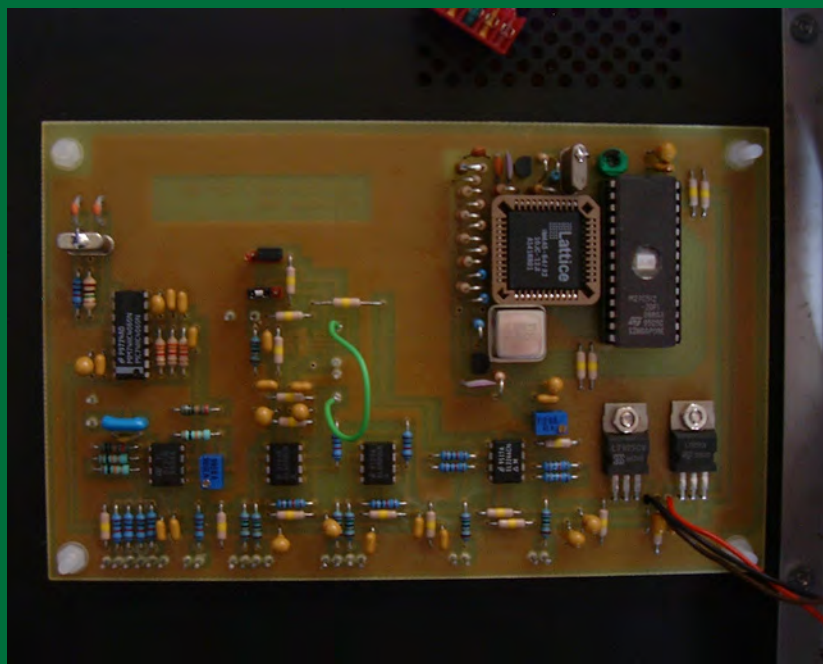




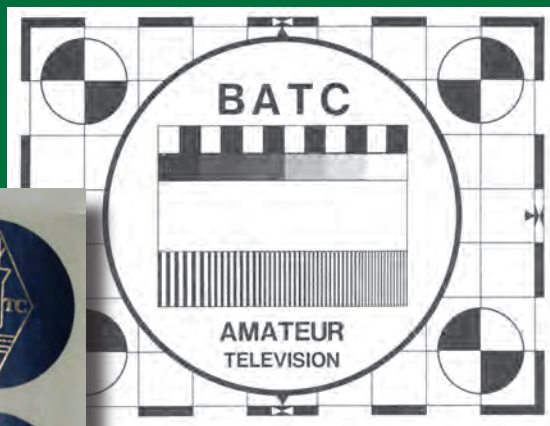
CQ-TV

222



AV Distribution with test generators

Page 18



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Caption Contest

Here are the entries for last issues picture (shown below):

Dave G3WUN

“His homebrew Satnav system needed a few modifications, Peter decided”

“Frank would go to great lengths to avoid paying a broadcast TV license”

Viv - G1IXE

“Mobile Merry-go-round for the birds”



Dave Ackrill - G0DJA

“No, I said your signal is P5, not that I’m driving a P5...”

“No dear, moving the car round *would not* be a less expensive solution”

and the winner is..... Dave Ackrill, congratulation - a caption generator will be on its way shortly.

Please send in your suggestions for the image below, by email to editor@cq-tv.com or by post (see committee contacts for address)



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Deadlines

CQ-TV is published quarterly in February, May, August and November each year. The deadlines for each issue are as follows: -

February	-	please submit by	December	31st
May	-	please submit by	March	31st
August	-	please submit by	June	30th
November	-	please submit by	September	30th

Please send your contributions in as soon as you can prior to this date. Don't wait for the deadline if you have something to publish as the longer we have your article, the easier it is for us to prepare the page layouts. If you have pictures that you want including in your article, please send them, in the highest possible quality, as separate files. Pictures already embedded in a page are difficult to extract at high quality but if you want to demonstrate your preferred layout, a sample of your finished work with pictures in place is welcomed. Please note the implications of submitting an article which are detailed on the contents page.

Editors Preamble

The nice weather is upon us again, I went to my first BBQ last night and very nice it was too. So as you lounge in the sun reading this latest issue, perhaps spare a thought or two about your club and how you can contribute... Articles for CQ-TV are still quite thin on the ground, so if you can spare even five minutes and email a "letter to the editor" about your ATV activities, I (and the other readers) would appreciate it very much !

Having said that, I hope you enjoy this issue, it has a bit of something for everyone, from the historic to the latest digital technology, from HD-TV to NBTv as well as some new and exciting news...

Your committee has been quite busy recently, we've been getting our heads together to try and think of ways we can promote ATV and I think we've come up with a couple of ideas that will bring us right up to date with modern technology: First of all there is the new online forum, suggested by several of our members, we agreed it was a good idea and have

done something about it - see page 15 "Online Information" for the details. Like most things Internet related, it will only be a success if it is used, so please don't be shy, take a look, register and PARTICIPATE !!!

Secondly, we are in the process of setting up an online "streaming media" service. Trevor has more details in his "Chairmans Column", but basically the project will create a channel for anyone interested in ATV to watch, as well as broadcast interesting material. At the time of going to press, the project was in its very early stages, but by the next issue we hope to be fully up and running. To keep abreast of the progress, we have setup a website exclusively for the project:

<http://www.batc.tv>

If you have any suitable content, please do get in touch and send us your videos. We have a sub-committee working on the project, but would welcome any help from our members: If anyone has

any experience in Flash Media Server or video editing and encoding - there is plenty of work to go round.

Members services is having a sale, so take a look at page 32 and grab yourself a bargain. The stickers will look nice on your latest homebrew equipment case, and the lapel badges are very smart, not to mention how useful the reporting chart and testcards are!

Don't forget, this year is BGM year, read all about it on page 24 and make a date in your diary!

Finally, it was nice to see a couple of names from my "good old days" when I first got interested in ATV: Bob Platts contributes a short article (page 23) and Gary Shipton in "Contest News", perhaps if Gary is reading this, he could drop me an email with details of his ATV activities in VK land.

73

Chris Smith - G1FEF



We have produced a DVD containing electronic versions of CQ-TV and the CQ-TV articles index. Also included are electronic versions of our three most recent handbooks, 'Slow Scan Television Explained', 'Amateur Television Handbook' and 'An Introduction to Amateur Television'.

The archive is constantly being updated as more of the old paper issues are converted to electronic format. Currently issues 1 to 134 and 161 to 216 are included along with a few odd ones. This DVD is updated 4 times a year, to include the current issue of CQ-TV.

The DVD is playable in a standard (domestic) DVD player (and on a PC with a DVD player) and the data files will 'auto-run' when the DVD is put into a PC.

The video section was prepared by Brian Kelly and contains videos from Bletchley Park 1999, one from Shuttleworth 2002 and one from 2004. The cost for this DVD is £5.00 for current members and £10.00 for non-members.

Note: This DVD is supplied on +R media only.

Chairman's Column

Let me start by saying a few words on Arthur C Clarke who passed away on March 19 aged 90, to everyone he was famous as an author of over 50 books, the most famous being 2001: A Space Odyssey, which was later made into a film by Stanley Kubrick. He was also of course a Past President of the BATC.

He was born in Somerset, and was involved in the development of aircraft blind landing systems, much of his work was as a prophet, with vivid predictions of modern space exploration and technology; his stories were the inspiration behind Sir Tim Berners-Lee's invention of the World Wide Web. He is credited for the communication satellite and the geographic location in space where they reside bears his name "The Clarke Belt". What is little known is that he is not the only member of his family to attain literary accreditation, his mother wrote a book "My four feet on the ground" the story of her family.

His brother Fred wrote a slightly less known publication on small bore heating, his chosen profession. I think it's true to say he inspired others. For a while back in the late 80's early 90's we both belonged to BATC and BSAC (British Sub Aqua club) because besides being an electronic enthusiasts he was also a keen scuba diver, working with Cousteau in the 50's. I don't think either of them were my inspiration to scuba, I think that came later from Lloyd Bridges and the TV series Sea Hunt. The ham radio, maybe Tony Hancock, TV engineering - well it seemed like a good idea at the time, it did lead to some minor involvement in the "Arthur C. Clarke's Mysterious World", where it is rumoured he borrowed the Umbrella he is so often remembered by, from a member of the film crew when filming on the beach in Sri Lanka, where he lived since 1956. He will be missed by us all and I am pleased that for a time he was part of the BATC.

<http://www.batc.tv>

This is our new TV streaming site that we hope will be a permanent home for ATV repeater streaming and more. At the moment several ATV repeaters are streamed on the internet. If your local repeater is one of them, then others can monitor its output around the world. Similarly you can monitor other repeaters and have a cross repeater QSO via the internet. Delays are a problem, particularly with camstream where the average is around 16 seconds, Ustream has less delay. Our streamer hardware will be located in Docklands connected to a major internet pipe. This will minimise delays and the software will enable several repeaters to be viewed at once on a single screen, so you will be able to call CQ and check for a reply on several repeaters at once. In addition to live streaming it will also be a home for the BATC television archive so you can view on line some of the programmes old and new produced by our members. Please let Chris Smith have a copy, if you have anything you think others would like to see.

As a club we will have to pay an annual rent on the equipment space, electricity and bandwidth charges for the data, based on a commercial rate. To this end we are looking for both commercial sponsorship for the site, and other users to share the facilities, rent and data charges. This is a big step for our small club, and although the rent is within our reach it is difficult to estimate data charges but then so many of our members have found ways to stream their local repeater, it is only reasonable that we should support them and hopefully become the hub of ATV streaming. The software will use flash technology to bring the best quality pictures. The site will also facilitate live broadcast from sources other than ATV repeaters, which could for instance be live coverage of the BGM or other ATV events around the world. The options are endless, if we can make this site the hub of ATV pictures on the web, then we will raise the club profile and encourage others to join the hobby we all share.



Circuit Notebook 97

By John Lawrence GW3JGA

Earth Loops

Dealing with earth loop problems covers a huge range of probable causes, frequency effects and possible solutions. Here we look at mains frequency earth loops and its effects on audio and video equipment in the amateurs shack.

Most electrical / electronic equipment is protectively earthed by the fitting of a three core mains lead and a three pin plug, the earth pin of which connects to the mains supply earthing system.

If two pieces of equipment, for example, a tape or disc player and an amplifier are both plugged into the mains and thus earthed, then the action of connecting a screened signal coax lead, from one to the other, will result in the screen and the earth wiring forming a continuous loop - an earth loop, as shown in Fig. 1. This earth loop is not a problem in itself, but if any of the wiring is subjected to a mains a.c. magnetic field from, for example, a nearby mains transformer then the resulting induced voltage will cause an alternating current at mains frequency to circulate around the loop. In addition, a circulating current may be the result of magnetic coupling taking place elsewhere in the mains earthing system.

This circulating current will pass through equipment, possibly from the input connector, through the PC board inside the equipment, as shown in Fig.1. Depending on the resistance of the copper track on the PC board, this current will cause a small a.c. 'hum' voltage to develop within the circuit which may then impose itself on the normal signal being handled.

Similarly, if the screened connecting lead has a poor braid connection in the coax plug or the plug body has a poor connection to its other half, as shown in Fig.2 (sometimes a problem with 3.5mm jack plugs and cheap BNC connectors) then the a.c signal developed across the poor earthing connection will be in series with the required signal, again resulting in 'hum' being added to the audio or video signal.

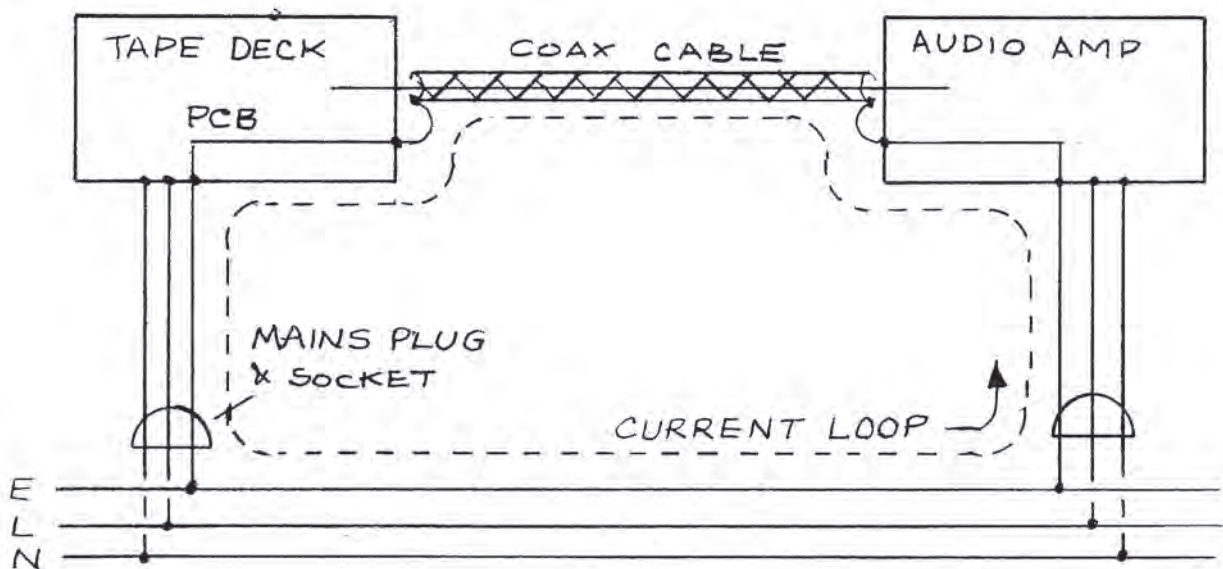
The result on audio systems (microphone amplifiers etc.) is a background 50Hz or 60Hz hum and in video systems the presence of light or dark horizontal bars drifting vertically over the screen. Unfortunately, interconnection of equipment in the ATV shack provides an

ideal situation for developing earth loop problems. The discussion here relates to mains frequency currents circulating in the earth loop.

