

ACT Vidicheck

Guidance to CCTV testing

1: CCIR Video Signal

The CCIR standard for composite video is a I_{vpp} signal containing the luminance, chrominance, line and field sync, and chroma burst. This signal is sometimes referred to as CVBS which stands for *Composite Video, Burst and Sync*. The CCIR standard applies not only to the CCTV industry but to all video equipment.

Luminance, or luma, is the black and white information. Chrominance, or chroma, is the colour information. The sync signals ensure correct timing of all cameras, monitors, VCR^S, switchers, etc. The chroma burst serves as a sync signal for the colour circuits.

It is important to note that the peak to peak signal level is dependant upon the impedance in the circuit, and will only be at I_{vpp} when the input and output impedance's of all of the equipment connected in the circuit are the same as that of the cable, which in the case of co-axial cable is 75Ω . In other words, if you place an oscilloscope on the unterminated output from a camera, the level will more than likely read around $2v - 2.5v$. The signal would fall to I_{vpp} once the camera is connected to a piece of equipment (e.g. a monitor) with a built in 75Ω terminator.

If the peak to peak level falls below I_v , the picture contrast becomes weaker, and picture roll or horizontal pulling may be evident due to the reduced size of the sync pulses.

A single T.V picture (frame) is made up of 625 individual lines of video information. The time taken for the electron beam in the monitor tube to scan from left to right is $52\mu\text{sec}$, and this is called the active line period. Once the beam reaches the right hand side it must quickly return to the left in order to begin the next scan. This period, known as the line flyback period, lasts $12\mu\text{sec}$. So, one complete T.V line takes a total of $52 + 12 = 64\mu\text{sec}$. Fig 1 (page four) shows a typical waveform for one complete T.V line as it would appear when viewed on an oscilloscope.

2: The Vidicheck Signal

The black and white output from the Vidicheck generator is designed for testing video circuits. The unterminated output is approximately $2v_{pp}$, falling to I_{vpp} when applied to a 75Ω impedance.

When viewed on an oscilloscope the waveshape appears as shown in fig 2 (page four), however remember to scope the signal across a 75Ω termination. To obtain the waveshape shown in fig 2, your scope settings should be as follows...

Volts/cm = 0.5 Timebase = $10\mu\text{sec/cm}$ Trigger = 'Auto' position

It is worth noting that these settings can be used when scoping *any* video signal waveforms in CCTV systems, although sometimes it may be necessary to use the 'manual' trigger facility to obtain a stable trace.

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Operating Instructions

The Vidicheck Video Signal Generator and Video Strength Meter can be used either together or individually to verify the operation of cables, cameras and monitors.

The generator produces two white bars on a black background, which when viewed on a monitor should appear as illustrated in fig 3 (page five).

The strength meter indicates the peak to peak signal level using a coloured LED bargraph display. In order to obtain a true reading, the strength meter input is internally terminated at 75Ω. Table 1 lists the indicated levels, and the interpretations that may be made for each indication. For example, if the highest lit LED is 0.6v, then the signal level can be taken to be 0.6vpp, and the associated interpretation in table 1 applies.

Table 1:

Voltage	Colour	Interpretation
0.5	Red	This is lit even with no signal input, and is used as a 'Power On' indication. If this is the only LED lit after applying a video input, the signal level must be 0.5v or less, making it too small to be of any use.
0.6	Red	Signal is too small to guarantee reliable operation of this part of the system. Some signal loss has occurred. Check camera output level, terminators, cable connections, etc.
0.7	Yellow	Signal is too small to guarantee reliable operation of this part of the system. Some signal loss has occurred. Check camera output level, terminators, cable connections, etc.
0.8	Yellow	Although the signal is a little low, the system should be able to cope, as long as the level does not occasionally fall further. If this is a long cable run the low level is probably due to cable loss; if it is a short cable run check for poor connections, etc.
1.0	Green	Correct CCIR signal level.
1.2	Green	Signal is slightly high, but the system would probably cope. Possibly the camera is out of adjustment internally, but this fault would have to be rectified by the manufacturer or service agent. Possibly caused by an incorrectly set terminator switch or a missing terminator*.
1.4	Red	Signal is too high and may overload other equipment causing poor sync and excessive contrast. More than likely caused by incorrect termination* somewhere.

