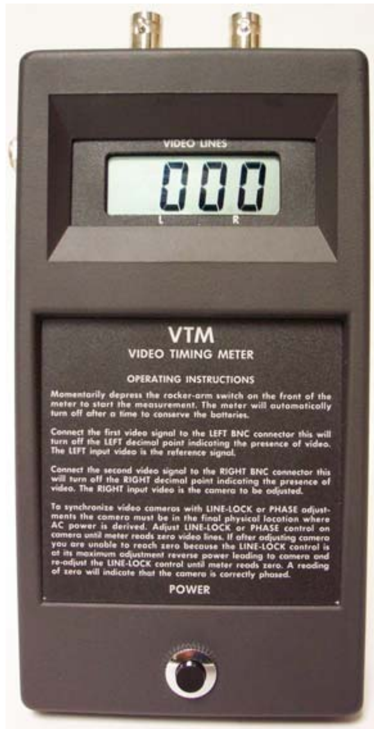
VTM



VIDEO TIMING METER

IB6275-02

INSTRUCTION BOOK

<u>PLEASE READ THIS BEFORE OPERATING THE EQUIPMENT!</u>

VTM
VIDEO TIMING METER

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I GENERAL DESCRIPTION

The VTM **V**IDEO **T**IMING **M**ETER measures the degree of synchronism between any two AC-Power Line-Locked television cameras. The VTM thus enables a technician to precisely synchronize any number of CCTV cameras to a designated " Master Camera ".

The two cameras to be synchronized are connected to the VTM. The VTM will display the degree of synchronism by measuring the number of television lines that occur between the vertical synchronizing pulse of the Master Camera and that of the camera being tested. The phase control of the camera being tested is then adjusted to cause the VTM to read zero. The two cameras are then in synchronism.

The VTM also indicates the presence or absence of a video signal connected to each of the two input connectors. When no video is present at one connector, a decimal point associated with that connector will flash on and off. As soon as a video signal is present, that decimal point vanishes. Since two video signals (one from each camera to be synchronized) must be present, both decimal points must be off before a valid test can be performed.

Momentary actuation of the "Power On" rocker-arm switch will start meter operation. There is no "Off" control since the VTM will turn itself off in about four minutes so as to conserve battery power.

A short-form instruction on meter operation is found on the front label of the VTM.

II FIELD APPLICATION

A. Synchronization Measurement at the Camera.

This measurement process is used for making initial synchronization alignment of cameras and also when routine testing at the monitor location reveals that a camera is out of sync.

Since this measurement is made at the camera that is to be adjusted, the sync signal from the "Master Camera" must be brought to the camera under test. This is done by connecting the coaxial cable from the "Master Camera" to the cable going to the camera to be tested. This is accomplished at the Monitor location in one of two ways:

1. If only one camera needs to be synchronized to the "Master Camera", the two cables at the Monitor location may be connected together for the duration of the test using a "BNC Barrel".

2. If more than one camera is to be synchronized with the "Master Camera" then a VTG Video Timing Generator is used to bring the "Master Camera" sync signal to up to ten cameras simultaneously. In this case the cable from the "Master Camera" is connected to the input of the VTG Video Timing Generator. The output connections on the VTG are then connected to the cables leading to the cameras to be tested for synchronism. The VTG has provisions for testing up to ten cameras at one time.

The Master Camera sync signal is now available at each camera to be synchronized. To synchronize a given camera to the Master Camera, disconnect the coaxial cable from the camera to be adjusted and connect that cable to one input of the VTM. Connect a short coaxial cable between the camera and the other input of the VTM. At this time both decimal points should be "out". If either decimal point is still on, this indicates that the camera on that cable is not operating. When both decimal points are "out", a number will appear that measures the timing error between the Master Camera and the camera being tested.

Adjust the timing control on the camera in such a way as to reduce the reading to zero. The two cameras now have their Vertical Interval perfectly synchronized. The numbers being displayed records the number of Horizontal Television Lines that elapse between the Vertical Interval of the Master Camera and the Camera under test.

Note that while zero is the best synchronization, an error of a few lines will not result in picture rolls. In practice, any adjustment that causes the VTM to read +/- 4 of zero will perform satisfactorily, but the best adjustment is zero.

B. Synchronization Measurement at the Monitor Location.

This process is used primarily on a routine basis after the cameras have previously been synchronized in order to establish that all cameras are still in synchronization. These routine tests are necessary, especially in large systems where all of the cameras are not served from the same power line. Electricians may change power line phase to a camera at any time while they are engaged in line load balancing at the power panel. Any one of three phases and two polarities may be chosen by the electrician and thus cause the cameras to go out of synchronism.

This test is performed at the monitor location where all coaxial cables from the cameras come together. To perform such a test, select one camera to be the " Master Camera " that all other cameras are to be measured against, and connect the cable from that camera to the left-hand BNC connector on the VTM.

Momentarily push the POWER rocker-arm switch. This will turn on the VTM for about 4 minutes. The left-hand decimal point will stop flashing and go out when a sync signal is present from the " Master Camera ". If the left-hand decimal point does not stop flashing, that means that the " Master Camera " is not delivering a sync signal through the coaxial cable to the VTM.

Connect another camera coaxial cable to the right-hand BNC connector on the VTM. The right-hand decimal point should stop flashing if a sync signal is present and a number will now be displayed that measures the number of lines of error that exist between the "Master Camera" and the camera under test. A zero reading with no flashing decimal points shows that the two cameras are in synchronism. Any measurement less than +/- 8 indicates that the two cameras are sufficiently synchronized so that picture rolling will probably not occur, however a reading below +/- 4 reduces the probability of picture rolling to almost zero. In practice, the lower the number the greater the certainly that picture rolling will not occur.