Resolving Earth Loop problems

1. Initially, everything should be done in the arrangement of wiring and equipment to minimise any earth loops by keeping cables tidy and close together but not coiled and away from any magnetic fields, to minimise inductive coupling.
2. Where possible feed all equipment from the same distribution point, this will reduce the earth loop length between equipment.
3. Avoid connecting some equipment to one mains socket and associated equipment to a different mains socket in another part of the shack. Keeping earth loop length to a minimum will reduce any possible coupling to circulating currents in the shack (house) wiring.
4. Even when reasonable care has been taken, it is still possible that due to unavoidable poor layout, long cables etc. earth loop problems may still persist. The option then is to break the earth loop in some way so that signals can be carried but loop currents can no

Figure 1 - Current Loop



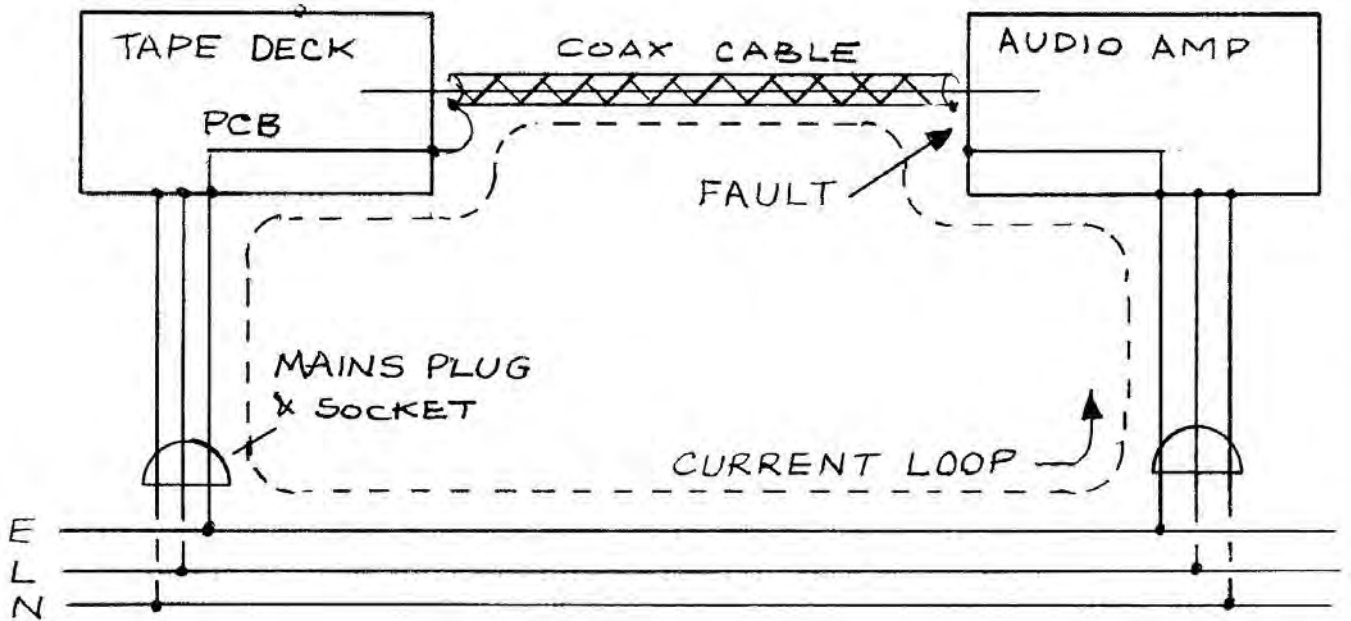


Figure 2 - Effect of faulty Connector

longer circulate. In the case of cables carrying audio, using a suitable 1:1 audio isolating transformer will usually suffice, as shown in Fig.3. A suitable transformer is shown on the left in Fig.4.

Where video signals are concerned, then again, a suitable video isolating transformer may be used. The special video transformer, shown on the right in Fig.4, uses a high frequency core material capable of providing a bandwidth of 20kHz to about 6MHz. when terminated in 75R.

WARNING! Under no circumstances must the earth wire in the three pin mains plug be disconnected in order to break the earth loop. Doing so could result in lethal voltages being present on the case of the instrument when the signal cable is unplugged.

Earth loops are not only prone to couple to mains frequency magnetic fields. Those fields produced by television scan coils and radio frequency fields produced by transmitters may also cause problems. Reading through 'Digital Modes for all Occasions' [1],

'The Radio Amateur's Guide to EMC' [2] and 'Personal Computers in the Ham Shack' [3], all provide specific information for avoiding earth loops when interconnecting amateur radio equipment.

In professional audio systems twin screened cables are used almost exclusively and amplifiers have balanced input circuits with good common mode signal rejection. Video is dealt with in a similar way with video amplifiers also having balanced inputs. See reference [4].

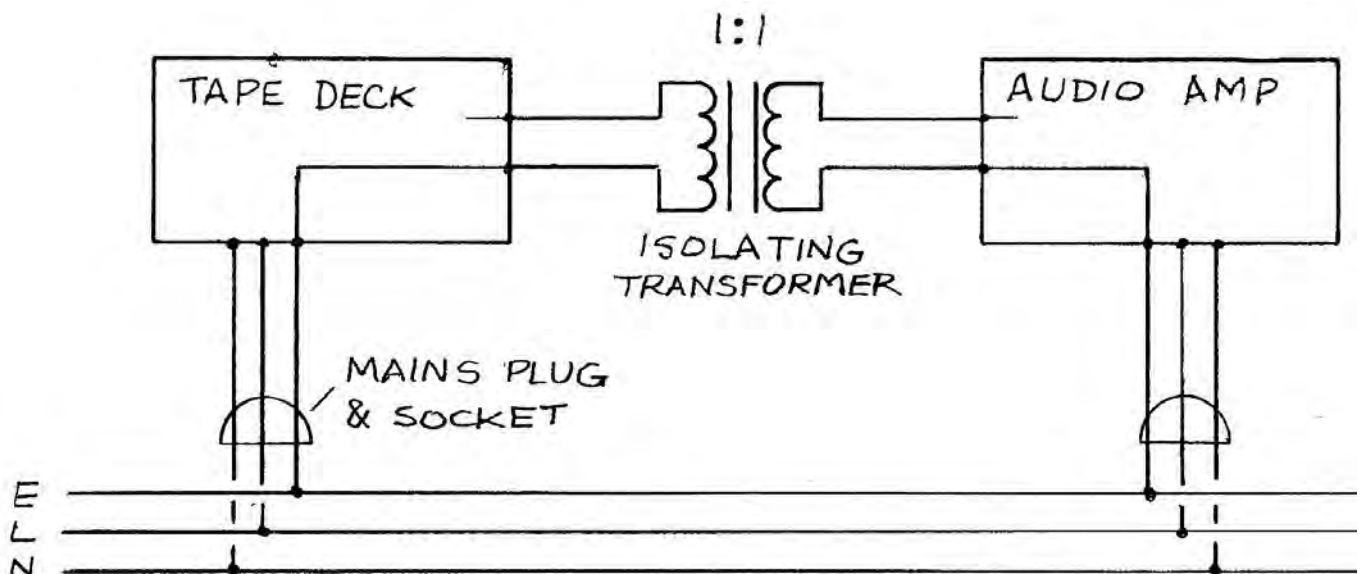


Figure 3 - Use of Isolating Transformer

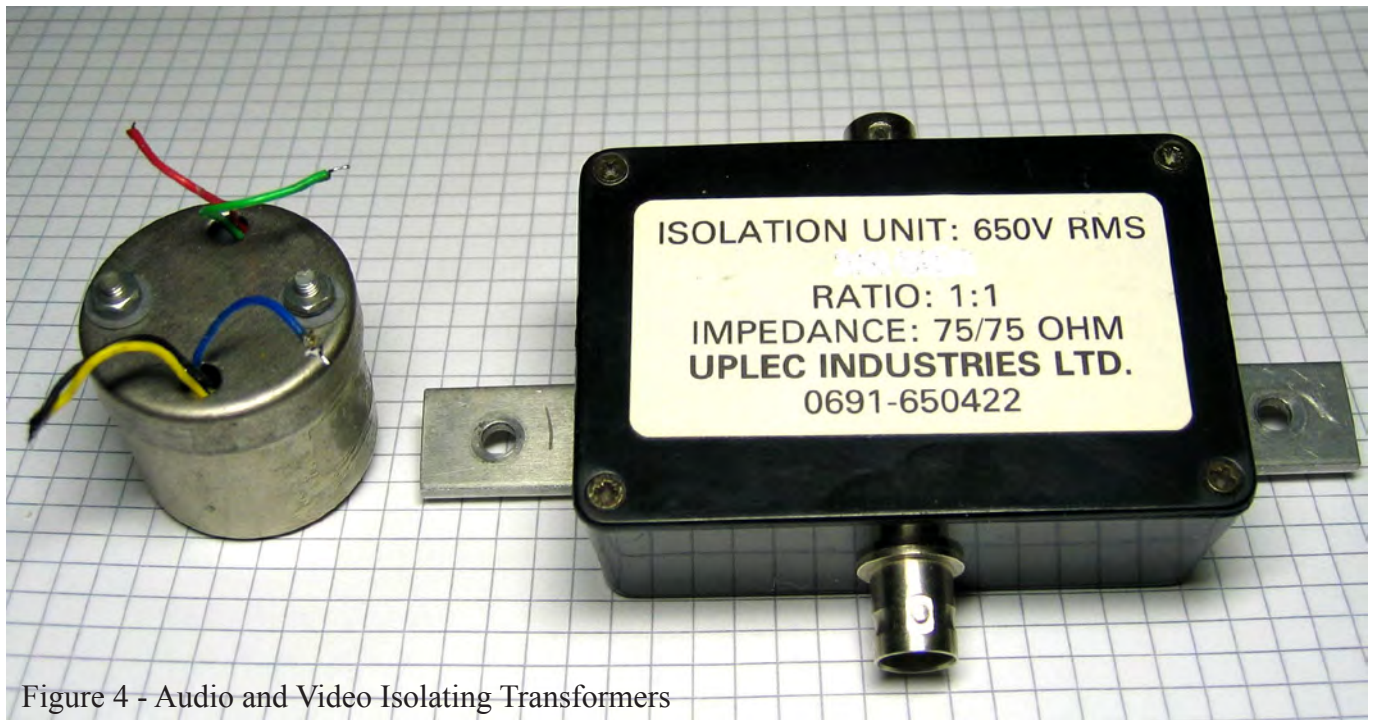


Figure 4 - Audio and Video Isolating Transformers

References:

- [1] Digital Modes for all Occasions Murray Greenman ZL1PPU
Published by RSGB
- [2] Personal Computer in the Ham Shack Paul Danzier N1II and
Richard Roznoy K1OF
Published by ARRL
- [3] The Radio Amateurs Guide to EMC Robin Page-Jones G3GWI
Published by RSGB
- [4] Video and Audio over CAT5 Mike Cox
CQ-TV 220 pages 9-12

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Luxeon PWM method applied to a CRT display

By Steve Anderson

Preamble

In Vol. 31 No. 4 of the ATV newsletter Jeremy Jago outlined a novel display method for NBTv on a scope screen. I was going to use this in conjunction with a CRT display which had no internal graticules to obscure the picture, but as I was planning to build this from the 'ground up' I decided to use the same PWM method as Steve Ostler has used in his Luxeon display, except the display device here is a CRT.

An outline of the differences between this system and the more conventional mechanical display is in order, this is interim; and will be developed in time to cater for more lines and a higher frame rate:-

- 1). Scanning is left-to-right for the lines and top-to-bottom for the frame, the same as 525/625 TV.
- 2). The aspect ratio is 4:3, slightly landscape, again the same as conventional TV.
- 3). There are 48 lines each consisting of 64 pixels, the line rate is 600Hz and frame rate is 12.5Hz.
- 4). This is a sync-less system with (currently) the exception of a frame reference.
- 5). There is black-level clamping ensuring true luminance values.

Caution.

This unit uses both high AC and DC voltages and the author of this in no way accepts any responsibility for any incident, injury or fatality of those attempting to replicate it. If you're not used to working with high voltages, get some experienced supervision. Although this is considered a low-voltage CRT, there is nigh on 1000V of potential difference in parts of the device. Do not work on this alone.

Basic Signal Characteristics.

The source material is from a .wav file played back on a PC; this is sampled at 48kHz with eight-bit video resolution. At a line rate of 600Hz this yields 80 pixels per line of which only 64 contain active video, the other 16 at the end of each line are set to black level. This was originally for black-level clamping but it proved unnecessary, more on this later.

There are no sync pulses used with the exception of a 'frame reference' consisting of 16 cycles of full amplitude 24kHz at the start of line 48. This is followed by a black reference for the remainder of the line where the black-level clamping is done once per frame. Sadly we lose one line in 48, but I plan to recover line 48.

The snapshot below shows the input waveform from the PC (yellow) with the video utilizing the entire 8-bit resolution and the 24kHz burst for line 48 identification followed by the black reference.

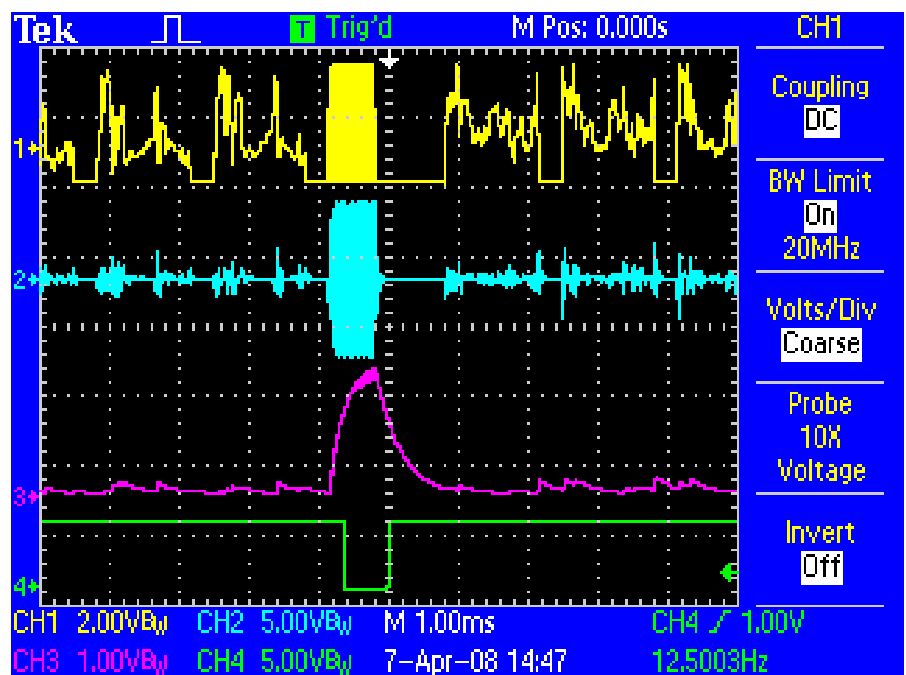
The cyan trace is the 24kHz bandpass filter output (IC204b pin 7, Fig. 1 below). The magenta trace is the envelope detector output (C210) and the green trace is the comparator output (IC205 pin 7).

This all relies on the exactitude of two oscillators, one in the PC which drives the audio D-A and the one in the display. The oscillator in my PC is around 32ppm off-frequency, whereas the displays reference is far more accurate.

This results in a slow drift in line-rates, around one line in 90 seconds. But with a refresh every frame results in an error of around one tenth of a pixel per frame. I did consider adding a 24kHz reference signal to the right audio channel which would have made things very easy, but I felt this would be cheating.

