By Les Simmonds

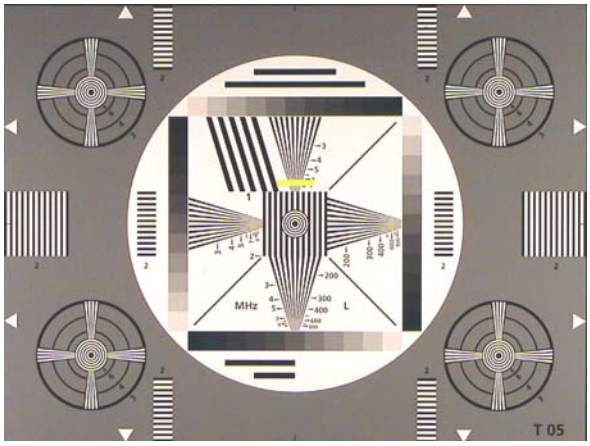
New Technology Monochrome Camera Tests

A few months ago we tested two Bosch new technology, high performance colour CCTV cameras and because of the outstanding performance of these colour CCTV cameras we thought it might be a good idea to test their monochrome cousins and see how they perform.

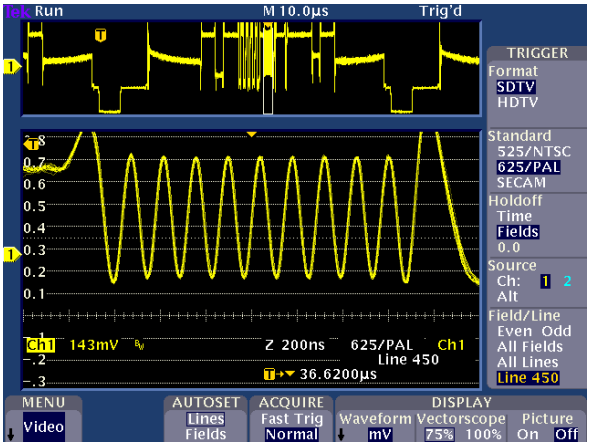
Before we proceed with this month's test results, we had a few emails regarding tests we carried out on the Bosch colour CCTV cameras a few months ago. Of these emails, some asked why we used waveforms from the 1/2" model rather than the 1/3" model. Well there wasn't any reason, because our tests showed the performance of the 1/2" model and 1/3" model is almost identical except for sensitivity and signal-to-noise ratio. The difference regarding sensitivity was written in that article and the signal-to-noise ratio difference would only just be noticeable to an expert eye. So for these monochrome CCTV camera test result waveforms we will use the 1/3" format camera waveforms in most cases, to show we are not biased against the 1/3" chip format.

Some high performance monochrome CCTV cameras that perform well under low light have many vices during daylight. One well known high performance monochrome CCTV camera has great performance under low light, but in daylight has milky low contrast images. In many installations, with daylight and bright highlights this camera requires neutral density filters to reduce the light level falling on the chip, which of course, once added to the lens also reduces the low light performance. Some installers place a lens cap with a small hole in the centre over the lens instead of the neutral density filter. This usually introduces more vices than a neutral density filter.

We will carry out some basic objective tests on the Bosch Dinion XF LTC0510 1/2" monochrome CCTV camera and the Bosch Dinion XF LTC0385 1/3" monochrome CCTV camera. Bosch claims these cameras are the first monochrome CCTV cameras with 15 bit digital processing technology and we understand the full series of Bosch Dinion XF monochrome and colour CCTV cameras is now available in Australia.



Universal camera test chart (RETMA) image showing position of resolution measurement in yellow.



Bosch Dinion XF LTC0385 monochrome CCTV camera resolution waveform showing about 80% depth of modulation at 570 TV lines. A very good result!

The camera tests we will carry out will comply with the European Standard EN 61146-1 Video Cameras (PAL/SECAM/NTSC) – Methods of measurement – Part 1: Non-broadcast single-sensor cameras. This standard is also known as IEC 1146-1 and BS EN 61146-1 and is accepted world wide as the preferred method of testing single chip CCTV cameras and is suitable for all current colour or monochrome single chip cameras.

This standard includes a large number of camera tests and it would take all pages in this magazine to show you test results and waveform images for each of the tests, so, we will limit the results to the most common issues discussed in the industry in relation to CCTV cameras.

