

# CM-1S



**S VIDEO CAMERA MASTER ADAPTOR**

**INSTRUCTION BOOK**

**IB6427-01**

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## **FORWARD:**

In the past, measuring S video quality has been very difficult. Without some way to measure actual video transmission results, there was no way to objectively evaluate system performance, especially in terms of picture definition and the relative performance of the various types of equipment available to implement S video transmission.

The term S Video is an abbreviation for Super Video, it is also referred to as Y/C video. S video differs from normal composite video in several ways. The main difference is that the Sync and Luminance (Y black and white) part of the signal is carried on one coaxial cable and the Chrominance (C color) signal is carried on a separate cable. Usually these two cables are combined into one cable with both coaxial cables inside the same jacket.

S video performs well with cable lengths under 25 feet, cable lengths longer than 25 feet will have noticeable loss and should be measured and corrected with amplifier equalizers as necessary.

## **DESCRIPTION:**

The CM-1S is an adaptor that is used with the CM-1 CAMERA MASTER meter to measure video levels on S video installations. The adaptor conveniently mounts on the two BNC connectors on the top of the CM-1 CAMERA MASTER and is self terminating for both channels of video information.

It can be used to verify the proper level of any S video system. Use this adaptor with a CM-1 to measure any video level out of S video equipment to check and correct the levels in the system. Use it to verify the proper operating level for any S video equipment.

The S female connector makes video connection simple. The unit has a built-in automatic termination for both the Chrominance and the Luminance channels.

It can also be used to determine the location and measure the severity of low frequency video loss, using the "SYNC" Position on the CM-1. Low frequency video loss can cause picture darkness and rolling when the level is too low. If the level is too high it will cause "Blooming" over brightness and loss of detail in the bright areas of the picture as well as "DIGITAL VIDEO RECORDER OVERLOAD" a common malfunction.

The location and severity of high frequency loss can also be measured using the "COLOR BURST" position on the CM-1. High frequency loss will result in the loss of picture definition and can cause the video monitor to switch to black and white mode. If the video high frequency level is too high it can cause color saturation and distortion of the video picture. This can be seen as an extremely grainy picture with color flaring called "Commit Tails". A Commit Tail is an unnatural streak of bright color leading off to the right hand side of an oversaturated color pixel.

## VIDEO STANDARDS:

It is helpful to be aware of the standards for video waveforms and the parameters that are used in professional S video. The main reason for measuring in I.R.E. Units instead of Volts peak-to-peak is simplicity of the numbers created while measuring an S video signal. For instance a correct amplitude video signal in Volts peak-to-peak and I.R.E. Units measure exactly:

<b><u>VIDEO COMPONENT</u></b>	<b><u>I.R.E. UNITS</u></b>	<b><u>VOLTS peak-to-peak</u></b>
Y (Luminance and Sync)	140	1.000000000-----
C (Chrominance)	40	0.285714286-----
Y (Sync Pulse only)	40	0.285714286-----
C (Color Burst only)	40	0.285714286-----

All professional S video measurement is made in terms of I.R.E. UNITS. The I.R.E. UNIT gets its name from the INSTITUTE of RADIO ENGINEERS that developed the standard "I.R.E. UNIT" for S video measurement used in the United States, Canada and elsewhere.

A perfect S video signal will have a sync pulse of 40 I.R.E. units, the peak picture Luminance amplitude would have 100 I.R.E. units, so a standard one volt black and white peak-to-peak S video signal is 140 I.R.E units (40 SYNC + 100 LUMINANCE (WHITE)). Both of these signals comprise the "Y" or Luminance channel of the S video signal. The minimum bandwidth of this signal is 4.8MHz but can have significant energy at much higher frequencies.

The color channel of an S video signal is normally 40 I.R.E. units in amplitude at 3.58MHz in frequency. Color-Burst signals and CHROMINANCE in the picture are 40 I.R.E. units when the video is at 100% saturated color. This color information is phase shifted to convey the color information. The phase relationship between the Color Burst and the Chrominance dictates the true color and the amplitude of the Chrominance conveys the color brightness. An important bit of information here is that color pictures have a maximum peak-to-peak output of 140 I.R.E. peak-to-peak "Luminance" and "Chrominance" together.