The circuits.

Figure 1 shows the input side of things where the signal from the PC is increased to 7V p/p and followed by a band-pass filter to extract the frame 24kHz burst. Flat-out my PC outputs 3.5V p/p, adjust



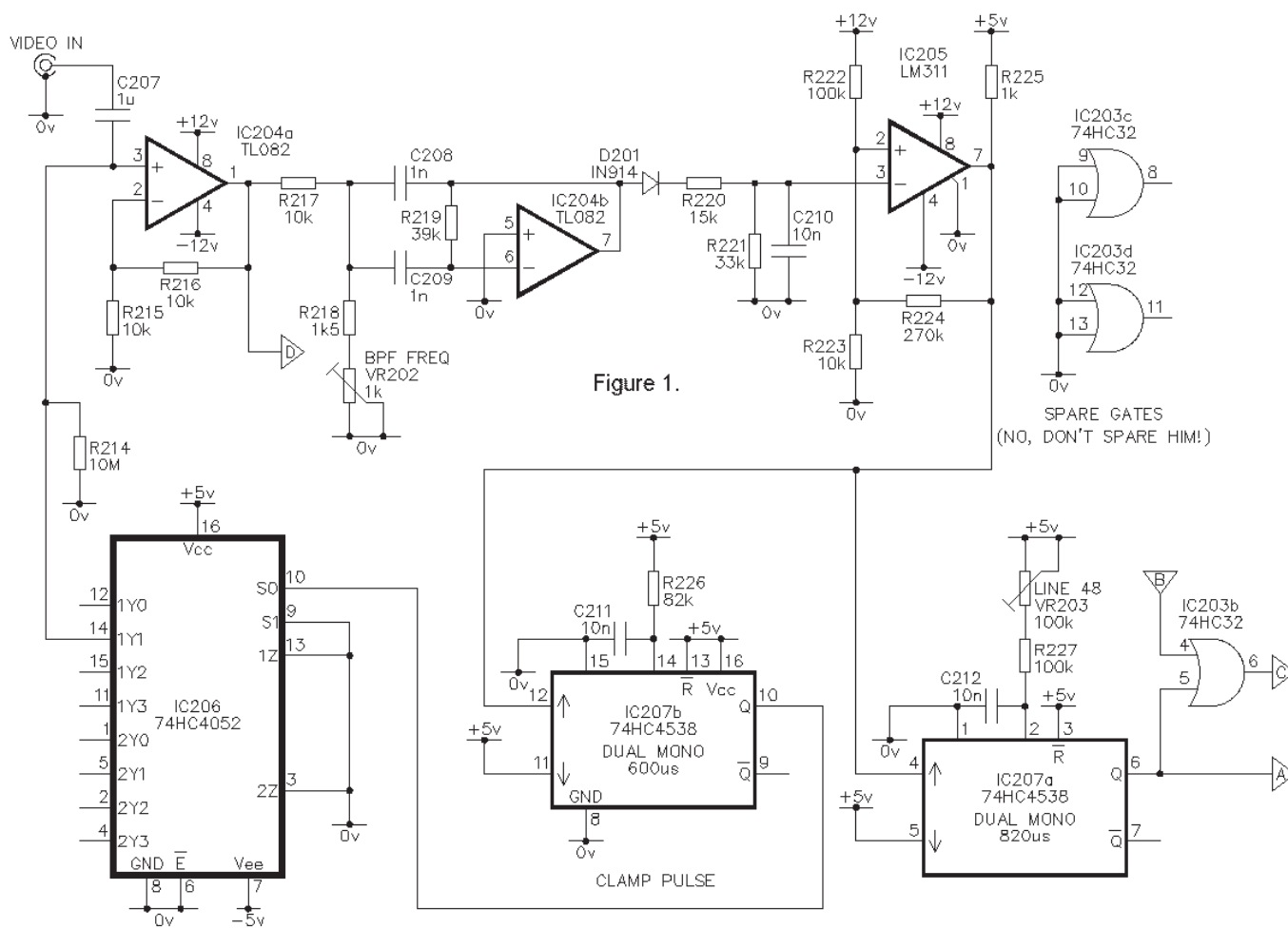


Figure 1.

R216 to suit other levels. IC204b is the band-pass filter that detects the 24kHz burst followed by a simple detector comprising D201 and associated components. See waveform above.

This is then cleaned up by IC205, a comparator which generates a pulse that triggers IC207a and IC207b. IC 207b is the black-level clamping monostable that enables IC206 welding the black reference to zero volts that follows the burst in line 48. I did try a LM/NE567 tone decoder, but with only 16 cycles to work with it was susceptible to false triggering from the actual video waveform.

Once the 24kHz frame sync is detected IC201b is continually retriggered to illuminate a green LED which indicates the presence of a NBTV signal with frame reference.

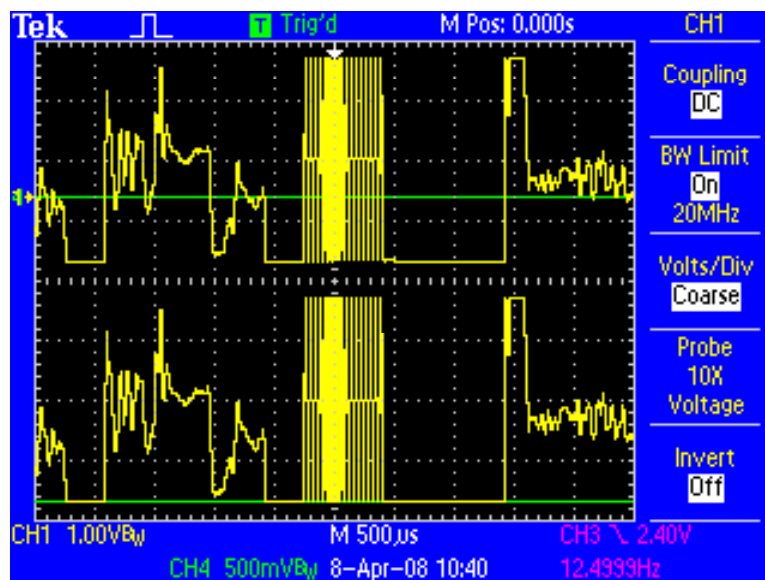
Due to the slight difference in clock frequencies all the counters in the division from 3MHz that generate the timing of the timebase waveforms, both horizontally and vertically, are reset at

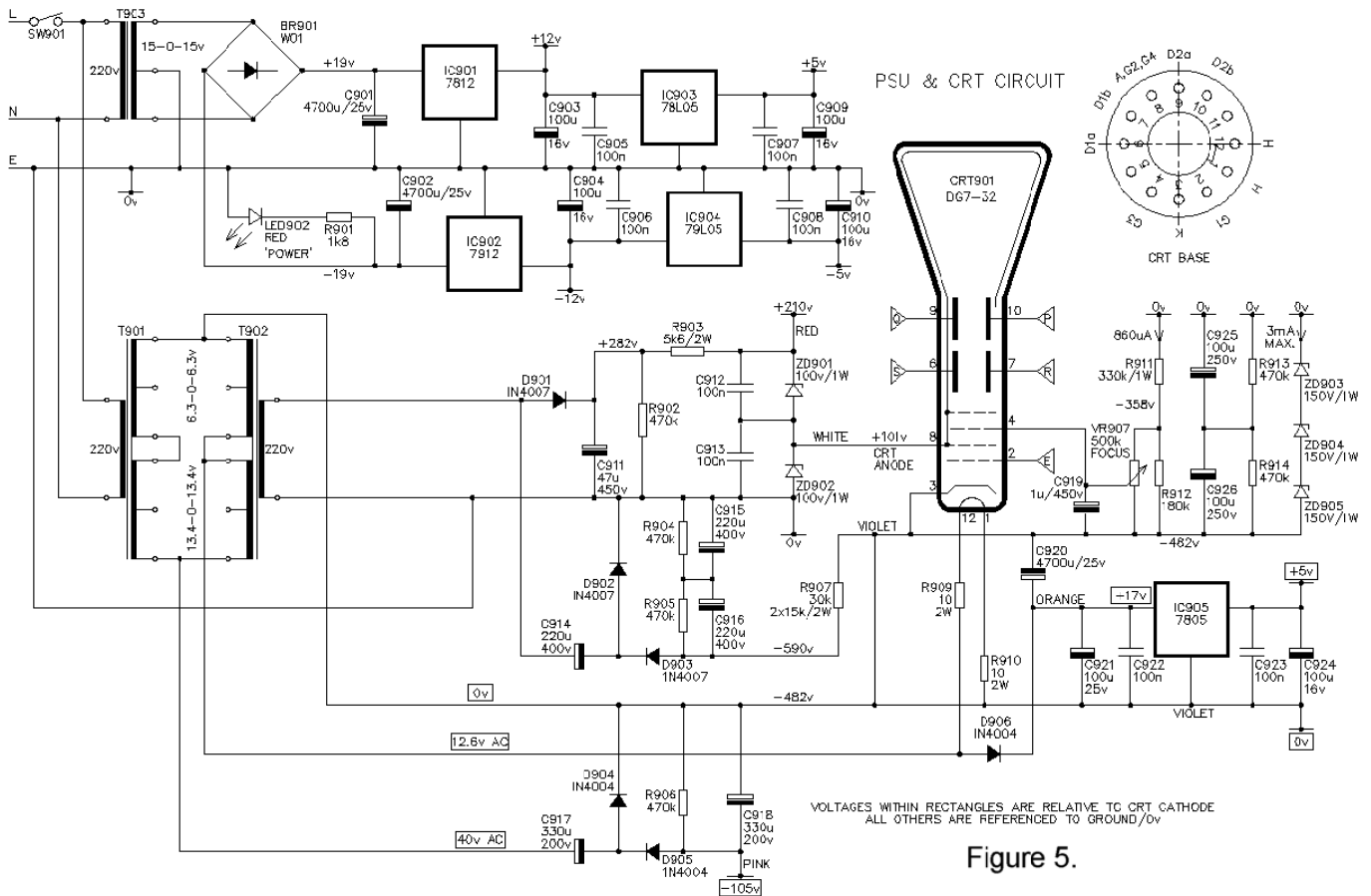
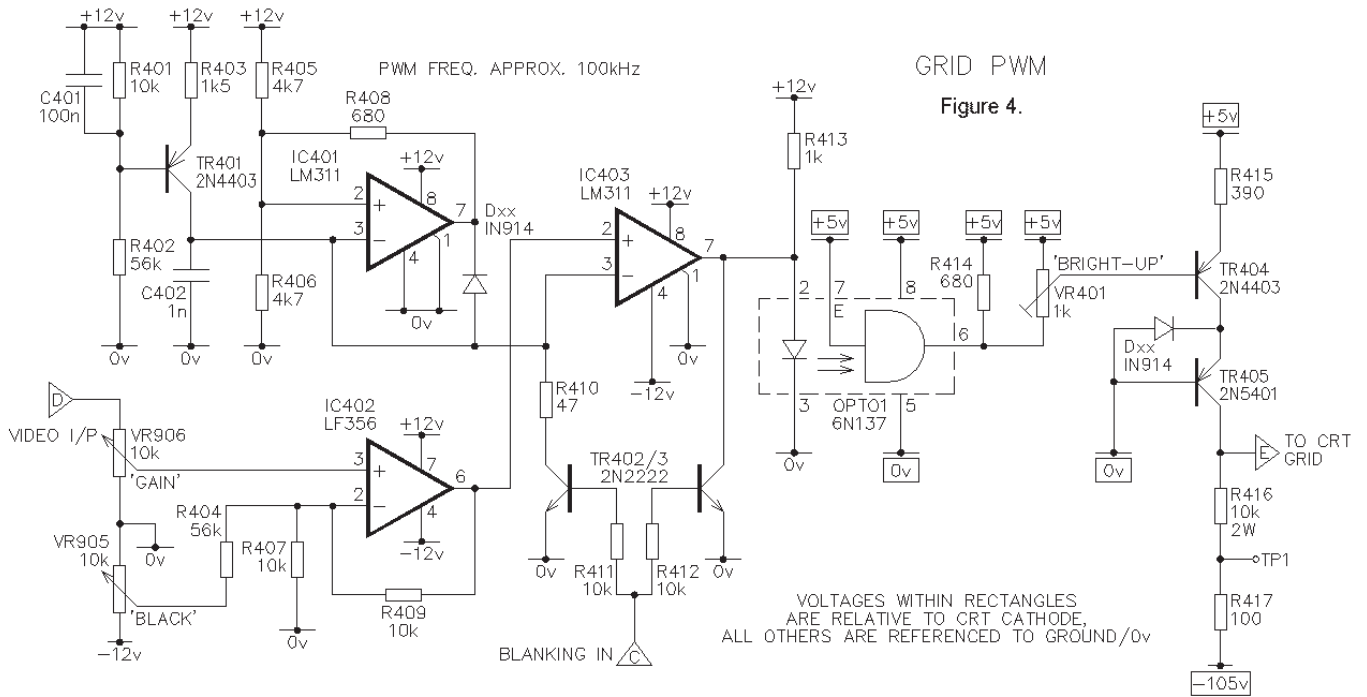
each detection of frame sync (Fig. 2). IC207a generates a pulse to add the missing line one sync when the counters are reset to zero. IC203b is a 'leftover' from previous versions of this, it's not needed. Pin 5 could be at ground or IC203b could be omitted entirely.

IC201a in conjunction with TR201 and TR202 generate the horizontal deflection waveform at 600Hz. In a similar manner

TR203 and TR204 generate the vertical ramp waveform.

Black level clamping is performed by IC206 (Fig. 1) driven by the clamp pulse from IC207b. The waveforms below show the normal AC-coupled output of the PC at the top, the green trace indicating ground/0V. The lower one shows the black being clamped to ground.





back transformers and the requirement of voltage multiplication. The transformers used have some strange voltages, but I had them to hand. R909 and R910 were added to the CRT heater circuit to reduce the inrush current when first switched on cold.

The Results.

So, after all that effort what's the upshot of it all? Pictures are worth a thousand words...See below.

You can see the vertical burst in the first half of the last line. I deliberately didn't blank it as I wish to be able to see the visible effects as I modify it.

Future Developments.

Depending on how the frequency stability issue works out I intend to reduce the number of frame references such that it's almost invisible. Now that the last 16 samples in a line are redundant I intend to use those for active display. More in due course.

