INSTRUCTION MANUAL

MODEL 442 Video Subtractor

s/n_____

COLORADO VIDEO, INC

BOULDER, COLORADO

March 2005

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.

TABLE OF CONTENTS

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 442CS and 422C Video Subtractor.

DESCRIPTION OF EQUIPMENT

The Model 442 Video Subtractor is a single video-memory unit capable of comparing one stored image with the image at its input and displaying the difference. It is intended for use in inspection, registration, interferometry, quality control, surveillance and other applications where differences between two images can be used for decision making or process control.

In a typical application, a reference image is digitized and stored in the unit's video memory. The incoming video is subtracted from the reference memory and the difference is provided as a ideo output for display on a standard video monitor. It is also possible to continuously compare the input video with the reference image.

A third operational mode allows subtraction of each video frame from the previous frame to provide "frog's eye" capability to detect motion in the scene being monitored by the input video camera.

SPECIFICATIONS

422CS

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 2.1 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)	
	Memory Input:	a / b	
	Memory:	Freeze / Update (switch)	
	Subtract:	Memory-Input / Input-Memory (switch)	
	Output:	Absolute Value / Difference+0.5(switch)	
	Difference Threshold (potentiometer)		

422C

Size:	8"W x 11"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)	
	Memory Input:	a / b	
	Memory:	Freeze / Update (switch)	
	Subtract:	Memory-Input / Input-Memory (switch)	
	Output:	Absolute Value / Difference+0.5(switch)	
	Difference Threshold (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

Setting the Subtraction Mode

The Model 442 Video Subtractor has two possible modes for generating the difference output. The model selected depends on what the user is trying to accomplish. We will describe these two modes.

Absolute mode provides a difference signal of

$$I_{out} = | \text{ Memory} - \text{Input } |$$

This provides the absolute value of the difference between the two images, displaying all differences as positive-going, and the "no-difference" state as black. This is the usual choice for laser speckle interferometry.

Normal mode provides the difference signal

$$I_{out} = \text{Memory-Input+0.5}$$

0.5 represents 50% luminance. If the value of an input pixel exceeds the value of a stored pixel, the subtraction will yield a negative value (blacker than black). Adding 0.5 biases the entire picture brighter so that all pixels are presented with visible values.

System Connections

The Model 442 Video Subtractor 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.

OPERATING CONTROLS

Front Panel Controls

Power	On/Off with internal pilot light (442C only).
Difference Threshold	Adjusts the amount of difference required for differences to be displayed.
Subtract	Determines whether the memory is subtracted from the input or the input is subtracted from the memory. It is useful for determining whether new objects in a picture, and conversely the background thereby replaced, appear positive or negative.
Memory	Determines whether the memory is updated or not. To store a reference image, leave the switch in update until the desired image is present, then switch it to freeze. For motion detection (frog's eye), leave this switch in the update position. Memory Input Determines which input is fed to the memory when the memory switch is in the update position.
Output	Selects between the absolute value of the difference or the difference +50% luminance.
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.