

instruction manual

video dynamic noise reduction system  
model 449

s/n \_\_\_\_\_

**COLORADO VIDEO, INC**

**BOULDER, COLORADO**

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## **WARNING**

This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications.

It has been tested and found to comply with the limits for a class A computing device pursuant to subpart of J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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# SECTION I

## GENERAL DESCRIPTION

### INTRODUCTION

This instruction manual is to be used as a guide to the installation, adjustment, operation and maintenance of the Colorado Video Model 449 Dynamic Noise Reduction System.

### DESCRIPTION OF EQUIPMENT

The Colorado Video Model 449 Dynamic Video Noise Reduction System provides a running quasi-average, or temporal filtering, of the video signal at its input. More precisely, the value for any given pixel in the unit's output is determined by the equation:

$$P_n = \frac{1}{2^t} P_i + \left(1 - \frac{1}{2^t}\right) P_{n-1}$$

where  $P_n$  is the value of the pixel in the current output frame,  $P_i$  is the value of the pixel in the current input frame,  $P_{n-1}$  is the value of the pixel in the previous output frame, and  $t$  is a user selected time constant. This equation is solved for each pixel at the normal video frame rate of 30 times per second. As the user selects larger values for  $t$ , the exponentially decaying "influence" of a given pixel's value in a particular input frame will persist over a longer period of time in subsequent output frames. The Model 449 allows values of  $t$  to range from zero (binary 0000) to 15 (binary 1111), making possible temporal filtering of from one to 32,768 (in steps of powers of two) frames on a running basis. The Model 449's 16-bit grayscale resolution provides 65,536 shades of gray for the filtering process.

## SPECIFICATIONS

### Model 449S

Size:	6.9"W x 4.9"L x 2.4"H sloping to 1.4"H	
Mounting:	Free standing desktop	
Power Connector:	5.5 x 2.5 mm coaxial power jack, center-pin negative	
Power Input:	5 VDC (120 VAC Adaptor included where appropriate)	
Chassis:	Black ABS	
Video Input/Output:	1Vp-p, composite, 75 ohm (s-video optional)	
I/O Connectors:	BNC	
Controls	Resolution:	Frame / Field (switch)
	Mode:	Filter / Normal (switch)
	Memory:	Freeze / Live (switch)
	Contrast:	Normal / X2 (switch)
	No. of Frames Averaged:	X 1 / 2 (switch)
		X 1 / 4 (switch)
		X 1 / 16 (switch)
	X 1 / 256 (switch)	
Black Level	(potentiometer)	

### Model 449

Size:	8"W x 9"L x 1.67"H	
Mounting:	Free standing, rack mount optional	
Power Connector:	IEC	
Power Input:	120 or 240 (spec when ordering) VAC	
Chassis:	Painted Aluminum	
Video Input/Output:	1Vp-p, composite, 75 ohm (s-video optional)	
Options:	Rack Mount	
I/O Connectors:	BNC	
Controls	Resolution:	Frame / Field (switch)
	Mode:	Filter / Normal (switch)
	Memory:	Freeze / Live (switch)
	Contrast:	Normal / X2 (switch)
	No. of Frames Averaged:	X 1 / 2 (switch)
		X 1 / 4 (switch)
		X 1 / 16 (switch)
	X 1 / 256 (switch)	
Black Level	(potentiometer)	
Power:	On/Off	
Indicators:	Power	
Performance:	Resolution:	720 pixels per line x 480 lines
	Sampling:	4:2:2 (CCIR601)

## SECTION II

### OPERATING INSTRUCTIONS

#### INITIAL INSTALLATION

##### System Connections

The Model 449 series is usually used with a television camera and monitor. The video interconnections are made using 75-ohm coaxial cables. The most commonly used cable is Type RG-59/U with BNC connectors on each end, and are available from Colorado Video or almost any electronics supply store.

##### Power Input

The Model 449S requires regulated 5VDC at up to 1000mA. An AC adapter is provided in regions where a North American 120VAC type power plug is suitable. The Model 449 requires 100 to 240 VAC, 50 or 60 Hz, at its standard IEC power connector.

##### Setting the Filter Mode

To activate the temporal filtering function, put the filter/normal switch in the filter position. The time constant,  $t$ , is selected by placing the four “number of frames averaged” switches in the desired position. In its up position, each switch respectively multiplies the number of frames averaged by the number above it.

##### Contrast & Brightness

Many applications with excessive dynamic noise suffer from low video signal levels. The Model 449(S) offers a 2x signal multiplier, thus doubling contrast, and a digital brightness control set by potentiometer adjustable with a small screwdriver. The potentiometer will adjust brightness at the input to the Model 449 prior to signal filtering.

##### Freeze Frame

The output signal can be frozen for continuous display and the filtering function halted by placing the freeze/live switch in the “freeze” position.

##### Frame/Field Modes

The Model 449 normally operates in a 30 frame per second mode with a resolution of 720H x 480V pixels. Placing the frame/filter switch in the “field” position will cause the unit to operate in field mode at 60 fields per second, with 720H x 240V pixels. Grayscale is always 16 bit.

## OPERATING CONTROLS

### Front Panel Controls

Power	On/Off with internal pilot light (449 only).
Filter / Normal	To activate the temporal filtering function, put the filter/normal switch in the filter position.
Contrast / x2	Selects between normal or doubled picture contrast.
Freeze / Live	The “Live” position continuously updates the display based on the video input and the filtering function. “Freeze” cause the display to freeze so that the picture can be held examined as long as desired.
Black Level	This screwdriver adjustable potentiometer sets picture brightness.
Field/Frame	Selects whether the stored information comes from a single field or a full frame of the input video signal. The Field position is sometimes useful when grabbing images with fast motion in them. The Frame position provides better vertical resolution.
Number of Frames Averaged (4)	These four switches set the time period for (pseudo) averaging. In its up position, each switch multiplies the number of frames averaged by the number (2, 4, 16, or 256) above it.

# warranty

Colorado Video, Incorporated warrants the equipment of its manufacture to be free of defects in material and/or workmanship under normal use and service. Colorado Video, Incorporated's obligation under this warranty is limited to making good at its laboratories any part or parts thereof, which shall within one (1) year after delivery to the original purchaser be returned to Colorado Video, Incorporated at its laboratories, with transportation charges prepaid, and which Colorado Video, Incorporated's examination shall disclose to its satisfaction to have been defective.

This warranty is expressly in lieu of all other warranties and representation, express or implied, and of all other obligations or liabilities on the part of Colorado Video, Incorporated. In no event shall Colorado Video, Incorporated be liable for damages of any kind connected with the use of its equipment or its failure to function properly.

This warranty shall not apply to any equipment which shall have been repaired or altered outside of Colorado Video, Incorporated's laboratories so as to, in Colorado Video, Incorporated's judgement, affect its use, function, reliability, or which shall have been subject to misuse, alteration, improper installation, negligence, or accident.

Before any equipment is returned to Colorado Video, Incorporated for repairs or adjustments, shipping instructions should be obtained from Colorado Video, Incorporated. Colorado Video, Incorporated assumes no responsibility for unauthorized returns.