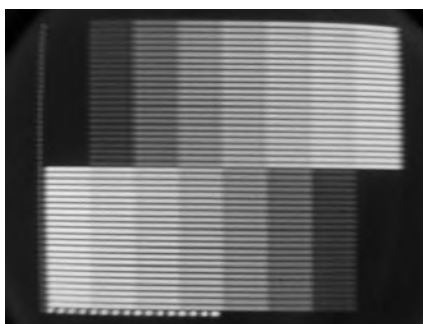
Using a 7cm (3") tube with a nominal line-width of 0.5mm this is about the limit of resolution for a DG7-32, next it's going to be a 13cm (5") 5ADP1 with an increase in the number of lines to 60/80/96, and a minor increase in voltage to 3000V. Another advantage of the 5ADP1 is that it has a flat faceplate so the curvature distortion introduced by the DG7-32 should be reduced or eliminated.

This display and the methods used were mainly a 'proof of concept' exercise; the display will again be torn down and used for something else.

If anyone should have any questions please contact me at the e-mail address below or via the forum.

<http://www.taswegian.com/NBTV/forum/index.php>

Steve Anderson.
steveand@truemail.co.th



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Online Information

This issue I want to let you know about a free service that your club has provided for you...

Point your browsers at:

http://www.batc.org.uk/club_stuff/forum.htm

and click on the image to go to the new ATV forum.

After suggestions from our members, we have setup an online forum for us all to meet and communicate.

It will only work if you use it though!

At the time of writing, the forum has 252 registered members and has had 155 posts, so a lot of members are

“lurking” i.e. they are reading other peoples posts, but not participating in the conversations.

In order for this to be a success, we must have participation! So please, register and take part in the discussions.

If you would like to see an area setup for a particular discussion topic, please let me know and (provided it is ATV related) I will be happy to set it up for you.

If you are a member of an ATV repeater group, let the other members of your group know about the forum - we have tried to include every ATV repeater in the UK and would welcome you taking advantage of the forum to keep your

members in touch with each other.

I know we are the “British” Amateur Television Club, but we welcome like minded folk from anywhere in the World - if you would like your own discussion area setup, wherever you are - please just ask.

I can be contacted via the forum - just post a message in the “Feedback” area. Or drop me an email:
editor@cq-tv.com

I look forward to meeting you online!

73
GIFEF
Chris Smith

http://www.batc.org.uk/club_stuff/forum.htm

Members Ads

I currently have the following two types of units that ‘must’ go to give me some work space in the garage, hence, free gratis!

1. 6 off NTL MPEG2 Compression Encoder 19”(10U)
2. 3 off NTL MPEG2 System Multiplexer 19”(4/5U)

with the addition of for example a System 3000 DVB Digital Modulator and some sort of RF up convertor (simple homebrew see CQTV221), you have a digital transmission system.

These units are ‘first generation’ (should all be working) but may be a bit big for ‘cupboard’ size shacks.

‘Take one or take all’. Can probably find a handbook or two first come first served.

BONUS:

Appart from costs nothing, there are also available a couple of boxes of spare ‘PCB’s’ and possibly some cables.

And, if you scrap any of the units - the switched mode PSU from 2 Multiplexers readily provide a 12/13V typically 50A power supply with other 12,15 & 28V supplies plus 3 x 9cm dia. fans from each unit to cool the PSU at max current and the PA’s you might use the power supply for.

And, the switched mode PSU from 2 Encoders readily provide a 12/13V typically 100A power supply with 3 x 12cm dia. fans from each unit to cool the PSU at max current and the your PA’s etc.

I have seen similar PSU arrangements on e-bay going for around £100. Why don’t I do the same? can’t spend the time and effort at the moment.

ROY G8CKN

Location Hampshire.

R G Powers

Antenna & Electronic Consultancy Co Ltd

+44 (0)1420 563 571

All down the Bar, except the VT Editor

(It's a line from a BBC Christmas tape) Trevor Brown explains

Its now almost 10 years since I worked in a VT department, but I still get asked about Christmas tapes, never seen one! let me explain

I think they evolved in different ways, before video tape, they were the domain of the film department, who collected out takes (the more embarrassing the better) and they would assemble this film for viewing at the annual Christmas party hence the Christmas part of the title. The material was similar to what you see on "Alright on the Night", but that material can only be shown with the permission of the artist; I suspect those rules did not apply to these private showings.

The tradition expanded when video tape arrived, the out takes would be collected by VT and again assembled into a single programme for viewing at Christmas, (the tape part), but the tradition changed by the inclusion of material often shot for the occasion. The tapes also got a much wider audience, in that they were networked around all the ITV companies and this grew into a contest to see who could produce the best tape, with its own judging panel. There was even an award which was a

large inscribed rubidium disc from an HS 100 slow motion machine. It looked a little like a DVD only about 30" in diameter and much heavier. Each year it would be inscribed with the winning companies name and it would reside in their VT department for the next 12 months. It must still exist somewhere and I would love to know where.

The tradition gathered momentum and the productions got more and more elaborate and attracted wider involvement of staff, it was getting competitive, and there is nothing like a competition to up the stakes. The artist began to get involved, they had always been involved in the out takes and when they screwed up a take they would often end up with merry Christmas VT, a phrase I think originally coined by Noel Edmonds, but now the artists were turning up in the bar asking for someone from the VT department and coming up with an idea for the Christmas tape. This got to the level at YTV when the then MD turned up to record a spoof announcement for one years offering.

The ITV tapes were generally about 10 to 20 mins long although there was

no time limit on productions in the contest rules. The next change was when we saw a BBC Christmas tape, officially there were two made by the BBC the first one was called "White Powder Christmas" White Powder was a tape backing problem with Memorex video tape which clogged up the VT machines and put many productions at risk, Memorex did produce some of the best performing video tape at a time of analogue technology where generations were lost in editing and duplication, and as such their Chroma 90 tape became the industry standard until this problem. I think naming the production after a VT problem showed that Christmas tapes had now firmly become the domain of VTR.

White Powder Christmas was much longer than any of the ITV tapes and showed the production muscle that the BBC could put together. This tape was produced in the year the BBC had its strikes and much of the specially shot footage reflects this era. This was followed by "Good King Memorex" and was the last Christmas tape officially made by the BBC and included spoof material featuring a prominent royal which attracted press attention and a clamp down on all Christmas tape production at the BBC, in a world where all controversial material is screened by lawyers and often has to be signed off at a very high level in the company, it was inevitable these flourishing underground productions would face the axe. There was one final BBC tape called an Easter Tape which was presumably to get around a poorly worded BBC memo of not producing Christmas tapes.

The BBC tapes had a different content to ITV tapes and often had a higher music content, with songs specially adapted for the production and performed by leading artist such as Suzy Quattro singing "Sports PA" the rumour goes this was written by a member of the VT department and performed on rehearsal. The words written on the back of a roll of wallpaper purchased in the lunch break and pulled over scaffold poles as an improvised autocue. The artists



did have a much higher involvement and Legs and co, the top of the pops dancers (for those of you that have been around as long as me) did have a dance routine performed in the VT area and again featured an adapted song to VT engineering. The faculties booking department performed what has now become a classic known as 4050. My own personal favourite is rip scratch, which was a send up of using RCA machines in a linear edit suite. At YTV all the editing was done on RCA machines and many of the gybes struck home, I still have the scars.

ITV was not going to be outdone and Thames took Hot Gossip who were working on the Kenny Everitt show at the time, up into their VT area and produced a raunchy version of the BBC legs and co production.

The adapted music still lives with me every time I hear a track on the radio that was adapted to a Christmas tape, from Pink Floyd's "Another Brick In The Wall" to "Run Around Sue" There was no doubt that planning and a great deal of production effort went into these productions at every level.

By the time I left YTV in 1998 Christmas productions had disappeared and the Rubidium disc had long since vacated the VT wall. Most of the tapes were produced as a team effort although there was often a single motivating person at each company I wont name names and embarrass anyone, most of the tapes have been lost but the good news is there are clips available on the net for you to view just follow the links to see the best of the BBC specially shot material and the more raunchy Thames version

Online:

<http://www.vtoldboys.com/>

<http://uk.youtube.com/watch?v=mU8QgrsLLvs> (Trevor's favourite)

<http://uk.youtube.com/watch?v=6VzrWCNnId0> Pams People in VT

<http://www.youtube.com/watch?v=fattrSxsras> Hot Gossip at Thames

<http://uk.youtube.com/watch?v=9nJbz0spZB0> Muppets and an RCA TR600

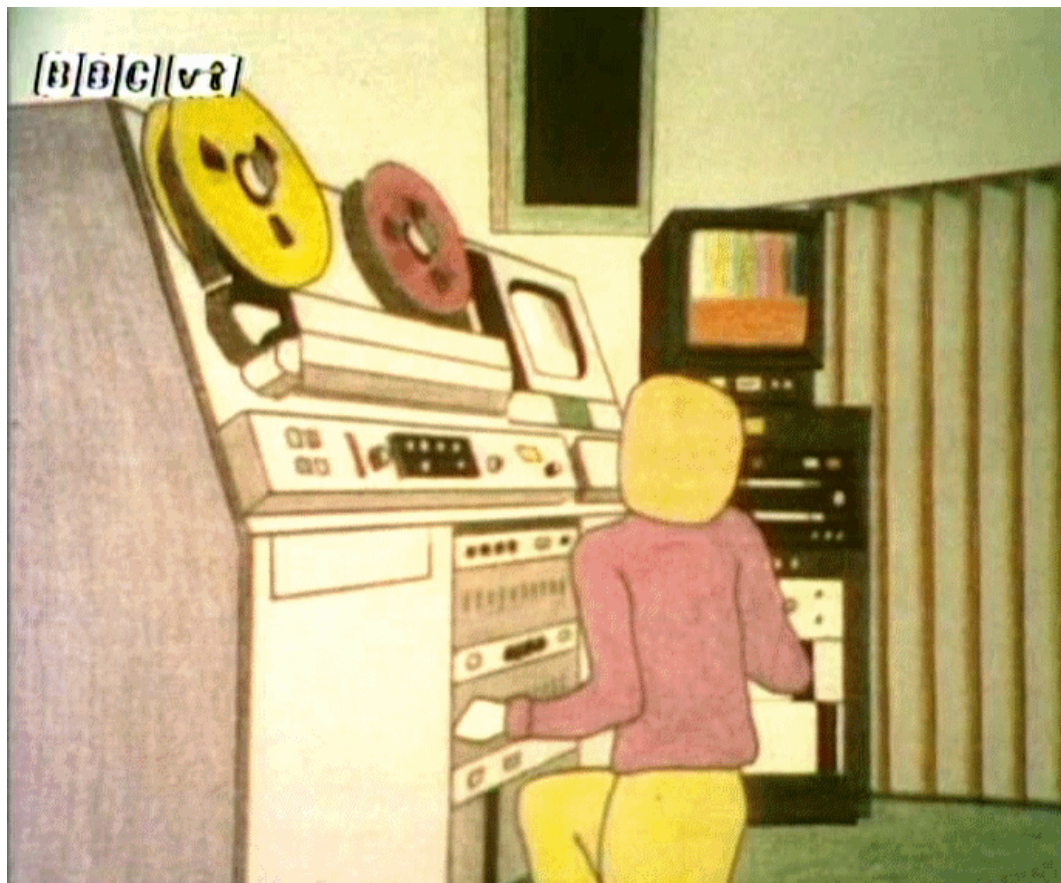
<http://uk.youtube.com/watch?v=KK0Pvr9eskE> BFBS a chance to see the RCA TR600 locking up (sometimes) and the mechanical genlock joke)

http://www.vtoldboys.com/slo70_3.htm HS100 info

The technical quality of some of the material that can be reached by the links below does not reflect that of the original productions which were all produced to full broadcast specification, none of us would compromise on a Christmas tape, they always got the latest and most up to date technology used on them.

If nothing else it proves that the engineers weren't boring, least not in VT

Trevor Brown
Ex VT Editor YTV



AV Distribution with test generators

By Brian Kelly. GW6BWX

This article describes a device that provides the functions of a one-to-four way distribution amplifier for audio and video signals, a video level stabiliser and produces both a 1KHz test tone and video pattern generator.

The block diagram of the device is shown in fig 1.

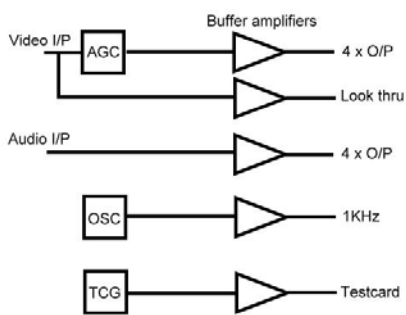
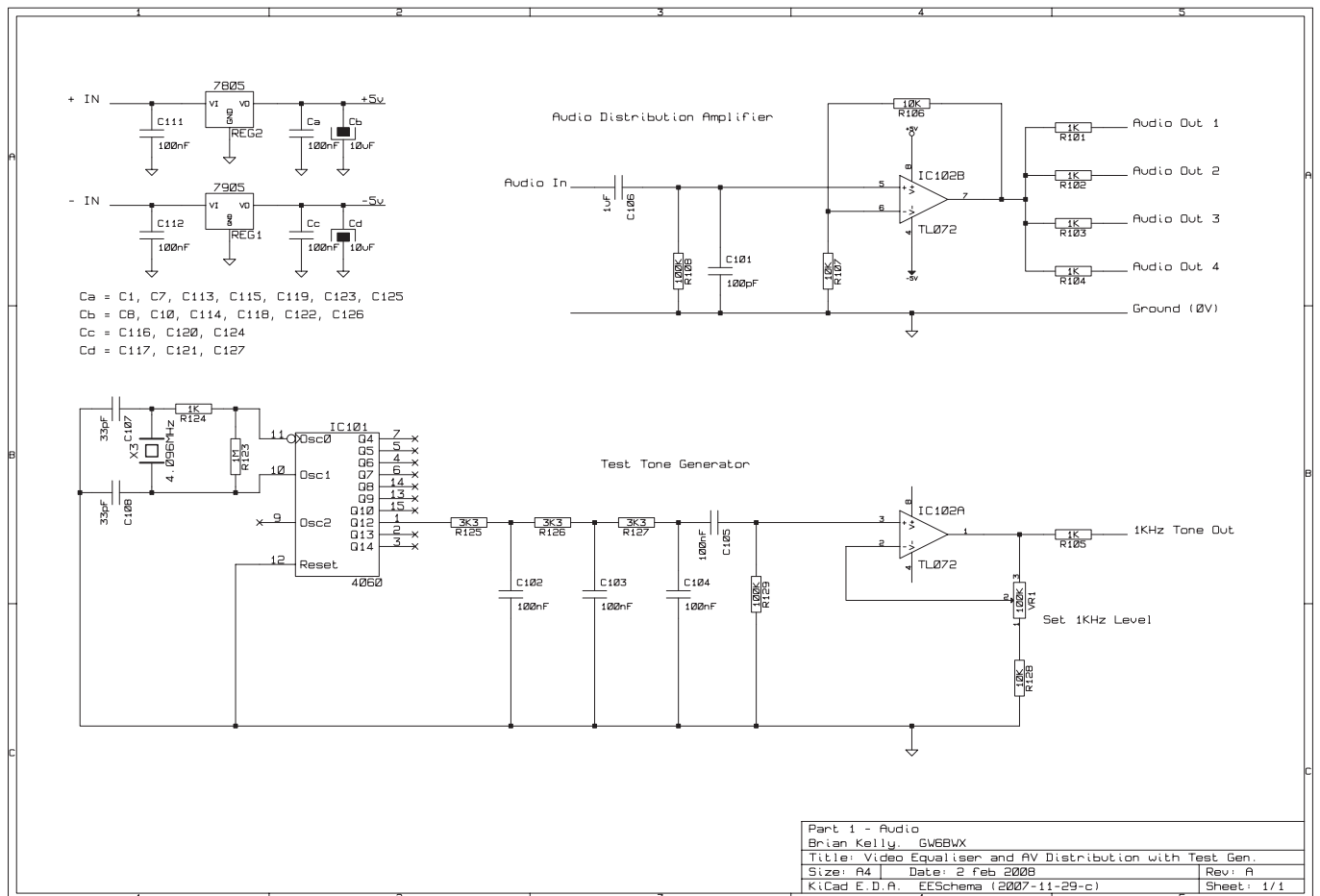


