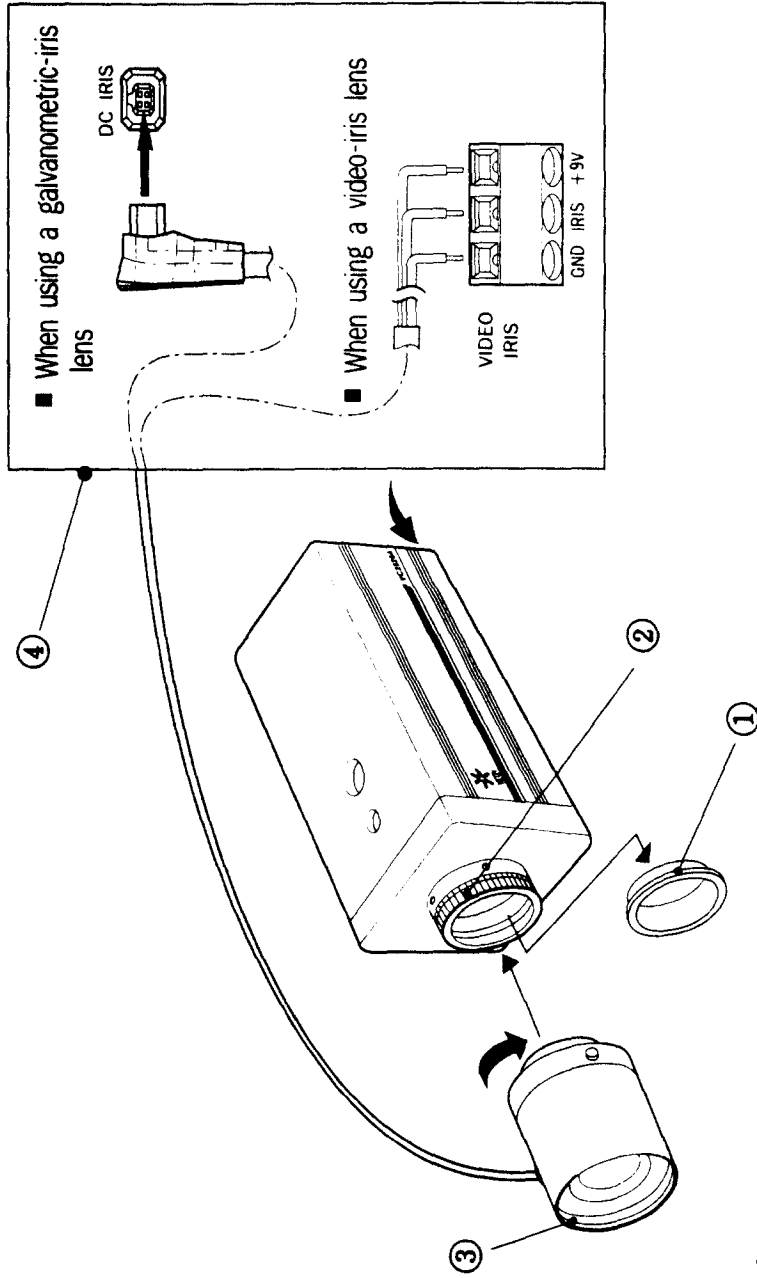
- Faster shutter speeds require more light than the normal speed. (In the 1/1000 mode, the sensitivity is approx. 1/20 that at normal speed; in the 1/10000 mode, approx. 1/200.)
- If the camera is used under fluorescent lights in one of the high-speed shutter modes, the color balance or brightness may vary.
- If a high-intensity subject is shot, smear (bright vertical lines) tends to appear as the shutter speed increases.



□ :  $\gamma = 0.45$ (OPEN)

⊞ :  $\gamma = 1$ (SHORT)

# LENS INSTALLATION



## Mounting a lens

- ① Pull out the lens mount cap to remove it.
- ② Attach or remove the C-mount adapter depending on the lens to be used.
  - Turn counterclockwise to remove it.
- ③ Attach the lens to the lens mount. Secure it so that it does not become loose.