Since some TV Monitors have better sync-lock circuits than others, not all monitors will necessarily roll at the same VTM meter reading, however, the nearer the VTM meter reading is to zero the greater the certainty that all monitors will remain locked when a switch is made from one camera to another by a vertical interval video switcher.

Repeat this test for each camera, always using the "Master Camera" as the comparison, Record the VTM meter reading of each camera for future reference. Any camera that shows wide variations in readings may be defective or may just be connected to a power outlet that has heavy motor loads that switch on and off, thereby causing power line phase changes at that outlet. Choose another outlet or run 24 Volt AC power from a nearby camera that is not so affected.

III CARE AND MAINTENANCE

This VTM is a precision measuring instrument and should be treated accordingly. While it can withstand ordinary everyday indoor use, it should not be left outside in the rain or otherwise mistreated. It is not waterproof. The battery should be removed if it is placed into storage to prevent leakage of corrosive fluids from batteries as they discharge and age.

Replace non-rechargeable batteries at least once a year even if ordinary use does not discharge the battery because old batteries may leak and cause corrosion damage.

No routine maintenance or test procedures are required other that battery replacement. Attempts at field repair or adjustment will void the warranty.

If the VTM fails to operate even after battery replacement, call the factory for a Return Authorization Number and return to the factory for repair.

IV AUXILIARY EQUIPMENT

The VTM Video Timing Meter can be used with the VTG Video Timing Generator to speed synchronization measurements even further. The VTG enables as many as ten (10) cameras to be synchronized at one time.

CCTV INSTALLATION TIPS

Someone once said "Timing is everything". The same thing can be said about Line-Lock CCTV camera installations. The Line-Lock feature is available on most CCTV camera's, and is used to prevent picture rolling on the monitor during switching from one camera to another. Picture Roll will cause the loss of vital picture information in the video recorder and is irritating to view. This article will discuss the problems encountered by installation and maintenance personnel along with solutions to save time and make your job more profitable.

The CCTV camera puts out a series of pulses called "Sync" pulses that allow a video monitor to synchronize the picture on the screen. Special sync pulses called "Vertical Interval Pulses" tell the monitor to begin a new picture. The Vertical Interval Pulses from multiple camera's must be synchronized if you wish to switch from one camera to another without the monitor producing a picture roll. When a roll in the monitor occurs, the Vertical Interval can be seen as a black horizontal bar that appears momentarily on the screen.

Lets look at how the Line-Lock system keeps CCTV camera's in synchronism. To synchronize multiple camera's you must first have a common reference, that is all the camera's must share the same timing information. The term Line-Lock refers to the 60 cycle AC (alternating current) supplied by the local power company. This 60 cycle line frequency is the common reference used to lock the camera's together. For this reason only AC powered camera's have the Line-Lock feature. DC powered camera's are not capable of being Line-Locked.

When you select the Line-Lock feature in a camera there is internal circuitry that samples the 60 cycle AC frequency and uses it to time the Vertical Interval Pulses. All Line-Lock camera's have a Phase control that must be adjusted when the camera is installed. The Phase control is adjusted so that all the camera's Vertical Intervals occur at the same time.

One way to adjust this Phase control is to switch between camera's and adjust the control until you no longer see the roll. This trial and error method is time consuming, requires 2 installers (one at the camera and one at the monitor) and is frustrating to accomplish.

The preferred method is to use a VTM (Video Timing Meter) to adjust the Phase control.

The VTM timing meter is specifically designed to quickly adjust the timing error to zero with a digital readout that does not require interpretation of the waveform.

To make the Phase adjustment, you must select one camera as the reference. At the monitor point connect the output of the reference camera directly into the output of the camera that you wish to adjust, use a BNC Barrel connector. This makes the reference signal available at the camera to be adjusted.

Next go to the camera you wish to adjust and insert the VTM or oscilloscope between the camera and the cable you previously connected to the reference camera. Now adjust the camera Phase control to zero on the meter display or zero coincidence of the Vertical Interval Pulses on the oscilloscope. Repeat this step for each camera in the system using the same reference camera. When all camera's in the system are adjusted, no roll of picture will occur when you switch from one camera to another. Once the Phase controls have been carefully set in the system no further timing adjustments will be needed.

There is one exception. This carefully set Phase adjustment can be upset if the power circuits are re-balanced by an electrician at the power breaker box. When an electrician installs new power circuits into a commercial building, sometimes they will move the circuit breakers to a different Phase in the breaker box. In commercial buildings the utility power is Three Phase, that is three separate 60 cycle lines whose phase is 120 degrees apart. Moving the power line that your camera is on to a different phase will throw off the timing and require a re-adjustment of the phase control on the camera.

If monitor personnel complain about picture roll, a fast check of timing can be made. Go to the monitor station and connect one camera as a reference to the VTM and then connect each camera one at a time to make the measurement. The timing should be zero +/- 3 Video Lines or Sync Pulses. A roll can be noticed if the difference between camera's is more than a few lines. As the line difference between camera's increase so does the noticeable roll. If you measure a camera and the readings seem to change, that indicates the camera is not Line-Locked. The solution is to select the Line-Lock feature on that camera or replace it with one that can Line-Lock.

A clear understanding of how the Line-Lock system works combined with a way of measuring the Phase of each camera will let you set them quickly and correctly with confidence.