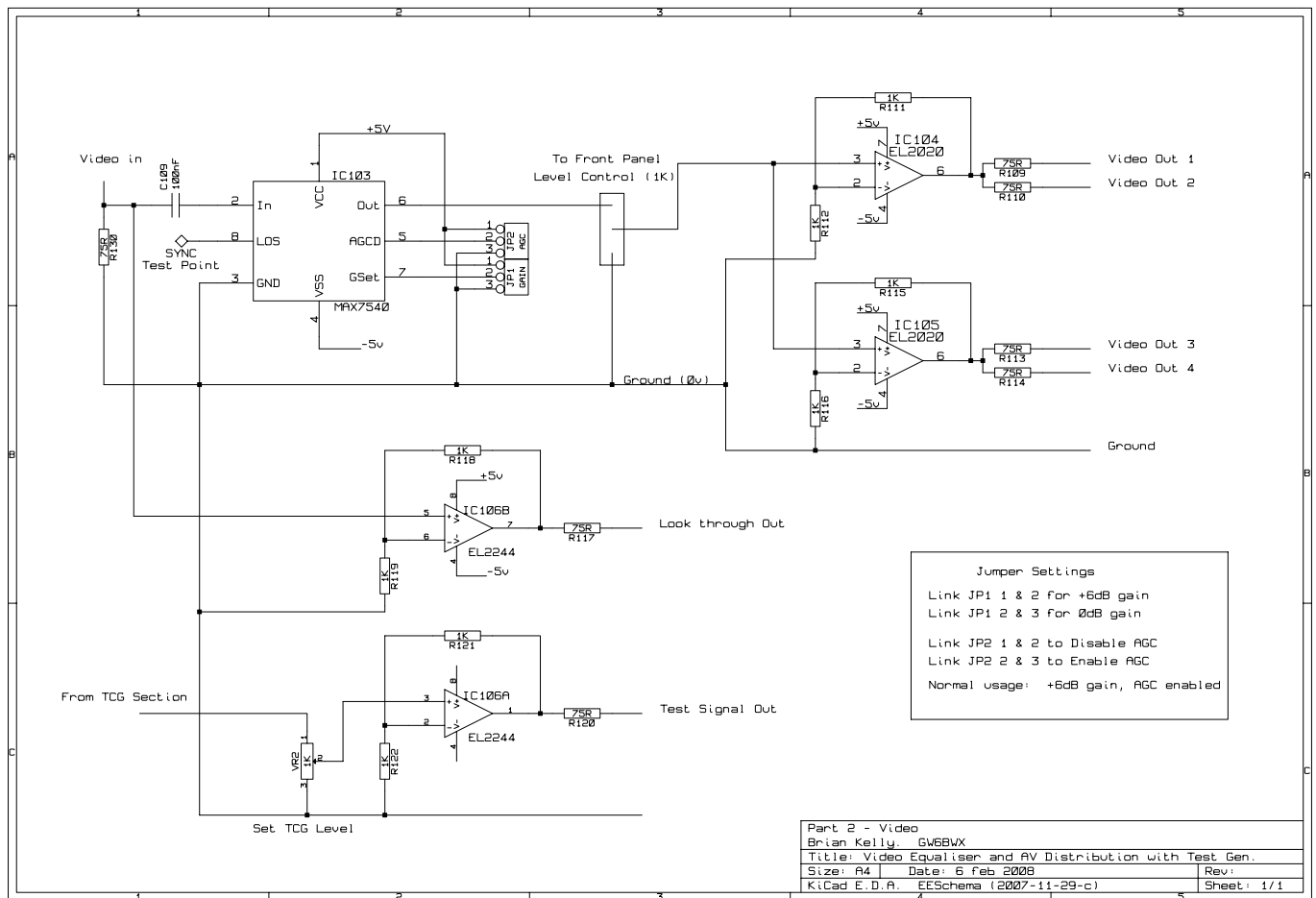
Fig. 1

Audio stages:

The distribution stage is one half of IC102 which is configured as a non-inverting amplifier with a voltage gain of 2 (approximately 6dB). The output of the IC is a low impedance point so each of the four outputs sees only the series resistance of R101 to R104 as it's impedance. When terminated with another 1K load, a potential divider is produced in which the voltage is halved, taking it back to the same level as fed to the amplifiers input. Note that within reason, the values of the output resistors can be changed to provide different output impedances. For example changing from 1K to 600 Ohms would drop the impedance to 600 Ohms. The output resistors can be mixed values but to prevent overloading the IC102, I would suggest that no single resistor should be less than 200 Ohms and their combined parallel value should not be lower than 100 Ohms.

The test tone generator is IC101 and the other half of IC102. The 1KHz tone is generated by dividing the frequency from a 4.096MHz crystal oscillator by two, twelve times. All this is done inside IC101. The result is a 1KHz square wave which is then passed through a low-pass filter to remove higher harmonics leaving a close approximation to a sine wave. IC102 is a buffer to reduce the load on the LPF and as it's feedback can be controlled with VR1, the output level can be set as required. I suggest setting the level to 1V peak-to-peak with the output connection terminated with a 1K resistor to ground. As with the distribution stage, it is possible to change the output impedance by adjusting the value of output resistor R105.





Video Stages:

The video input is terminated by R130 to match standard 75 Ohm cable. From here it takes two routes, the buffer stage feeding R117 provides “look through” and is a replica of the input signal. The other route is through IC103 which is a dedicated video level stabiliser. The chip a Maxim MAX7450 is configurable by two links to enable or disable the AGC function and to set the overall gain to x1 or x2. For normal operation, the AGC should be enabled and the gain set to x2. This gives a stabilised 2V peak to peak video signal at the top of the output level potentiometer. Note that this control is mounted on the front panel, not the PCB. The AGC will keep the level constant with inputs ranging from about 0.5V to 1.5V p-p. The wiper of the control will normally be set about half way to give 1V output but it will adjust between nothing and twice standard video level as required. IC104 and IC105 are driven in parallel and are to give sufficient current gain that four 75 Ohm outputs can be driven simultaneously.

Test Pattern Generator:

This is a modified version of the highly successful TCG Mk2 design which is fully described in CQ-TV magazine and on my web site <http://www.atv-projects.com>. The only differences between the original design and the one used here is that the pattern select pins on the EPROM are all tied high (+5) as only one pattern should be needed and the output buffer stage has been replaced by half of IC106. The video level can be set by adjusting VR2 and should normally be 1V p-p with the pattern output terminated with a 75 Ohm load.

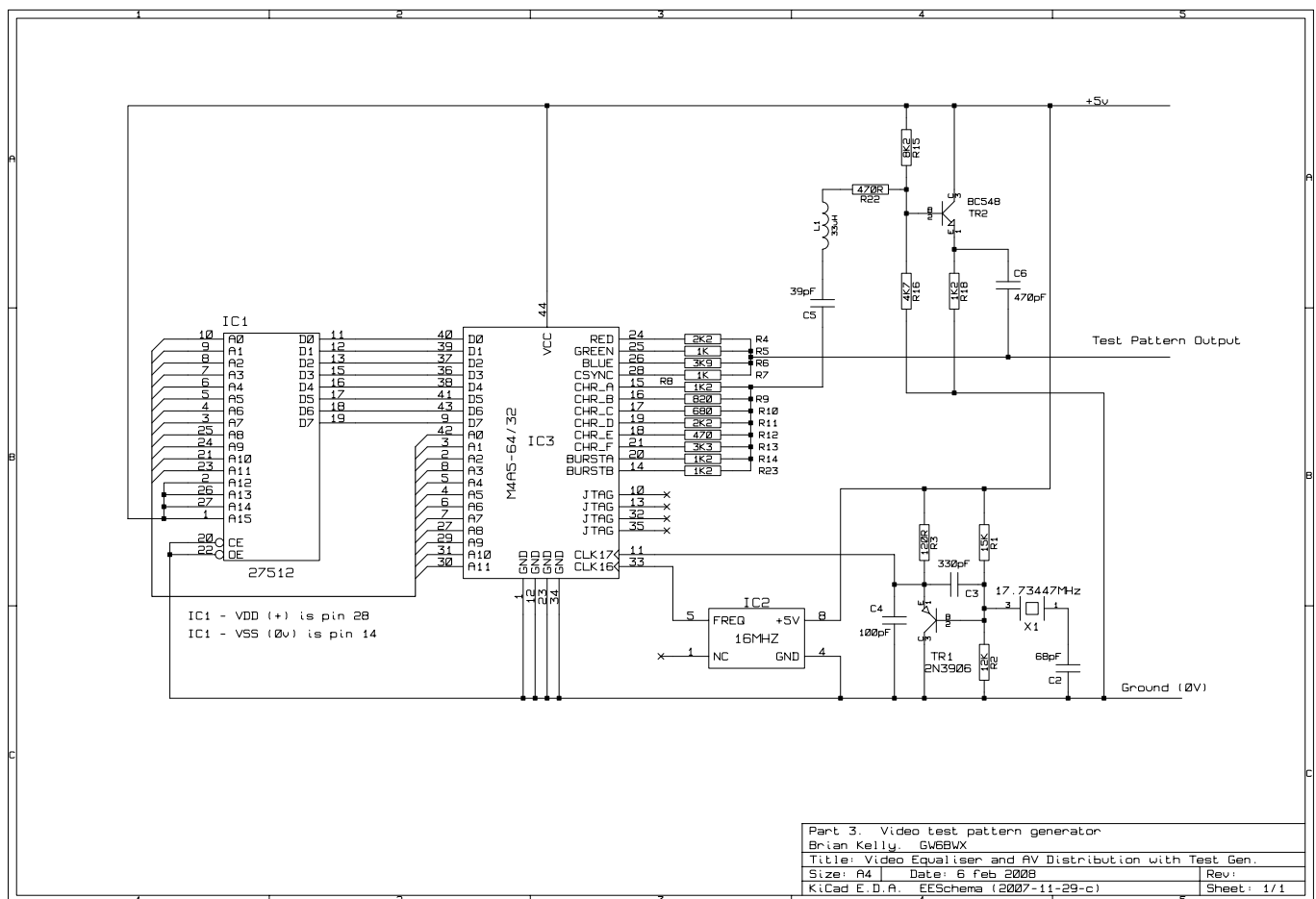
Construction:

The PCB is relatively easy to build. Apart from the usual anti-static precautions when handling the integrated circuits everything is robust and easy to work with. The only awkward component is IC103 which is only available in a surface-mount package. The underside of the IC has a bare metal area which should be connected to the same point as pin 4. As far as I can tell, the reason for this is to provide better heat conduction away from the chip and into the PCB. In

this application, the load on IC103 is the 1K Ohm level potentiometer rather than the 75 Ohms it would normally work with and the heat generated is therefore a little lower than normal. It is still best to connect the base pad if possible and the best way to do this is to pre-tin the PCB copper with a thin, level layer of solder then with the IC held in position, apply heat to the PCB as close to the chip as possible. Let the solder melt for about three seconds, this should be long enough for the flowing solder to bond with the underside of the IC. The pins can then be soldered as usual.

Testing:

Connect the level potentiometer, set it to full rotation (maximum level) and set VR1 and VR2 to mid position. Set the two links so the gain is x1 and AGC is disabled. Temporarily link the output end of R120 to the video input pin (junction of R130 and C109) with a wire. Connect a 75 Ohm resistor from the output end of R109 to ground and look at the signal across it with an oscilloscope. If an oscilloscope is not available, a television monitor can be used instead of the resistor but



ensure nothing in the TV itself provides automatic level adjustment as this will hide the operation of the on-board AGC function. The contrast of the TV picture will give an indication of the video level leaving the unit. Turn on the power source, this should be more than 8V positive and negative but less than 15V.

If all is well, a video signal from the pattern generator will appear, if using a TV monitor a locked but possibly "washed out" picture should be seen. Set VR2 to give a reasonable quality picture (about 1V p-p on the 'scope), the exact setting isn't important at this stage.

Turn the level control to half way, the video should be about 0.5V p-p and the picture will fade, possibly losing sync

as well. Move the link to set the gain to x2. This will double the video gain and restore the picture seen before. On an oscilloscope the level should be restored to 1V again.

Now move the other link so the AGC is enabled. Ignore any change in level as the link is moved. Turning VR2 should now make little difference to the level except at extreme ends of it's rotation. If the level (or contrast) remains essentially constant over most of the control range, the AGC is doing it's job.

