By Les Simmonds

MPEG-2 Digital Video Recorder Test

Last month we tested Dallmeier's latest Wavelet DVR, the DMS 180 III DVR, which is probably the best performing Wavelet DVR available today. The big surprise to me about last month's test was that we had lots of emails and phone calls about Brand X which we used for comparison purposes. I think many end users out there are worried they might have poor performing Brand X DVR(s) in their system. Well, many may have Brand X or similar DVR systems which is a shame when you consider "value for money".

I can't say what brand Brand X is, but I can say that the Brand X waveforms and therefore it's video performance are typical of some low quality DVRs sold today. Once again we will supply some waveform images from the infamous Brand X as a comparison to a high quality MPEG-2 DVR.

This month we will test the latest offering from Fast Video Security, the DVR-HP3 Alpha Technology network based DVR capable of recording 32 MPEG-2 IP video and audio data streams in real time with full video resolution. The DVR HP series Digital recorder (DVR) is a high quality compact DVR which combines the function of a real time recorder and time lapse recorder with a multiplexer in one unit.

The DVR-HP3 takes the MPEG-2 data streams from encoders with one channel VE1M2 and/or the eight channel VE8M2 connected directly to the integrated 10/100/1000 Base T interface, via an upstream switch.

The DVR can be upgraded to handle up to 32 TByte (32,000GByte) of storage; this generally allows continuous real time recording for several months under normal recording conditions. Recording time will vary, depending on the selected picture quality, the number of cameras recorded, recording speed and the bandwidth per camera data stream.

According to Fast Video Security their Frame Rate Reduction (FRR) uses the advantages of predictive frames and vectors for time lapse recording. Compared to MJPEG or Wavelet based DVRs you can save up to 60% on storage requirements.

The DVR physical and PCB construction quality is more akin to Broadcast quality electronic construction than a CCTV product for the Security industry, particularly the one channel encoder VE1M2.

It should be noted here that our policy and that of most testing authorities, is to test equipment as supplied straight out of the box. Therefore, you see equipment tests relating to the equipment you may have purchased on that day. It would be improper for us to tweak non operational adjustments and setting on any equipment supplied for test.

For this test our test signal generator output was fed into the composite video input of a one channel VE1M2 encoder then via a LAN to the DVR-HP3. We recorded all test signals for five minutes and then replayed them from the DVR-HP3. The recorded output of the Sweep, 5 Step Greyscale and Multiburst were connected to our test equipment via the DVR-HP3 Y (Luminance) signal output of the Y/C (Sometimes referred to as S-Video) video output. The recorded output of the 2T Pulse, Modulated 20T Pulse and Colour Bars were connected to our test equipment via the DVR-HP3 Composite (CVBS) video output.

First we looked at the Fast DVR-HP3 recorded and replayed resolution/frequency response from the Y video signal output and found the recorded and replayed 0.5 MHz to 6 MHz Sweep waveform shows a gradual frequency response roll-off which is a very good achievement for any type of CCTV video recorder. The markers shown on this waveform image are at 1 MHz, 2 MHz, 3 MHz, 4 MHz, 5 MHz and 6 MHz. The waveform shows the frequency response at 4.0 MHz to be about -2 dB and at 5.0 MHz to be about -5 dB. This is a very good result when you compare it with poor old Brand X with a frequency response at 1.5 MHz of about -10 dB and no meaningful measurements possible above 2.0 MHz.

Brand X does not have a video output and therefore the VGA output is measured though a high quality scan converter which does not reduce the quality of the VGA signal during scan conversion. This and other Brand X waveforms were measured without considering the GUI bits and pieces shown on each side of the original test signal generator video waveform. The GUI on Brand X and many other similar DVRs is part of the VGA output and therefore usually cannot be removed

For those of you who are more familiar with Multiburst waveforms we have also included a Fast DVR-HP3 recorded and replayed magnified Multiburst waveform showing burst frequencies of 0.5 MHz, 1.0 MHz, 2.0 MHz, 4.0 MHz, 4.8 MHz and 5.8 MHz. Most of us would be happy to see 200 metres of RG59BU coaxial cable with a frequency response like the Fast Video Security DVR-HP3 DVR.