* Note 1: If a terminator is missing, the signal level will be too high. However, because the Vidicheck Signal Strength Meter incorporates its own internal 75Ω terminator, attaching it to the line will actually rectify the fault and the reading will be correct, which could be misleading. A visual check that all 75Ω terminator switches are set correctly, and that terminator devices are fitted where required is strongly recommended. Note 2: In all instances where the signal level is found to be incorrect, co-axial fed telemetry may suffer, perhaps intermittently. If a short length of coaxial cable is connected between the two units, the strength meter should give an indication of 1.0v.

3: Cable Verification

By attaching the signal generator to one end of a cable and the strength meter to the other, the integrity of the cable can be verified by checking for a 1.0v signal level. Confirmation that the signal is not only present but is also at the correct level is very useful when locating faults relating to low or missing signals.

If a monitor is connected to the output in place of the strength meter, the display can be observed and checks can be made for ghosting, horizontal pulling, frame bounce, etc. This test can also be used to verify the operation of a monitor.

4: Camera Verification

The strength meter can be used to check the output from a camera by making a direct connection using a short lead. However it should be noted that a number of LED's may light, indicating a range of voltage levels. This is due to the fact that the strength meter is seeing the variations in brightness level over the complete tv frame. The effect is more pronounced with a colour camera where a high chroma signal will be picked up. Also note that if there are no bright areas in the picture the Iv LED will not illuminate, so to check the peak to peak output the camera should be trained onto a bright area such as the sky (but not directly at the sun!). To familiarise yourself with these effects, connect the strength meter to a known good camera, point it at a bright area, and move your hand slowly around the field of view. You should observe the 0.5v - Iv LED's 'twinkling' as the video levels change.

5: Other Applications

The Vidicheck is very useful for identifying unmarked cables when, for example, taking over a CCTV system. The small signal generator is very easily attached to each camera position, and the cable can be identified at the control room end using either the strength meter or a monitor.

The strength meter can be used as a convenient 75Ω terminator for test purposes. A typical example could be where a monitor does not have an internally switched 75Ω terminator, and you need to assess if this is the cause of a fault in a system.

Auto iris operation can be confirmed at the camera by connecting the strength meter to the camera in question. Point the camera to a bright area and completely cover the lens with your hand. The strength meter should read 0.5v. Very quickly remove your hand whilst observing the LED indicators. Because the light level was zero the iris should be wide open, and it will take a brief moment for it to close. This action will be observed as a peaking of the 0.8v - 1.2v LED's before they settle down. A faulty iris, either mechanical or electronic, will not manifest this effect.

6: Battery Performance

Only quality **Alkaline** 9Volt PP3 batteries should be used in Vidicheck. New batteries will maintain accuracy for up to 12 hours continuous use. Batteries can be tested by connecting the Signal Generator and Strength Meter together using a short cable link. The Green 1.0Volt LED should show. If any other LED's show both batteries should be replaced.