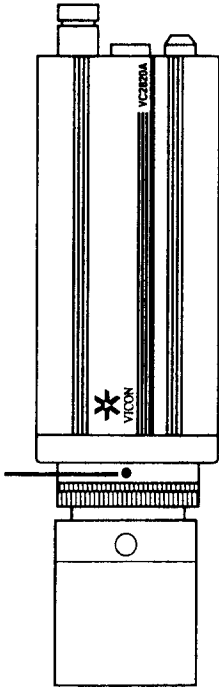
- ④ If the lens has an autoiris mechanism, connect the iris cable to the VIDEO IRIS connector.

- When installing a video-iris ES or AC lens, connect the lens cable to the VIDEO IRIS connector.
- When installing a galvanometric-iris CS-G lens, connect the lens cable to the DC IRIS connector.

### Back-focus adjustment

When a lens is mounted, adjustment of the back focus (the distance from the lens mounting position to the CCD chip) may sometimes be required.

Back-FOCUS screw



### With a fixed-focus lens

1. Fully open the aperture and set the focus ring to "∞" (infinity).
- In the case of an autoiris lens only, shoot a comparatively dark object so that the aperture is fully open.
2. Loosen the two lock screws and turn the lens mount ring until the picture is sharp.

#### Note:

- When focusing, point the camera at an object that is more than 2000 times the focal length of the lens away from the front of the lens. (For example, if the focal length is 7.5mm, the object should be more than 15m away from the camera.)

### With a zoom lens

1. Fully open the aperture and set the lens to the maximum telephoto position. Then turn the focus ring to focus.
- In the case of an autoiris lens, shoot a comparatively dark object so that the aperture is fully open.
2. Set the lens to its maximum wide-angle position.
3. Turn the lens mount ring to obtain the sharpest picture.
4. Repeat steps 1-3 until the difference between focusing position 1 and 2 is minimized.

#### Note:

- When focusing, point the camera at an object that is more than 5 times the minimum focal distance away from the lens. (for example, if the minimum focal distance is 1 m, the object should be more than 5 m away from the camera.)

### Lenses that can be used

- The VC2820A-24 can use C-mount lenses when the C-mount adapter (standard accessory) is installed. When removed, CS-mount lenses can also be used.
- The lens must have an area of view suitable for the scene to be viewed. The system designer must know the width or height of the object or scene to be viewed and the distance from the scene to the camera. If these two dimensions are known, the correct lens focal length can be calculated with one of the following formulae:

If the height of the scene is known:

$$\text{Lens focal length (mm)} = \frac{4.8 \times \text{distance from camera to scene (ft or m)}}{\text{Height of object or scene (ft or m)}}$$

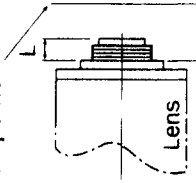
If the width of the scene is known:

$$\text{Lens focal length (mm)} = \frac{6.4 \times \text{distance from camera to scene (ft or m)}}{\text{Width of object or scene (ft or m)}}$$

### Notes:

- Use video-iris lenses powered by 9 VDC with a power consumption of 50 mA or less.
- The distance "L" in the illustration below should be as shown in the following table. If "L" exceeds the value in the table, it may damage the inside of the camera and correct mounting may be impossible; never use such lenses. Be sure not to attach the C-mount adapter when using a CS-mount lens.

Recommended focal point



Flange-back

Lens	Flange-back	Distance L
C-mount lens*	0.690 in. (1.7526 cm)	Less than 0.35 in. (0.9 cm)
CS-mount lens**	0.492 in. (1.25 cm)	Less than 0.16 in. (0.4 cm)

\* With the C-mount adapter attached.