The Fast DVR-HP3 recorded and replayed 5 Step Greyscale shows an even and linear greyscale with slightly low video level and a minor defect at the base of the bottom step which is 28.6 mV below blanking. This had no effect on the video signal other than what you see on the waveform. Video waveforms of this minor defect were passed on to Fast Video Security AG, they acted swiftly to make a minor adjustment to the video board and by the time you read this article this minor defect will no longer exist.

Brand X was a different story with the recorded and played 5 Step Greyscale showing low video level, uneven greyscale linearity, step 5 is lost forever (clipped or compressed) and a very poor signal to noise ratio shown as random noise on each step. This noise is noticeable if you compare the thickness of the steps on the
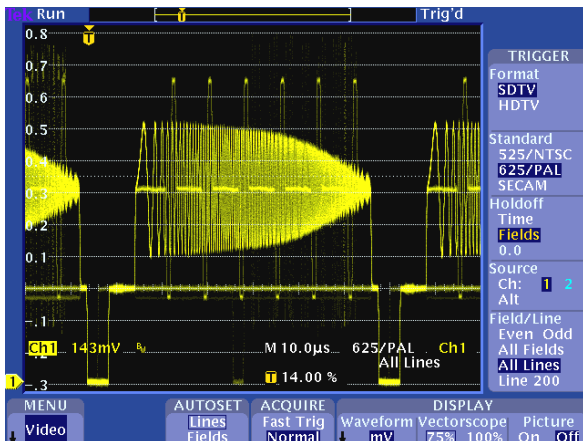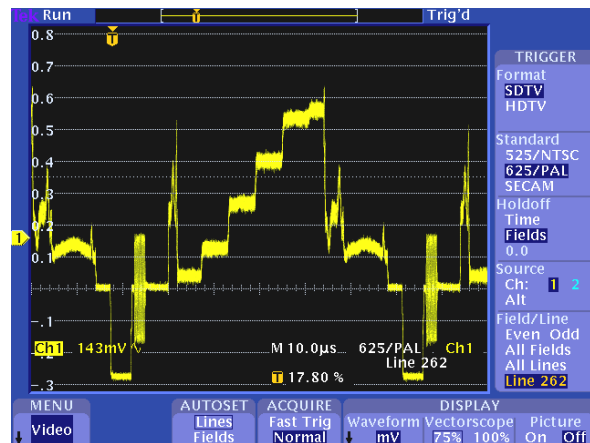

Fast Video Security DVR-HP3 DVR recorded and replayed 0.5 MHz to 6 MHz Sweep waveform image at the Y (luminance) video output.
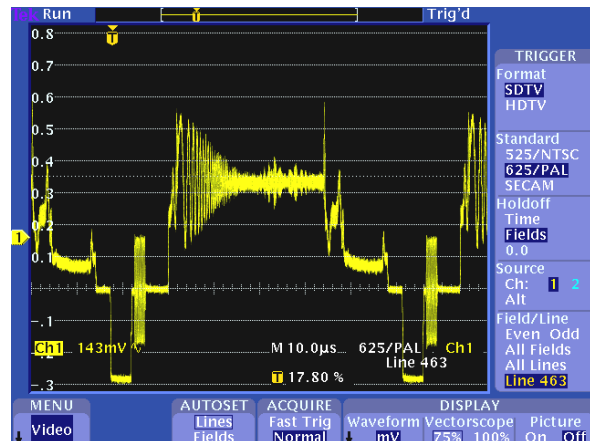
Brand X recorded and replayed 0.5 MHz to 6 MHz Sweep waveform image at VGA monitor out.
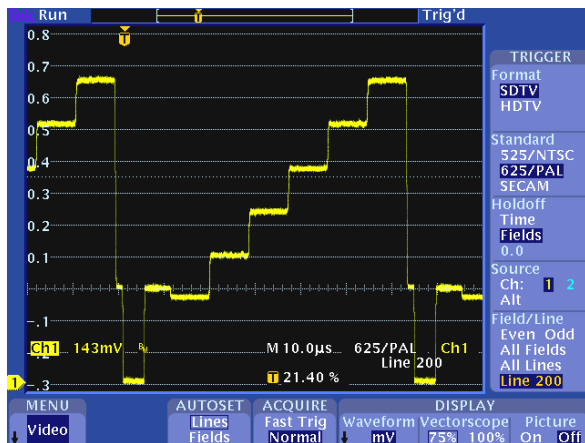
Fast Video Security DVR-HP3 DVR recorded and replayed 5 Step Greyscale waveform image at the Y (luminance) video output.