Remove the wire link. For the next steps it is far better to use an oscilloscope than a monitor as the reference levels need to be fairly precise. Move the 75 Ohm resistor to the output end of R120 and adjust VR2 until the video level is

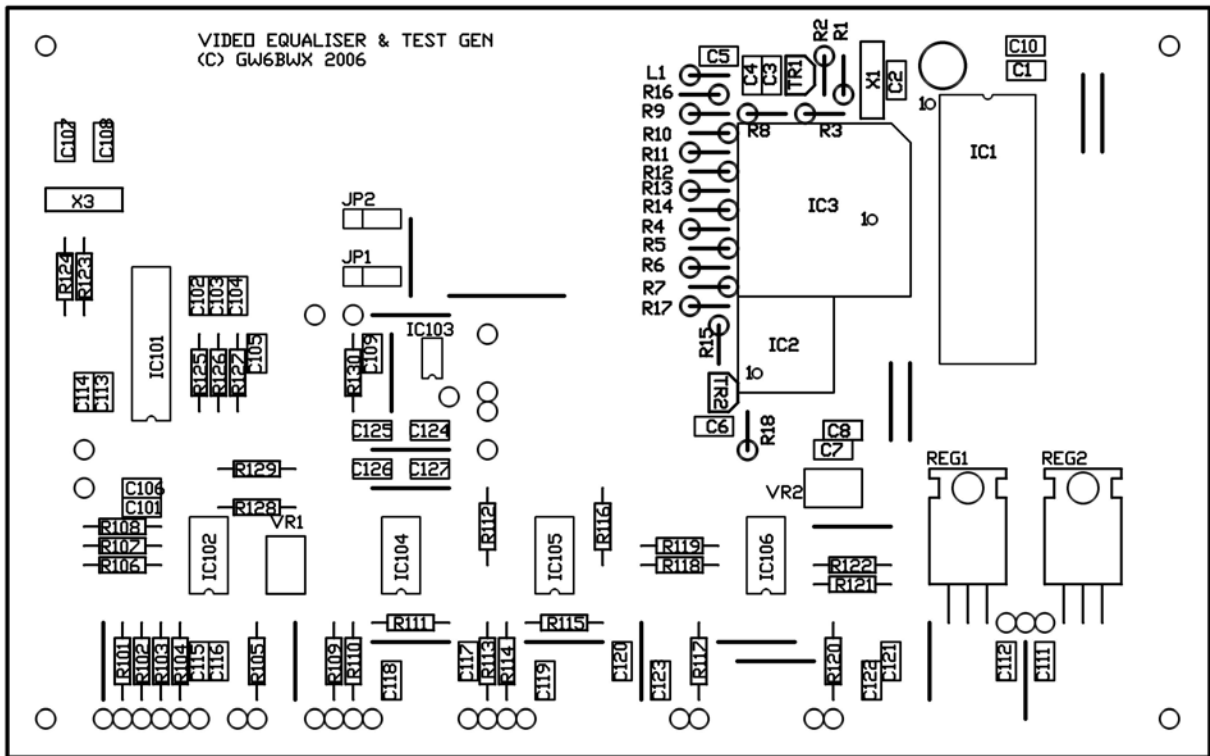
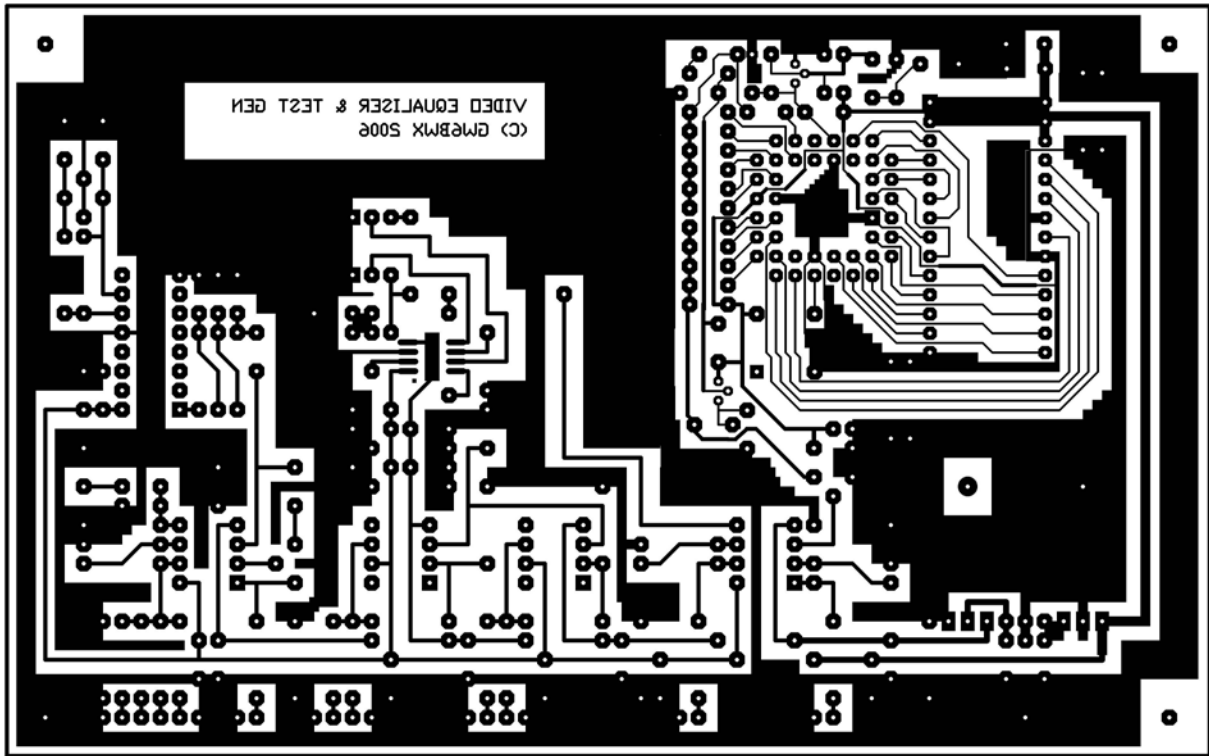
1V p-p across it. Next, connect a 1K resistor from the output end of R105 to ground and connect the oscilloscope across it. Adjust VR1 so the waveform is 1V p-p. You will probably have to use a lower oscilloscope timebase speed to see this waveform.

That's it. You now have a testcard generator, test tone generator and distribution amplifiers at your disposal.

Please note that the video produced by the pattern generator is to PAL 625 line / 50 Hz frame standard. Unfortunately, I have no NTSC test equipment here and my TV auto-adapts to just about anything I feed it so confirming NTSC standards are reached would be difficult. As far as I know, replacing the 17.73447MHz crystal with a 14.318MHz one and reprogramming the EPROM should make it work in NTSC countries.

Anyone want a challenge....

Bookmark the new online ATV forum now:
http://www.batc.org.uk/club_stuff/forum.htm



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- SMS API via SMPP/HTTP/SOAP/Email
- Bespoke SMS services
- Low cost bulk SMS
- Low cost premium route SMS

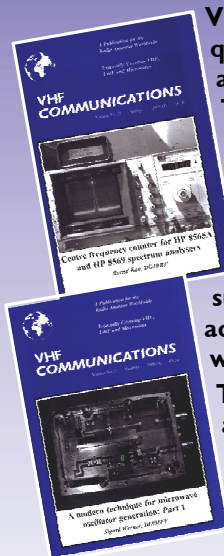
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VHF COMMUNICATIONS MAGAZINE



A publication for the radio amateur worldwide, especially covering VHF, UHF and Microwaves

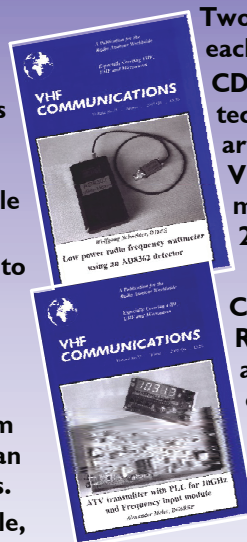


VHF Communications is a quarterly magazine only available by subscription. The subscription for 2008 is £21.00 which includes UK and surface mail postage. Air mail postage is available at an extra cost.

For more information or to subscribe contact us at the address below or visit www.vhfcomm.co.uk

The web site has sample articles and a full index from 1969 to the present that can be searched to find articles.

All back issues are available, most are just £1 plus postage.



Two compilation CDs are available for £10 each plus postage.

CD-1 on measuring techniques contains 21 articles published in VHF Communications magazine from 1988 - 2005.

CD-2 on Transmitters, Receivers, Amplifiers and Ancillaries contains 32 articles published in VHF Communications magazine from 2000 - 2005.



K M Publications, 63 Ringwood Road, Luton, Beds, LU2 7BG, UK. Tel/Fax: +44 (0) 1582 581051, email: andy@vhfcomm.co.uk

Switching 24v Relays from 12v

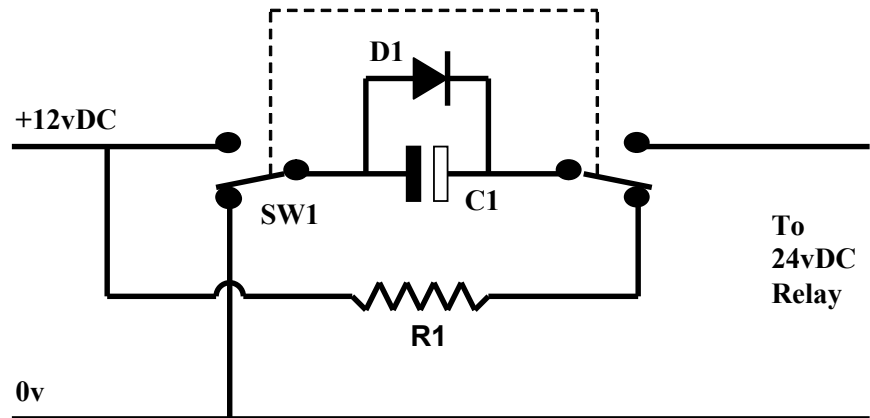
By Bob Platts G8OZP

Quality antenna changeover relays found at rallies etc. are often designed to be operated from 24vDC.

Such relays, once pulled in, may often be maintained by a lower voltage. This simple arrangement performs this function.

With SW1 as shown, C1 is charged to 12v via R1. Upon changeover C1 is placed in series with the supply increasing it to 24V, discharging through the relay pulling it in.

When discharged 12v is maintained via D1. Returning SW1 re-charges C1 Via R1.



D1 should ideally be a Schottky type with a low Vf and able to handle the relay current.

should suit most types.

R1 should be typically 47 - 100Ω. 0.25W is fine as it only charges C1

C1 depends upon the energising current of the relay. 4700 - 10,000uF @25v

Members Services

Sale now on !

Grab yourself a bargain, these prices are only “while stocks last” so get ordering...

73	BATC blue diamond clutch pin badge	£2.00 each
74	BATC cloth badge	£3.50 each
75	BATC equipment label	£1.00 for TWO strips (12 stickers)
76	BATC square windscreen sticker	£0.50 each
78	BATC test card	£0.50 each
79	BATC reporting chart	£0.50 each

Special Offer:

Twelve equipment stickers plus one each of items 76, 78 & 79
Only £2.00

See front cover for photos of items 73, 75, 78 & 79 All prices *INCLUDE* postage and packing

As a special incentive, from now until issue 223, in partnership with one of our sponsors: Nonanet (UK) Ltd, anyone placing an order with Members Services can claim a free gift worth £58.75

We are giving away a year of commercial grade hosting, normally sold for £50 + VAT which includes web and email hosting, free domain registration or transfer and a control panel to manage it all.

(The offer is restricted to one account per household and the free domain is restricted to one ending in .uk / .com / .net or .org
Details of how to claim your free gift will be included in your order)

PLEASE MAKE CHEQUES PAYABLE TO ‘BATC’.

The 2008 BATC Rally and Biennial General Meeting

by *Graham Hankins - G8EMX*

The 2008 BATC Rally and Biennial General Meeting will be held at:

THE VILLAGE HALL
STOW-CUM-QUY
near CAMBRIDGE

on SUNDAY 5TH OCTOBER

This is the same venue as our last rally and BGM two year ago, which attracted several good traders and an excellent lecture stream. Even more importantly, there is a good pub just staggering distance away!

Just as importantly, there is an ATV repeater in Cambridge, so we hope to be creating activity through that repeater during the event. For those members who cannot see the Cambridge repeater, we will be video recording the lectures and distributing a DVD to ALL OTHER REPEATER GROUPS - so PLEASE SEND ME YOUR CONTACT DETAILS ie. the Keeper or any other contact. This is an ongoing request anyway.

I will also be trying to attract some 'big guns' to the lectures eg. RSGB Repeater Management Committee; CAA Radar(?) but is there ANY LECTURE YOU WOULD LIKE TO SEE? ANY SPEAKER, ORGANISATION OR SUBJECT? Please let me know AS SOON AS POSSIBLE. No guarantees but I will try! Remember - our rallies and BGM are for the members - not just to elect a committee!!

All ATV repeater groups are particularly urged to attend if at all possible – we want to meet you, we want to greet you! We want to help you – if you need it – do ask! Tables will be available at which you can publicise your repeater, show photos of its hardware, bring along any current projects your group is developing or any ATV kit that you sell to local members (we are all interested). Traders large or small will also be heavily persuaded to attend, this particularly includes the individuals who occasionally advertise within CQ-TV. It will be nice to see you – to see you, it will be nice!

And, as usual, all aspects of television are welcome to be there; vintage, broadcast – please contact me at the email below. Plus yes, the world is 'going digital' so we will be trying to arrange demonstrations of Digital ATV plus the recently introduced BATC internet streaming service!

Directions: For those with sat-nav the postcode is CB25 9AW or if you prefer, the NGR is TL519603

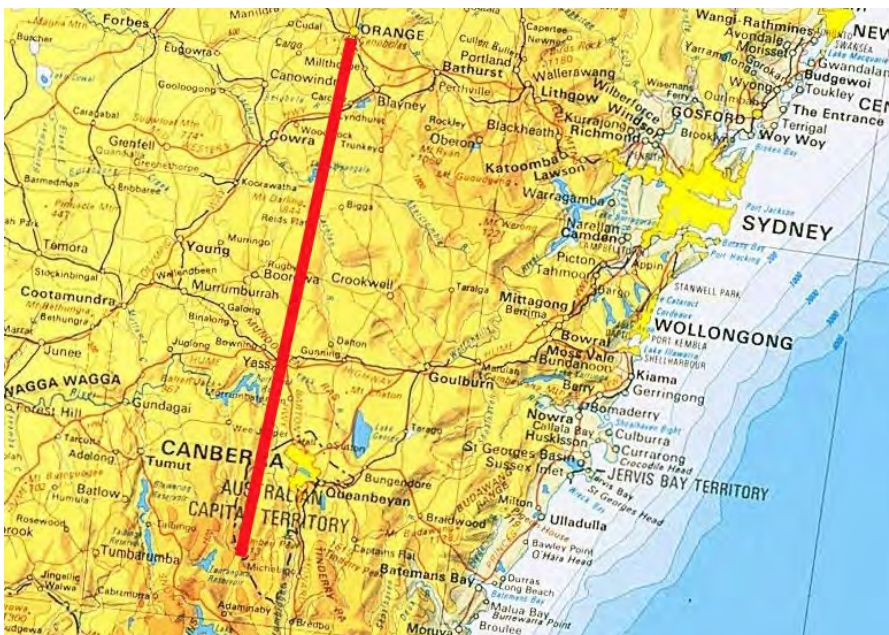
The village is on the B1102 approximately 0.5 mile from junction 35 of the A14, 2 miles east of Cambridge.

If you are approaching from the west on the A14 take care to come off at the Quy junction or you have a 22 mile round trip to get back!

The village of Stow-Cum-Quy might never be the same again.....

More details will be in the next CQ-TV (August) but keep watching the BATC web site 'Latest News' page for developments as they come in!