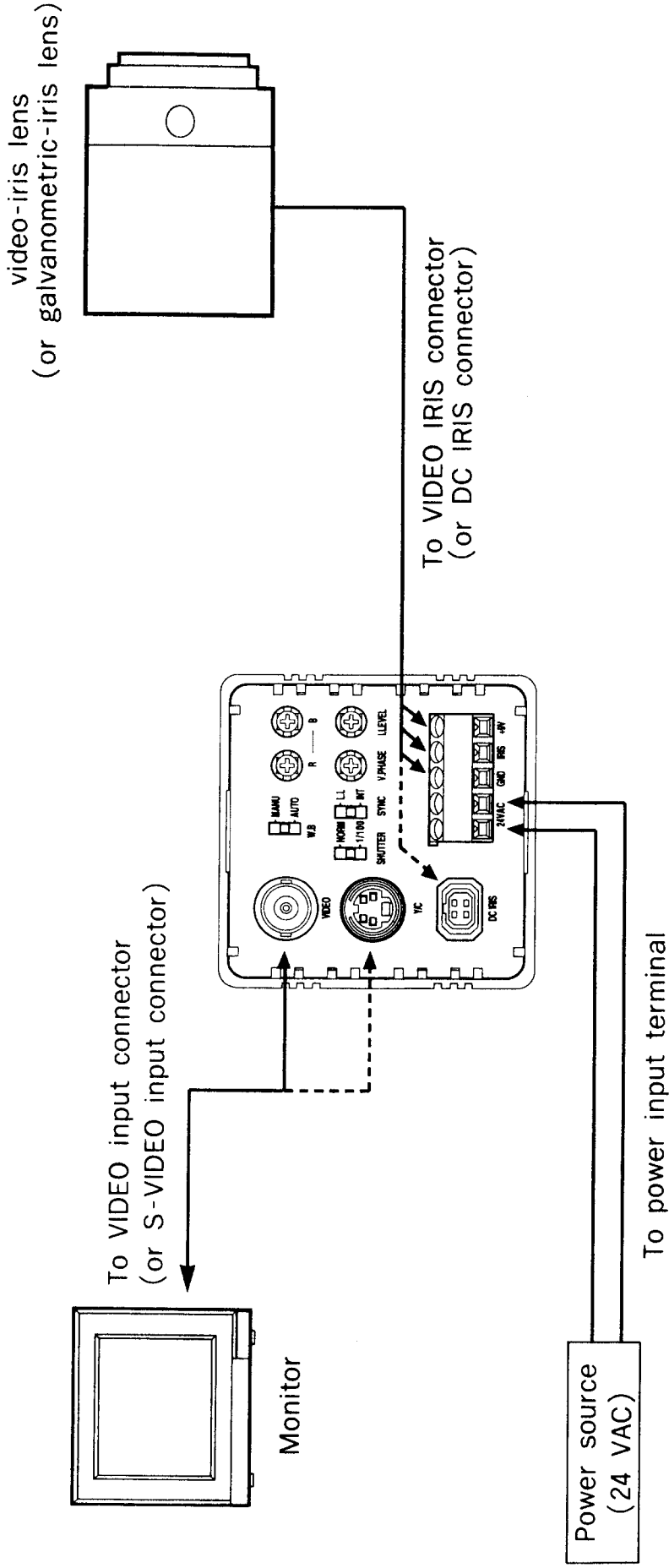
\*\* With the C-mount adapter removed.

- Lenses designed for color video cameras are recommended. Lenses designed for B/W cameras may have inferior color reproduction and picture quality. In particular, they are not suitable for use outdoors or in very bright conditions. When using a lens with an ND filter attached, shooting may not be possible with the minimum required illumination specified.