Brand X recorded and replayed 5 Step Greyscale waveform image at VGA monitor out.

Brand X recorded and replayed 5 Step Greyscale waveform against the thickness of the steps on the Fast DVR-HP3 recorded and re-played 5 Step Greyscale. This is a subjective look at noise for your information. Later in this series we will show you the preferred method of determining the signal to noise ratio (SNR) of a video signal.

We recorded and replayed a 2T pulse through the DVR-HP3 and found it to be very clean, slight low level and because it was so clean and due to time constraints we didn't use a 2T Mask to determine the K Factor etc. The Modulated 20T Pulse recorded and re-played from the DVR-HP3 displayed a very good result for this demanding test signal. The DVR-HP3 displayed minor low chrominance to luminance amplitude and a very slight chrominance to luminance delay.

75% Colour Bars were recorded and replayed through the DVR-HP3 and they displayed a well balanced vectorscope image with the only problem being minor low chrominance as per Modulated 20T Pulse comment above.

The objective video tests we carried out indicated the Fast Video Security DVD-HP3 MPEG-2 DVR is probably the yard stick to measure all other DVRs by and is a credit to those involved in its development and manufacture.

Beat Meier a Director of Fast Video Security AG is recognised as a world expert on video compression. His involvement with video transmission technologies started 1981 when he developed a slow scan video transceiver so he could transmit video images around the world via short wave radio. With his and the other Fast Video Security Directors complementary expertise it would not surprise anyone if Fast Video Security remain at the forefront of digital video recording and transmission technologies for a long time.
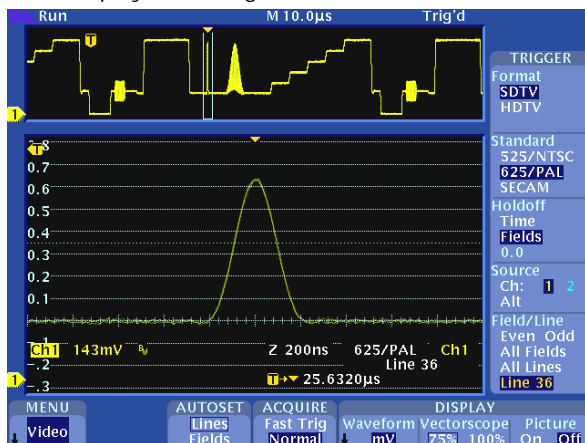
Les Simmonds is a truly independent CCTV consultant and CCTV testing authority.
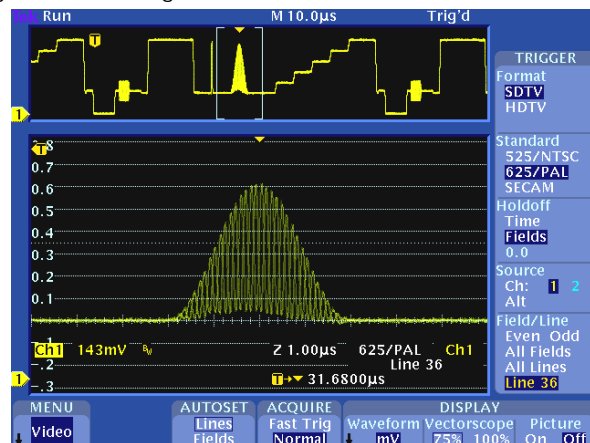
**Email:
les@cctvconsultants.com.au**