Graham Hankins G8EMX
g8emx@tiscali.co.uk



In CQ-TV 221 you read about the "VK FM ATV Grand Slam attempt". Out of interest, the map to the left shows the path between Mt Canobolas and Mt Coree in NSW Australia

Contest News

By Dave Crump

Repeater Contest

The results for the March ATV Repeater Contest are below. Congratulations to everybody who took part and submitted an entry; at least 10 other stations were active - including one portable.

I hesitate to single out a clear winner, although you can judge the result on points below. This was the sort of contest that I had hoped would result when I drafted the rules 2 years ago: it involved 5 repeaters; many of the contacts used the RF link between GB3BH and GB3HV; contestants used 4 bands; some of the contacts were using digital ATV; and one of the contestants used internet linking to participate from the other side of the world. Of note:

Dave, G8ADM transmitted using 70 cm DATV, and received using an internet link. Gary, VK2CRJ, used GB3BH's internet link (note he only received

points for the RF section of the path!). It was good to see Gary active again on the repeater that he originally housed at his QTH in High Wycombe. Paul G6MNJ transmitted on 13 cm and received on 3 cm.

As you can tell, I am not an RF purist. I wish to encourage the use of our bands and self-training in technology. The next repeater contest is in December - please put up new aerials, and get your broadband sorted out!

Summer Fun Contest

The Summer Fun Contest is planned for 7/8 June 2008 from 1200 UTC to 1200 UTC

International Contest 13/14 September

This year it is the BATC's turn to host the IARU Region 1 Contest. I'll be doing all the hard work of checking the logs and compiling the European Results - I just need some UK entries!

So please, let's make a special effort to try to operate during the September Contest.

Conclusion

I can be contacted through e-mail (contests@batc.org.uk), or through my BFPO address: Wg Cdr D G Crump, Mailbox Number ACT, BFPO 63, London. Please check that you have the correct address - one of the recent contest entries went half way around the world (the wrong way) before it got to me!

CONTEST CALENDAR 2008

1200 UTC 7 June - 1200 UTC 8 June -
BATC Summer Fun Contest

1800 UTC 13 September - 1200 UTC 14
September - International ATV Contest

1800 UTC 6 December - 1200 UTC 7
December - BATC Repeater Contest

BATC Repeater Contest 22/23 March 2008

70 cm

Place	Call	Points	Locator	QSO	Repeaters	
1	G8ADM	558	IO91UO	7	GB3BH	GB3HV

23 cm

Place	Call	Points	Locator	QSO	Repeaters	
1	M0SAT	2399	IO91TP	10	GB3HV	GB3BH
2	GW3JGA	1804	IO83HI	5	GB3TM	
3	MW1KDP/P	1236	IO73VA	4	GB3TM	
4=	GW0ABL	960	IO73VF	4	GB3TM	
4=	GW8FEY	960	IO73XH	4	GB3TM	
6=	GW3FDZ	540	IO72RL	3	GB3GW	
6=	MW1WEJ	540	IO72RL	3	GB3GW	
8	GW1TPS	380	IO72QM	3	GB3GW	
9	MW0AQZ	340	IO73QH	1	GB3TM	
10	G8BYI	284	IO81VH	1	GB3UT	

13/3 cm

Place	Call	Points	Locator	QSO	Repeaters	
1	G6MNJ	4515	IO91SR	10	GB3BH	GB3HV

Internet Linking

Place	Call	Points	Locator	QSO	Repeaters
1	VK2CRJ	690	QF56NE	5	GB3HV

720P Sync and test generator - part 1

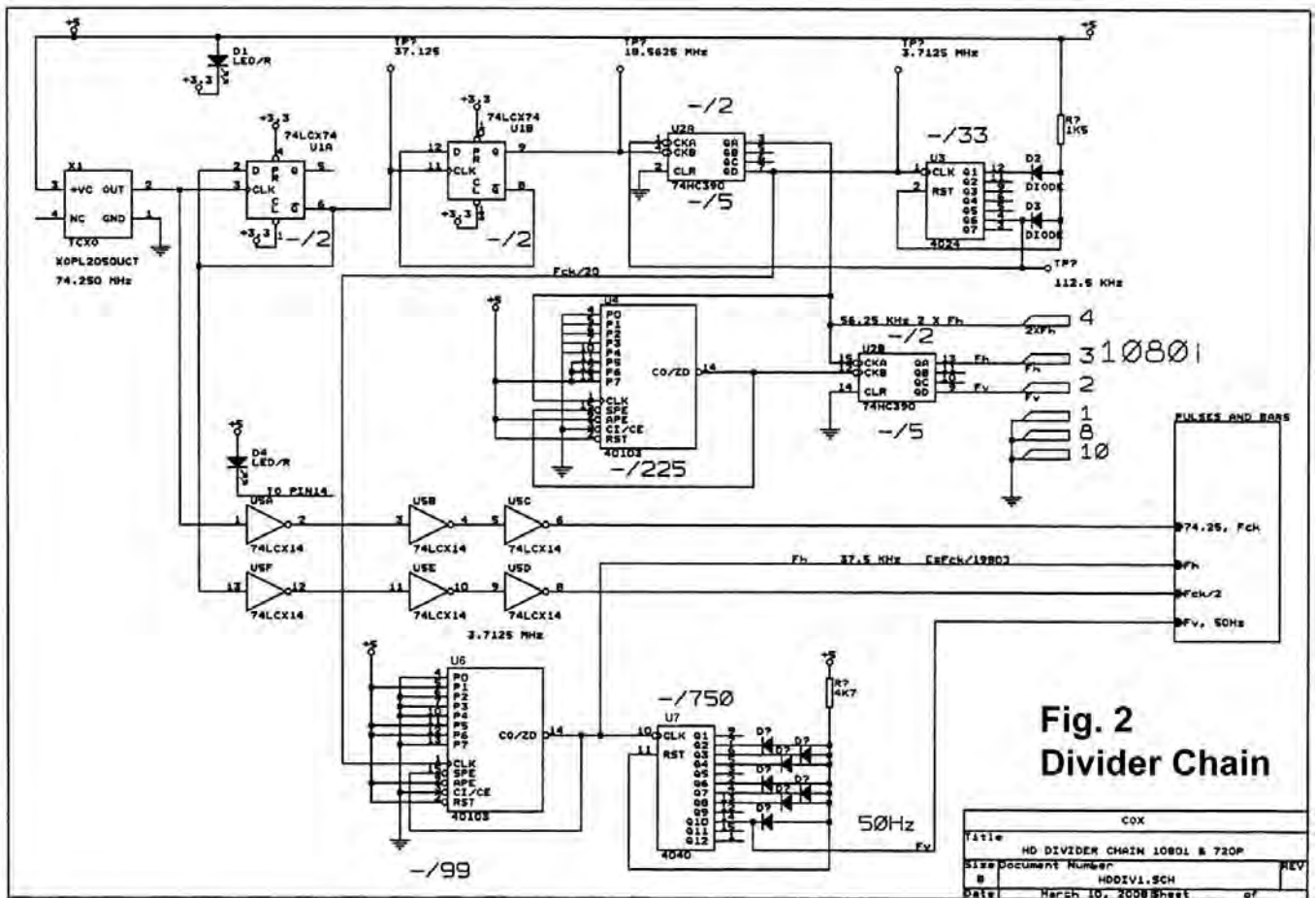
By Mike Cox

In 2007, the EBU [European Broadcasting Union] made an interesting recommendation, and gave convincing demonstrations at IBC to back it up.

As far as origination of programme material is concerned, it should be progressive scan. This reduces to two possible origination standards, 720 pixels by 1280 pixel [SMPTE 296M], either 50 or 60 Hz frame rate [720P], or 1080 pixel by 1920 pixel, 24, 25, 30, 50 or 60 HZ frame rate [1080P, SMPTE 274M]. Currently, HD is transmitted at 720P or 1080i [interlaced] at a bit rate after compression of 19 Mbps [MPEG2]. Much work is proceeding to reduce this bit rate, and the current best option is to use MPEG4 coding, which needs around half the bit rate.

The driver for this project is to move forward somewhat from standard definition, and to use 720P as an intermediate step towards 1080P. This reasoning will perhaps be reinforced when I mention that the clock rate for 720P [and 1080i] is 74.25 MHz, while for 1080P the clock rate is 148.5 MHz. This tends to be beyond the capabilities of 74HC logic, and will need a faster logic family [74VHCxxxx?] We are talking of baseband here; for parallel digital streams. When the streams are serialised, the data rate for HDSDI is 3 Gbits/sec. The other consideration is a display. Many have a 720P display in their front room; it is called an "HD Ready" LCD TV. The native resolution for most of these is 768 x 1366 pixels, which is as near as makes little odds 720P [Note that some TVs do not support a 50Hz "PC" input.] If you are lucky enough to have a native 1080 x 1920 LCD, then some up-conversion in the display is called for. I was lucky enough to have a 20" 1680x 1050 display [Viewsonic], and this gives a super 720P display [Fig. 1]. Obviously there is internal down conversion in the display, particularly as it seems to work well with a 600 x 800-pixel [SVGA] input. Similar displays are now available for £150 or so.





The object is to make an HD test source using parts that are fairly easy to come by, or even in your kit already. The first part will deal with the timing generator, pulse outputs including Tri-sync, colour Bars and ramp generation. Subsequent parts will deal with more test signals such as PLUGE [CQTV 198 p.5] and frequency bursts. The RGB output will appear on an HD15 connector with appropriate H and V drives, to connect straight to a display. There will also be a converter to derive Y, Pb and Pr components, to the HD specification. [Set out in EBU – TECH 3299 and ITU-R BT.709-5]. Given the enthusiasm, some ADCs will be sourced to turn the analog YPbPr signals into digital YCbCr parallel streams. Then it will be possible to add an LMH030 serialiser to achieve HD-SDI. As the clock rate for 720P is the same as for interlaced 1080, the HDSDI bit rate is 1.485 Mbps.

Specification

The 720P/50 specification starts from a master clock frequency of 74.25 MHz, which is divided down to 37.5 KHz for H scan frequency, and further by 750 to give field frequency [50 Hz]. Doing the sums gives 1980 sample periods per line, of which only 1280 are active. Rather a wide H blanking interval! Of the 750 lines, 720 are active.

The division ratios are simple, -/1980, and -/750; achieved with 74HCxxxx devices.

Fig. 2 shows the divider chain, starting from a boxed 74.25 MHz TCXO device.

For the first division, frequencies are a bit marginal for 74HC devices, and there happened to be some 74LCX74 in the drawer, it was decided to use them. They have a clock frequency in excess of 100 MHz, but require a 3.3

volt supply. Legacy logic devices tend to use +5 volt rails, but newer and faster families use 3.3 volts or even 2.5 volts. As the rest of the devices need +5 volts, Mike's old standby of a red LED was used to drop the supply. It works!

You will notice that some of the dividers are not connected with 720P; they were part of the original plan 18 months ago to build a 1080I divider and generator. As there was space on the card, the 720P dividers, U6, 7 were added. A 74HC40103 programmable divider goes from Fck/20 [3.7125 MHz] to H scan frequency, 37.50 KHz, in one go, a division by 99. The division by 750 to V scan frequency is achieved using a 74HC4040 with appropriate feedback diodes. Feedback around a ripple-through counter can cause problems at higher frequencies, and higher division ratios. You will see later on that the 74HC4040 is used successfully as an address counter with a 37 MHz clock input.

Tri-Sync and Drive signals

The division process gives the necessary 720P timing information. It is now necessary to extend this to produce H and V drive pulses, Mixed Blanking and something unfamiliar to most, Tri-Sync. This is a bipolar signal rather than the old unipolar sync signal we all know. [Fig. 3] Tri-sync originated with the Japanese 1125 line system in the 1980s. The objective is to give a more accurately defined reference point for H sync. By arranging the negative and positive pulses, the reference point is taken at the zero crossing. This is not so likely to be disturbed by amplitude changes or other distortions. Having said all this, it is hardly ever seen except on an analogue Y signal.

Other signals

We also need some colour bars, a 5% Safe Area mask, and some space to put text in.

Being a simple soul, my reaction to this is to use a pair of EPROMs, one for the horizontal rate information and one for the vertical rate information. The programme can readily be changed if necessary, and can save a lot of board space. There are those who will probably say “Why not use a CPLD or FPGA?” My reply would be that I have an EPROM programmer, and a selection of EPROMs, both re-programmable and one-time programmable.

Each EPROM has an address counter, and following the EPROM, an 8-bit latch. Some EPROMs can give a pretty ragged looking output, with odd spikes appearing, which the latch conveniently cleans up.

The EPROMs used are 70 nS parts, so the clock frequency for the horizontal address counter is master clock divided by 8. Each interval is thus 108 nS. This represents the limit of edge definition for the pulses. This is a short cut compared with the official specification, based on a resolution of 26 nS. I have selected the nearest width to the correct one for values like the Tri-Sync components. Fig. 4 shows the widths of the various output signals.