# CONNECTION EXAMPLES

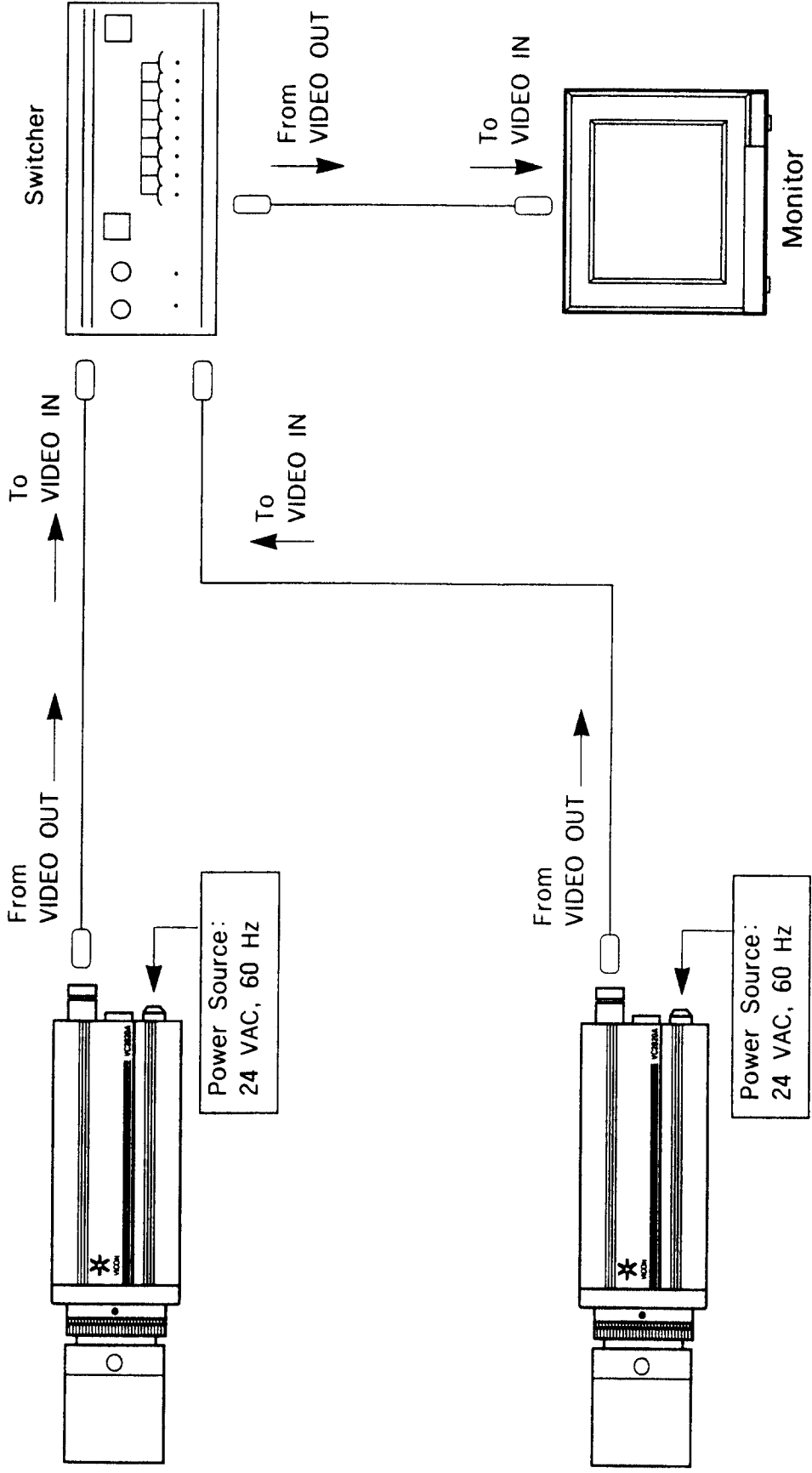
- Do not turn any component's power on until all connections are completed.
- Also read carefully the instruction manuals of all the equipment used.

**Example 1: When a single camera is used.**





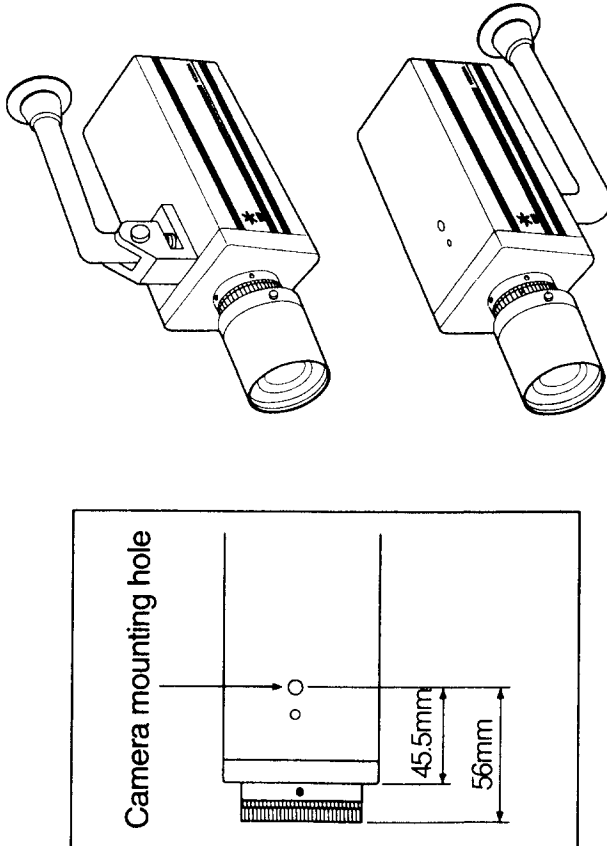
**Example 2: When more than one camera are line locked.**