The Cameras

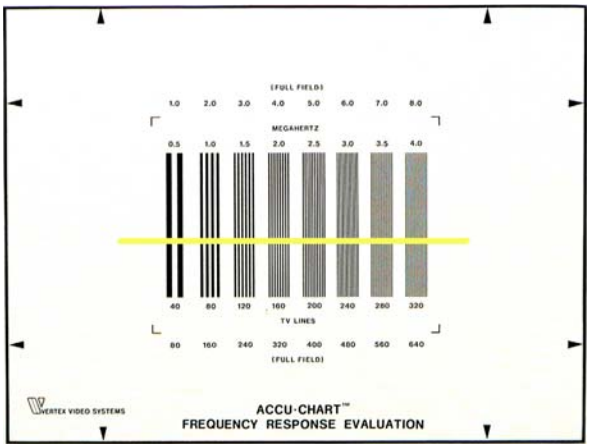
The features and manufacturer's specification for both tested cameras are the same, except for sensitivity, which is improved with the 1/2" model and most features are the same as their colour CCTV camera cousins.

Some of the interesting features of both monochrome cameras include:

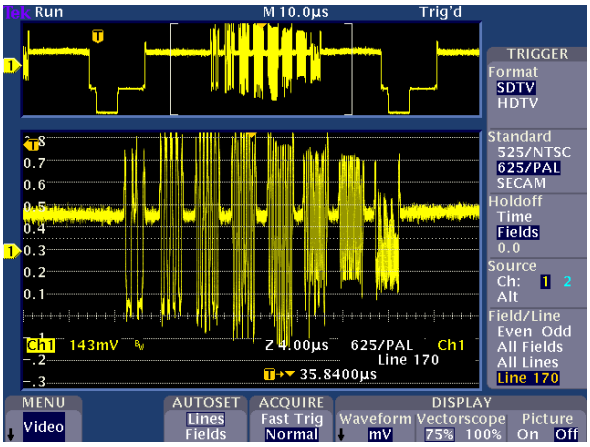
XF Dynamic – 15 bit digital processing which greatly improves the dynamic range (contrast handling capabilities) of the camera compared to other CCTV cameras.

We noted one of the effects of this on the greyscale test under high and low light levels where the results were found to be superior to most previous CCTV cameras we have tested.

Both cameras were accurately set for 1 volt peak-peak output during manufacture. Regular readers



Frequency response evaluation test chart image showing full measurement area in yellow.



Bosch Dinion XF LTC0385 monochrome CCTV camera frequency response waveform image showing 1.0 MHz, 2.0 MHz, 3.0 MHz, 4.0 MHz, 5.0 MHz, 6.0 MHz, 7 MHz and 8 MHz. Note: 7.0 MHz is equal to 560 TV lines.

know my concerns about the non standard and very high video levels from many CCTV cameras affecting and/or overloading digital recording and transmission equipment.

Programmable Modes – Both cameras support three independent operating profiles which are fully programmable by the on screen menu, which is controlled from the side of the camera, or via the Bosch Bilinx communications module which can control any menu item from a remote location via the coax cable.

Lens Wizard – The Dinion XF cameras auto detects the lens type (manual iris, DC iris, video iris) or it can set manually. The lens wizard can be used to back focus the lens with maximum iris opening so the lens will maintain focus through all lighting conditions over a 24 hour period. This and many other features make these cameras very easy to install.

Cable Compensation – The cameras include built in and menu controlled cable compensation which eliminates the need for an additional equalising amplifier on long coaxial cable runs. The cable compensation can be switched off or set for three types of coaxial cable and the equalising levels can be adjusted over a wide range.