The portable battery operated CM-1 Camera Master, with the CM-1S adaptor can measure Sync Pulse, Picture amplitude, overall Composite Sync, Picture Focus, and Color Burst amplitude in I.R.E. units, on any 75 Ohm unbalanced S video signal.

## MOUNTING THE CM-1S ADAPTOR:

Position the CM-1 facing toward you with its BNC (female) connectors facing upward. Place the CM-1S adaptor above the connectors with the BNC (male) connectors facing down. Line up the BNC connectors to mate. Rotate the BNC (male) connectors so that the notches align with the BNC (female) connectors. Gently push the adaptor onto the meter and rotate the collars on the BNC (male) connectors to lock both of them into place. To remove the adaptor simple reverse this process.

## **CABLE LOSS COMPENSATION:**

When cable loss or Color-Burst loss is excessive, consider utilizing an amplifier with appropriate cable equalization. With S video equalizers it is possible to completely compensate video cables of 1000' or longer.

## **THE KEY TO MEASURING SYSTEM PERFORMANCE:**

Two measurements (Sync Pulse and Color Burst amplitude), provide an exact and specific measure of the ability of any cable to transmit a quality picture. The easiest way to measure the Sync Pulse and Color Burst amplitude is with a CM-1 Camera Master. This is a digital, hand-held meter that reads these two and also other characteristics of the S video signal accurately in I.R.E. Units of measurement. All video measurements Worldwide are measured in I.R.E. units.

## **WHAT IS A 40-40 VIDEO SIGNAL?**

Notice the parts of the S video signals of particular interest to us (Sync Pulse in ( Y ) and Color Burst in ( C ) both have the standard amplitude of 40 I.R.E. Units. For our purposes, a no loss signal would measure 40-40, a very easy number to remember, it represents a perfect picture. Any more or less represents an impairment of the S video signal! TABLE 2 shows what can be expected for various lengths of cable.

**TABLE 2**

<b>SYNC PULSE</b>			<b>NOTE:</b>
<b><u>LENGTH</u></b>	<b><u>I.R.E</u></b>	<b><u>% LOSS</u></b>	
0 Feet	40	0%	In Tolerance "Correct Level Good Video"
100 Feet	39	2.4%	In Tolerance "Low but in tolerance"
500 Feet	35.2	11.9%	In Tolerance "Low edge of tolerance"
1000 Feet	31	22.4%	Out of Tolerance "Low contrast & brightness"
1500 Feet	27.4	31.6%	Out of Tolerance "Lower contrast & brightness"
2000 Feet	24.1	39.7%	Out of Tolerance "Very low contrast & brightness"
3000 Feet	18.7	53.2%	Out of Tolerance "Possible picture roll"

  

<b>COLOR BURST</b>			<b>NOTE:</b>
<b><u>LENGTH</u></b>	<b><u>I.R.E</u></b>	<b><u>% LOSS</u></b>	
0 Feet	40	0%	In Tolerance "Correct Level Good Video"
100 Feet	36.3	9.3%	Slight loss of color
500 Feet	21	47.5%	Weak color
1000 Feet	11	72.5%	Faded out color & picture sharpness loss
1500 Feet	5.8	85.5%	Possible loss of color and poor picture sharpness
2000 Feet	3.1	92.4%	Probable total loss of color very poor picture
3000 Feet	0.0	100.0%	Total Loss of Color and dull image.

Table 2 shows that there is a very serious loss of high frequency response as the S video cable extends beyond a hundred feet or so. Obviously, something must be done to be able to obtain high definition pictures at more than a few hundred feet.

### **THE ANSWER TO S VIDEO LOSS!**

The answer to S video loss is to offset this loss by amplification and equalization to exactly replace the energy lost at each frequency. Use the CM-1 and this adaptor to measure and set the equalization amplifiers for a perfect S video signal.