# CAMERA INSTALLATION

## INSTALLATION

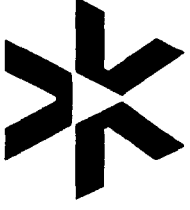
- The camera can be installed on a tripod or other camera mount either from the top or the bottom by using the 1/4-20 UNC threaded holes in the camera.



# SPECIFICATIONS

Type	Color video camera
Signal system	Based on NTSC standard
Pickup element	Interline-transfer system CCD solid-state image sensor
Pickup color system	(with complementary color filter) Single CCD complementary color system
No. of effective pixels	768(H) x 494(V)
Pickup area	7.95(H) x 6.45(V) mm
Scanning lines	525 lines, 2:1 interlaced
Scanning frequency	(H) 15.734 KHZ (V) 59.94 Hz
Sync system	Internal, Line lock
Video output	Composite video signal: 1 Vp-p, 75 ohms, unbalanced Separated Y/C video signals: Y/1 Vp-p, 75 ohms, unbalanced C/0.3 Vp-p (burst), 75 ohms, unbalanced
Video S/N ratio	48 dB (2000 lux, AGC switch set to "OFF", weighted) 460 TV lines (horizontal)
Resolution	
Minimum required scene illumination	0.57 lux (lens f/1.2, 89.9% highlight reflectance, 25 IRE video output level.)

<p><b>Recommended subject illumination</b></p> <p><b>Switching functions</b></p>	<p>2000 lux</p> <p>Gamma (0.45, 1)</p> <p>Shutter mode (1/60, 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000)</p> <p>White balance mode (MANU, AUTO)</p> <p>Sync mode (LL, INT)</p> <p>Back focus, manual white balance</p> <p>(2 axes; R, B), V phase, IRIS LEVEL</p> <p>Control</p> <p>C mount (with C-mount adapter)/</p> <p>CS mount (without C-mount adapter)</p> <p>24 VAC, 60Hz</p> <p>8 W (24 VAC)</p> <p>14 to 122°F (-10 to 50°C)</p> <p>Less than 90% relative (noncondensing)</p> <p>2.44(W) x 2.44(H) x 7.02 in. (6.2x6.2x17.0 cm)</p> <p>(without lens mount cap)</p> <p>1.62 lb (0.73kg)</p>	<p><b>Provided accessory</b></p> <p>Lens mount cap x 1</p> <p>C-mount adapter x 1</p> <p>Back-Focus screw L-wrench x 1</p> <p>Y/C Connector x 1</p> <p>(The lens mount cap and C-mount adapter are attached when shipped.)</p> <ul style="list-style-type: none"> <li>• Design and specifications subject to change without notice.</li> <li>• This color video camera is designed to generate video signals conforming to the NTSC standard, so that it cannot be used with video recorders or color monitors which use color systems other than NTSC.</li> </ul>
<p><b>Adjusting functions</b></p>		
<p><b>Lens mount</b></p>		
<p><b>Power requirement</b></p>		
<p><b>Power consumption (max.)</b></p>		
<p><b>Operating temperature range</b></p>		
<p><b>Operating humidity</b></p>		
<p><b>Maximum external dimensions</b></p>		
<p><b>Weight</b></p>		



VICON

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