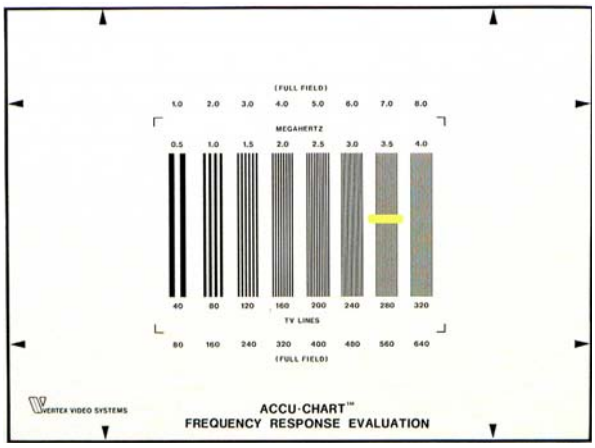
Interestingly, these monochrome CCTV cameras have an S-Video (Y-luminance only) output with no connection to pins 2 and 4 where the chrominance (C-chrominance) signal would normally be. This socket is apparently added for those systems cabled for colour CCTV cameras which use S-Video (Y/C) outputs and is used on these monochrome CCTV cameras to keep cabling the same in those systems!

Our tests showed that there is a degree of cable compensation even when the cable compensation is switched off. This adds overshoot and undershoot to the video signal with very short cable runs as can be seen on the waveform images. Our tests suggest Bosch have set the off position cable compensation to suit coaxial cable runs of about 100 metres, which is about average.

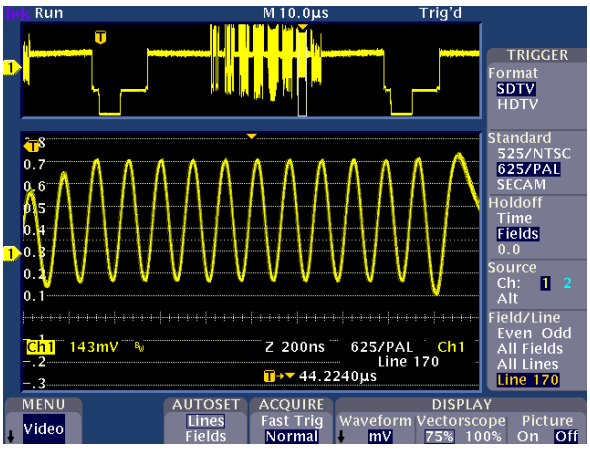
The overshoot and undershoot from these cameras is very clean and does not detract from the viewed image but is noticeable when the camera is connected via 1.5 metres of coaxial cable to sensitive test equipment.

The Tests

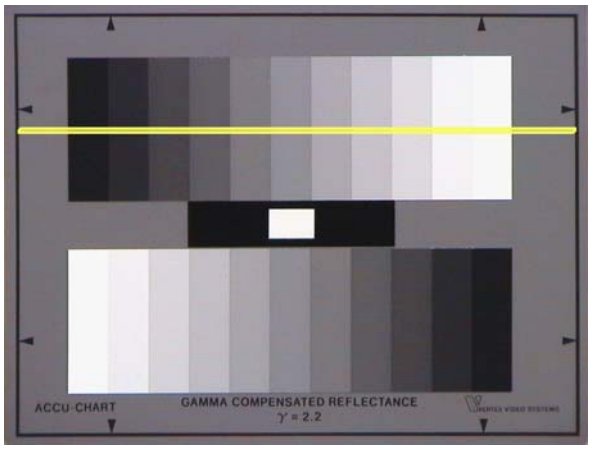
These tests, as with all our tests, were carried out on cameras straight to out of the box, with all menu items in their default conditions (no gizmo's or smart menu items added). The only adjust-



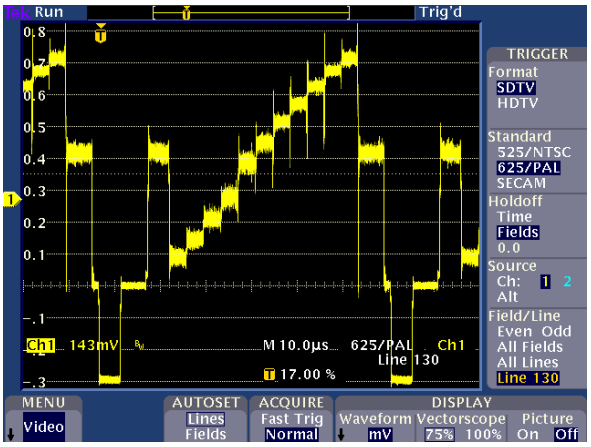
Frequency response evaluation test chart image showing 7 MHz measurement area in yellow.