**Web:
www.cctvconsultants.com.au**

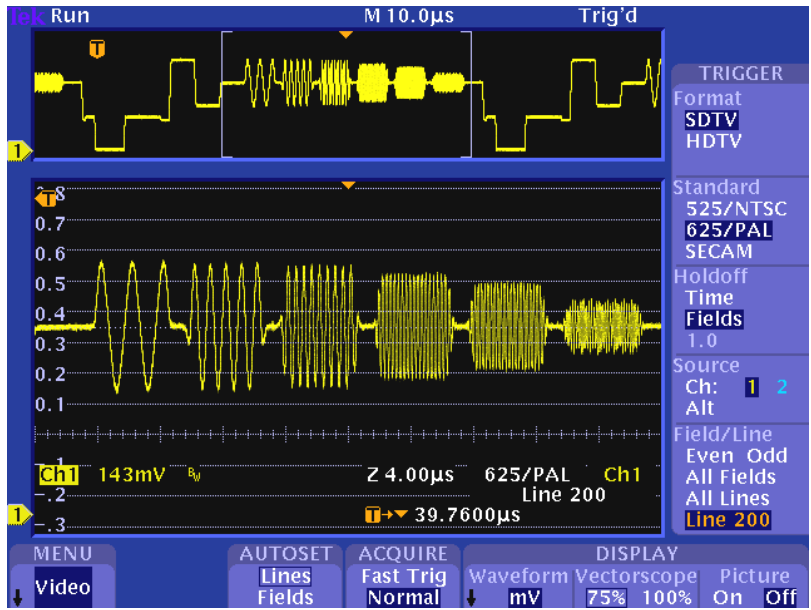***This article was originally published in Security Electronics Magazine Australia.***

Fast Video Security DVR-HP3 DVR recorded and replayed and magnified 2T Pulse waveform image at the composite video output.

Fast Video Security DVR-HP3 DVR recorded and replayed and magnified Modulated 20T Pulse waveform image at the composite video output.

Fast Video Security DVR-HP3 DVR recorded and replayed and magnified Multiburst waveform image showing burst frequencies of 0.5 MHz, 1.0 MHz, 2.0 MHz, 4.0 MHz, 4.8 MHz and 5.8 MHz waveform image at the composite video output.
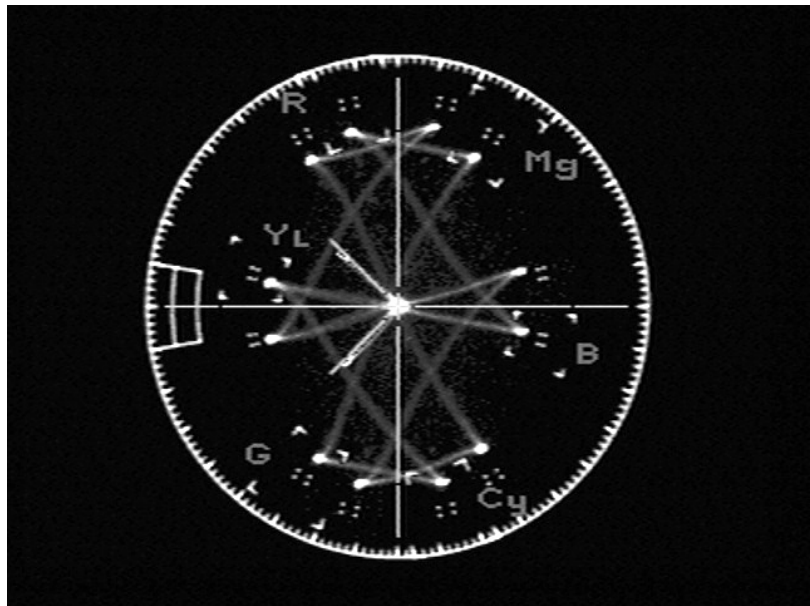
Fast Video Security DVR-HP3 DVR recorded and replayed 75% Colour Bars vectorscope image at the composite video output.