7: Illustrations

Fig 1

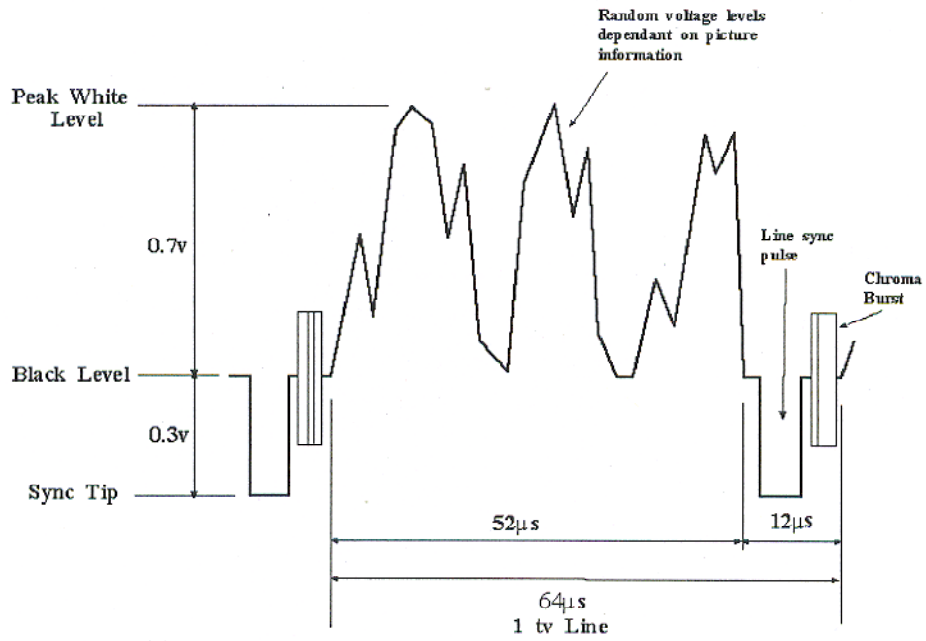
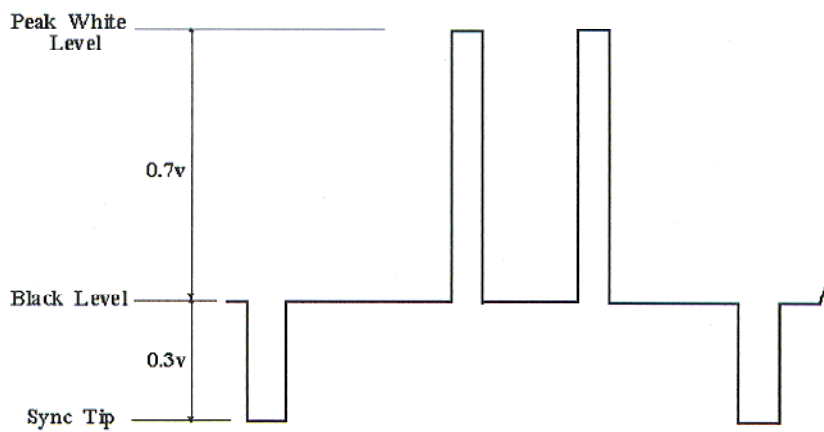


Fig 2



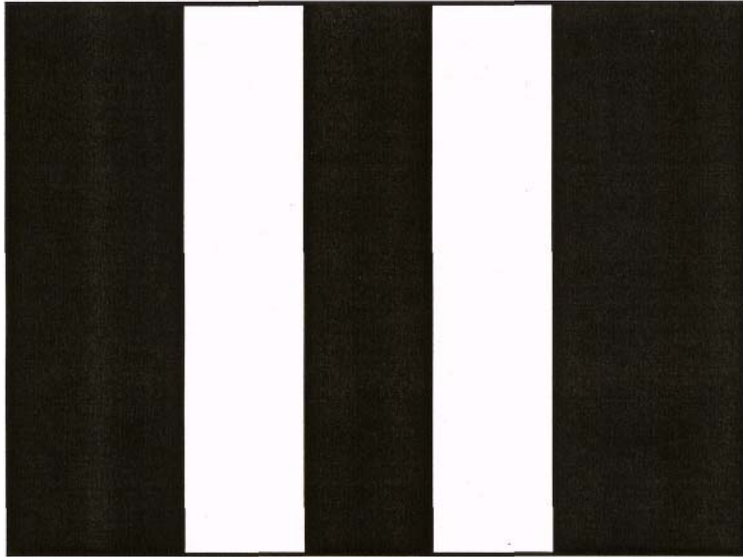


Fig 3

8: Acknowledgement

ACT Meters wishes to thank Joe Cieszynski for his expert advice and giving up his valuable spare time at home to test and produce the operating instructions for Vidicheck.

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