Bosch Dinion XF LTC385 monochrome CCTV camera frequency response waveform image showing magnified 7.0 MHz burst. Note: 7.0 MHz is equal to 560 TV lines.



Greyscale test chart image showing measurement area in yellow.



Bosch Dinion XF LTC0385 monochrome CCTV camera greyscale waveform image of test area showing good linearity.

ments we made were lens type (which we set to manual) and back focus. Both were set to suit our high performance Schneider test lens.

This series of tests shows the camera test chart with a yellow marker showing the actual position of measurement on the camera test chart in relation to the waveform image. This will assist those who are interested in how and where these test measurements are made.

The sensitivity according to EN 61146-1 standard for the Dinion XF LTC0510 1/2" monochrome CCTV camera sensitivity to be 1.41 lux for full video and the Dinion XF LTC0385 1/3" monochrome CCTV camera sensitivity to be 2.83 lux for full video. This figure is in variance with the manufacturer's claim, but this is normal with most cameras because sensitivity test references are rarely quoted by manufacturers these days. The sensitivity we have quoted is the actual light required for full video with an f1.4 lens, using lamps with a colour temperature of 3000 degrees Kelvin as per the EN 61146.1 standard. Please note lamps with different colour temperatures can give different sensitivity results with any CCTV camera.

The resolution of both cameras was 570 TV lines which are exactly as specified by Bosch. Another pleasant surprise! The waveform image shows a depth of modulation of about 80% at 570 TV lines which is about forty times more than the 5% depth of modulation as specified in EN 61146-1. This is probably why these cameras have such a high apparent resolution.

We found the greyscale of both cameras to be well within specification and more linear than most we have tested. We also found that the greyscale performance of both cameras, under high and low light level conditions was consistent (not like the other camera we mentioned earlier).

Our normal image tests, during day and night showed results consistent with the test results.

Once again these two monochrome CCTV cameras show the high level of engineering expertise and strong commitment Bosch are putting into their CCTV products.

In the next issue we will test an Australian made RF transmission system and once again mention why it is crazy to use low quality lenses on high performance cameras such as those tested above.

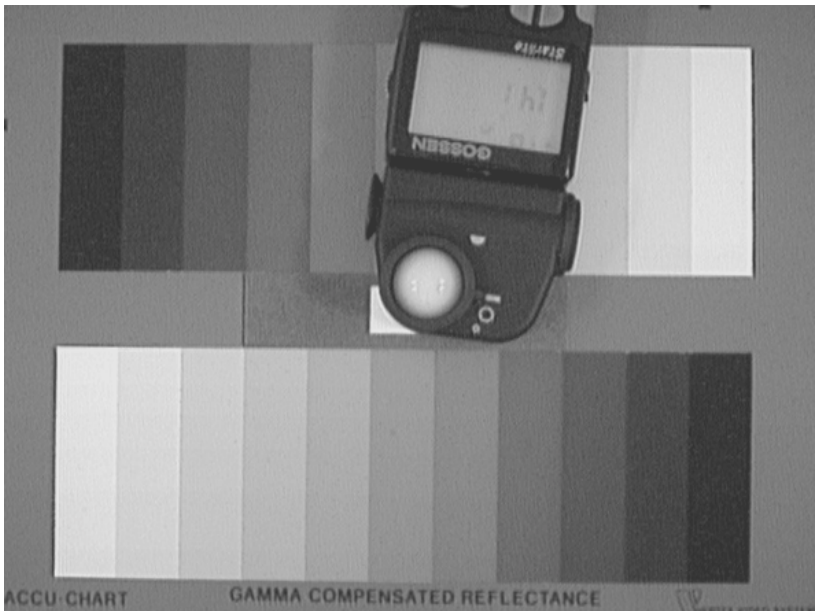
Acknowledgements:
Bosch Security Systems Pty Ltd
Web:
www.boschsecuritysystems.com.au.

Les Simmonds is a truly independent CCTV consultant and CCTV testing authority.

Email:
les@cctvconsultants.com.au

Web:
www.cctvconsultants.com.au

This article was originally published in Security Electronics Magazine Australia.



Bosch Dinion XF LTC0510 monochrome CCTV camera greyscale image at 1.41 lux showing greyscale result at minimum illumination.