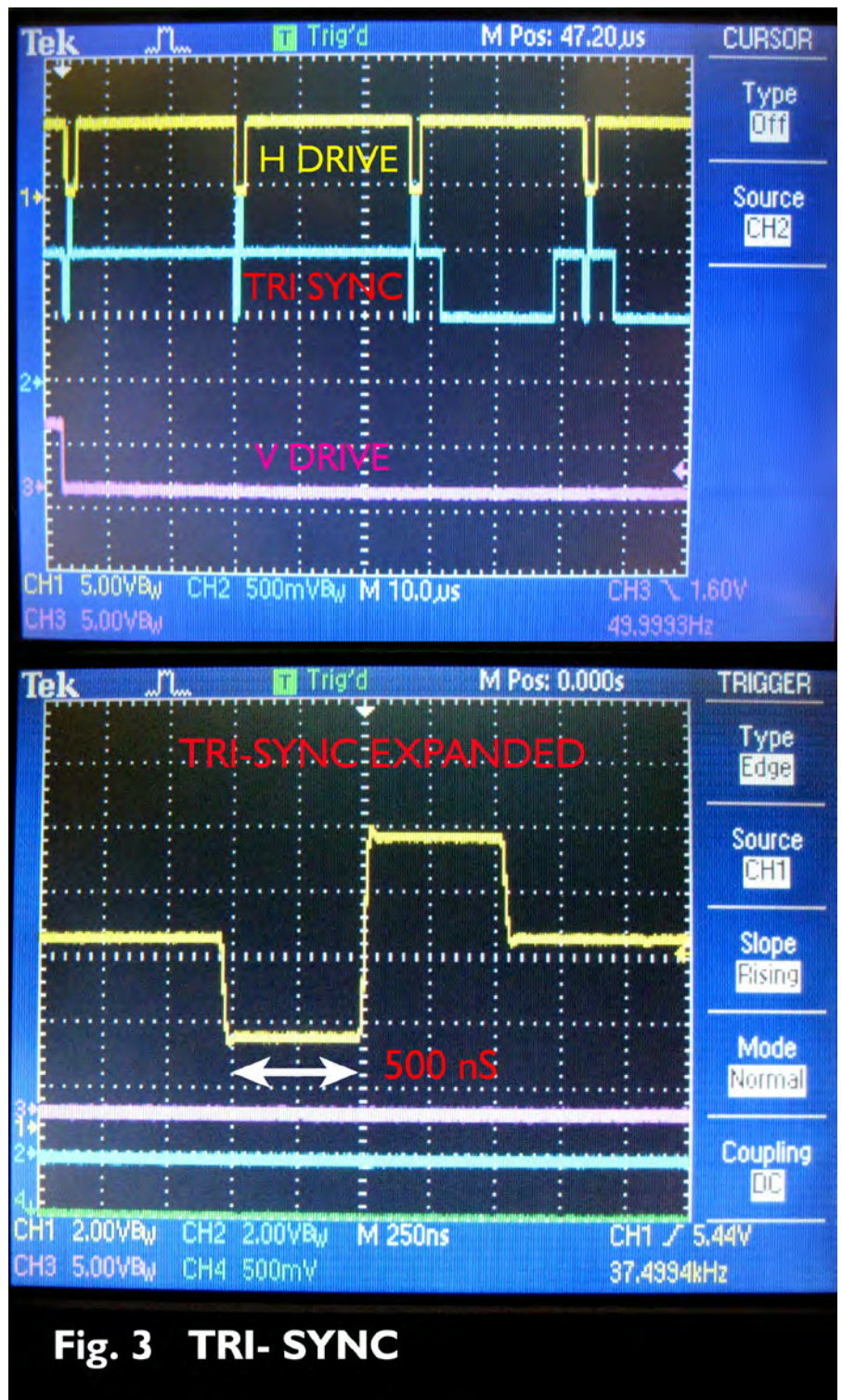


Fig. 3 TRI- SYNC

Fig. 5 shows the block diagram of the generator, showing the basic timing and pulse generation section, together with the test generators and the output section. This last is destined to grow, as initially it will output analog RGB and drive pulses to an HD15 socket [VGA], but will later have facility for conversion to YPbPr and subsequent digitisation. Most test signals will be generated digitally, except for colour bars, and will then be converted to analog for the

output stage. To start with truly digital bars would require 3 DACs, so I went for the simple approach.

The Safe Area signal is read directly out of the EPROMs, and is programmed to be 5% inside the active area. Ramp is generated from a counter, which is arranged to count up to 220. To make the ramp width right, a counter clock of 14,85 MHz is needed. This is generated by a VCO and PLL combination. This is

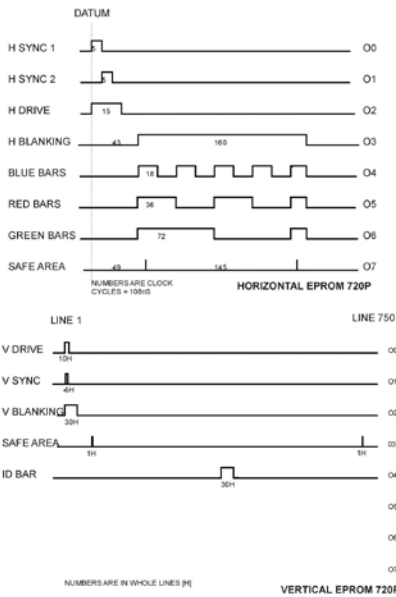


Fig. 4 EPROM OUTPUTS

one fifth of the master clock frequency, 74.25 MHz. The 74HC390 [-/2, -/5] will not reliably clock at 74.25 MHz, so it is run from the Fck/2 line. The other section of the chip divides the VCO output by two; the phase comparator compares the two frequencies, and controls the VCO to bring the two frequencies into coincidence. The VCO output is at 14.85 MHz and drives

the ramp counter after being gated by blanking. The counter starts at the beginning of active video and counts up to 220, when the comparator output changes and resets a bistable, set by H drive. The bistable output resets the counter.

You may ask why 220 is chosen as a value. This is the normal span of a digital Y signal.

It normally starts at 10h and ends at EBh [in numbers, 220]. After a digital to analog converter, it will have an amplitude of 700 mV, ie standard video level.

Four digital crosspoints [74HC574] are used to select the input to the DAC [DAC908, Texas/Burr Brown]. Selection is by taking the Enable pin [1] low. Because the colour bars from the EPROM are quasi-analogue signals, they are fed into one set of inputs of a 2 x 1 x 3 CMOS switch, 74HC4053. Because the other signals are effectively monochrome, the output of the DAC is fed into the three other inputs. The 74HC574 devices are clocked by the master clock frequency [74.25 MHz].

To add text, the CMOS switch is inhibited [both paths high impedance] by the ID Bar signal, and the text video added via diodes to the switch output. The outputs are then fed to the output amplifier, which drives the VGA output connector and the YPbPr converter. [To be discussed in Part 2]

Text is derived from another EPROM, which has been cloned from an old Texas Instruments chip, 74S262. This was an original Teletext character ROM, no longer available, but I happen to have some in my drawer [CD - CQTVs passim]. The EPROM requires the usual row and column scan, and character scan, addressed by ASCII code.

After re-clocking in a latch, the text is available to add to the output. The scans for the EPROM are gated so it is only addressed during the ID Bar [qv]. Prepared text is stored in the form of ASCII code in yet another EPROM. Each page holds a line of text, and by selecting a test signal with its page, an appropriate ident is shown.

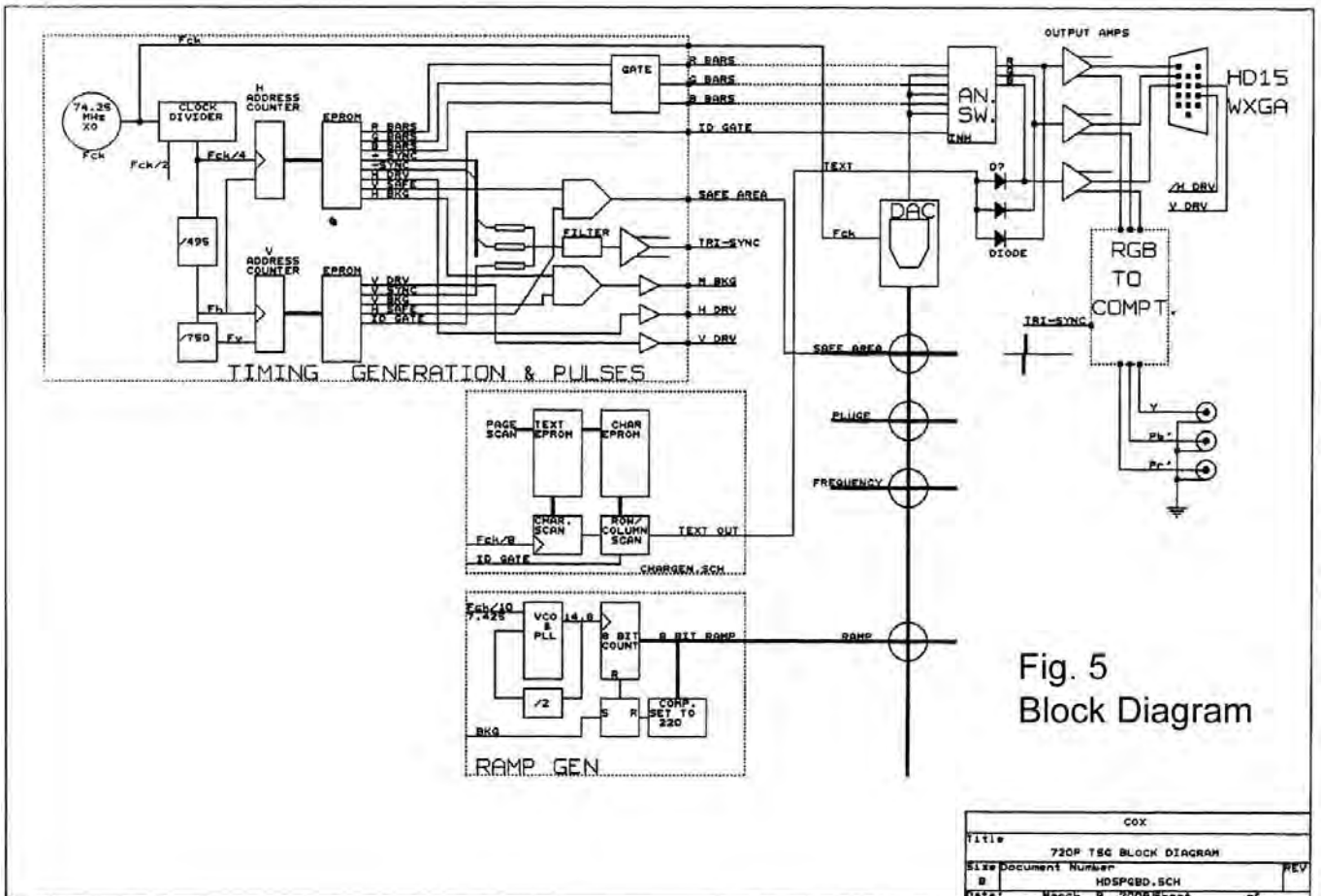


Fig. 5 Block Diagram

DVI and HDMI

It is worth spending a few moments looking at these connections, which are the future as far as displays are concerned. Many computer graphics cards now have DVI output connections. What is DVI? Digital Visual Interface was designed to better match graphics cards to LCD and Plasma displays that have fixed pixel arrays rather than the strictly analogue arrangements of a CRT display. Remember that early computers had monochrome displays, without even a shadow mask to define pixel structure.

VGA connections are always analogue, carrying RGB signals together with H and V drive signals. As always, things are not simple as certain versions of the DVI connector carry analog signals as well as digital versions [DVI-I]. The digital information is carried on 4 twisted pairs using Transition Minimised Differential Signalling [TMDS, Wikipedia has a useful piece on this]. The parallel 8 bit signals for R, G and B are serialised for transmission, and de-serialised at the display end. The total maximum data rate is 3.7 Gbits/sec for the single link version. This makes

HD-SDI look a bit slow!

For display resolutions up to WQXGA [2560 x 1600], the Dual Link variant is used where the number of pairs is doubled, and alternate pixels are sent on each link, with effective bit rate of 7 Gbits/sec.

Normally audio is not sent on DVI connections, but is obviously necessary in the HDMI variant, used for HD interfaces from DVD players to HD capable displays. The connector is different in physical shape. Adapters are available between the two connections. Again Wikipedia has useful pieces on this

Conclusions

So far, the generator is producing the signals mentioned above, together with the usual Mixed Blanking, drives and Tri-Sync. It is very much a work in progress, and there is much more to be done before it is boxed-up and called a finished project. You may find the links to the EBU and ITU helpful. I hope someone will bite the bullet and go on to produce a 1080P version, before I do. Fig. 6 shows the complete unit at

present. The Pulse Generation circuit is shown in Fig. 7, while Text Generation is shown in Fig. 8, and the Output Card is set out in Fig. 9. These circuits are still evolving as the project goes on, and more information will be available in Part 2. I am sure our Editor will pass on any queries you may have meanwhile. Power is from a 5 volt, 2A plug-top supply. Current draw is 350 mA, but this will increase when the YPbPr converter is added.

References:

<http://www.ebu.ch>

<http://www.itu.int>

Note – they charge for their specs. You may get what you want from Wikipedia

<http://www.uk.farnell.com>

For DAC908 [165 Msps device] and 74 series parts

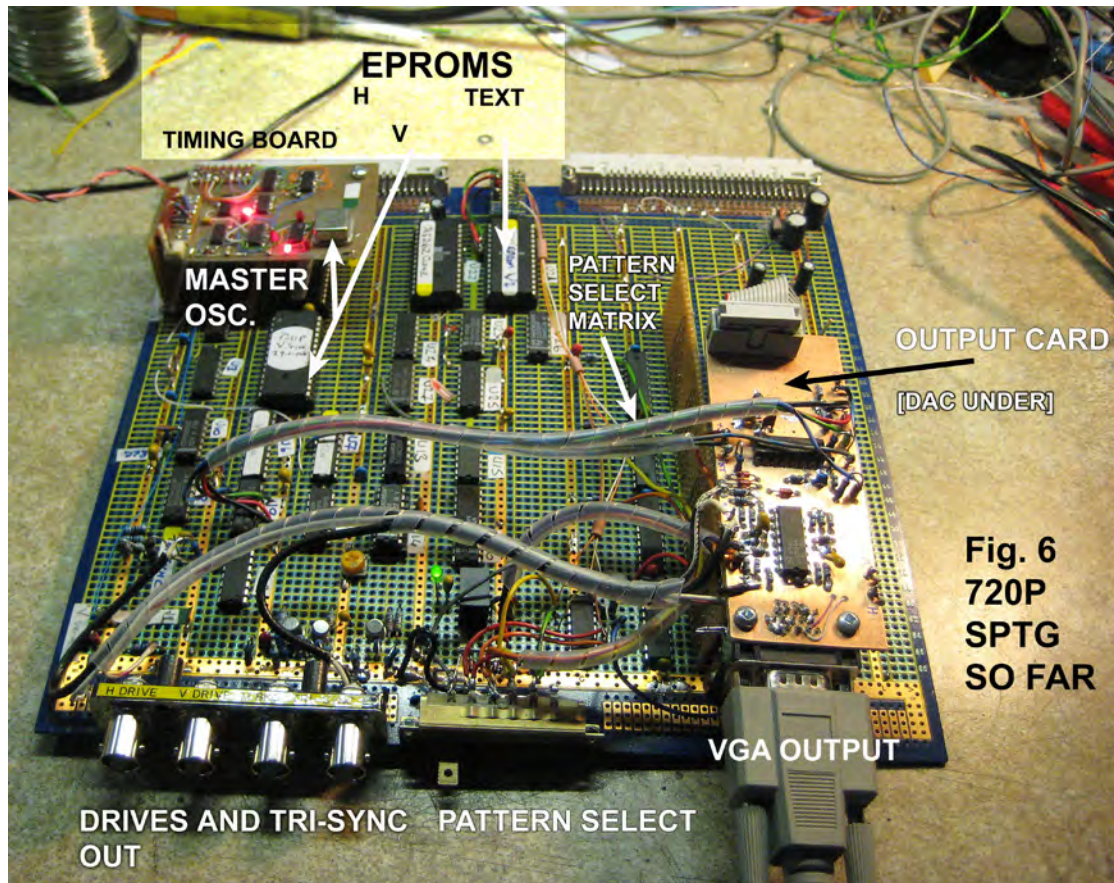
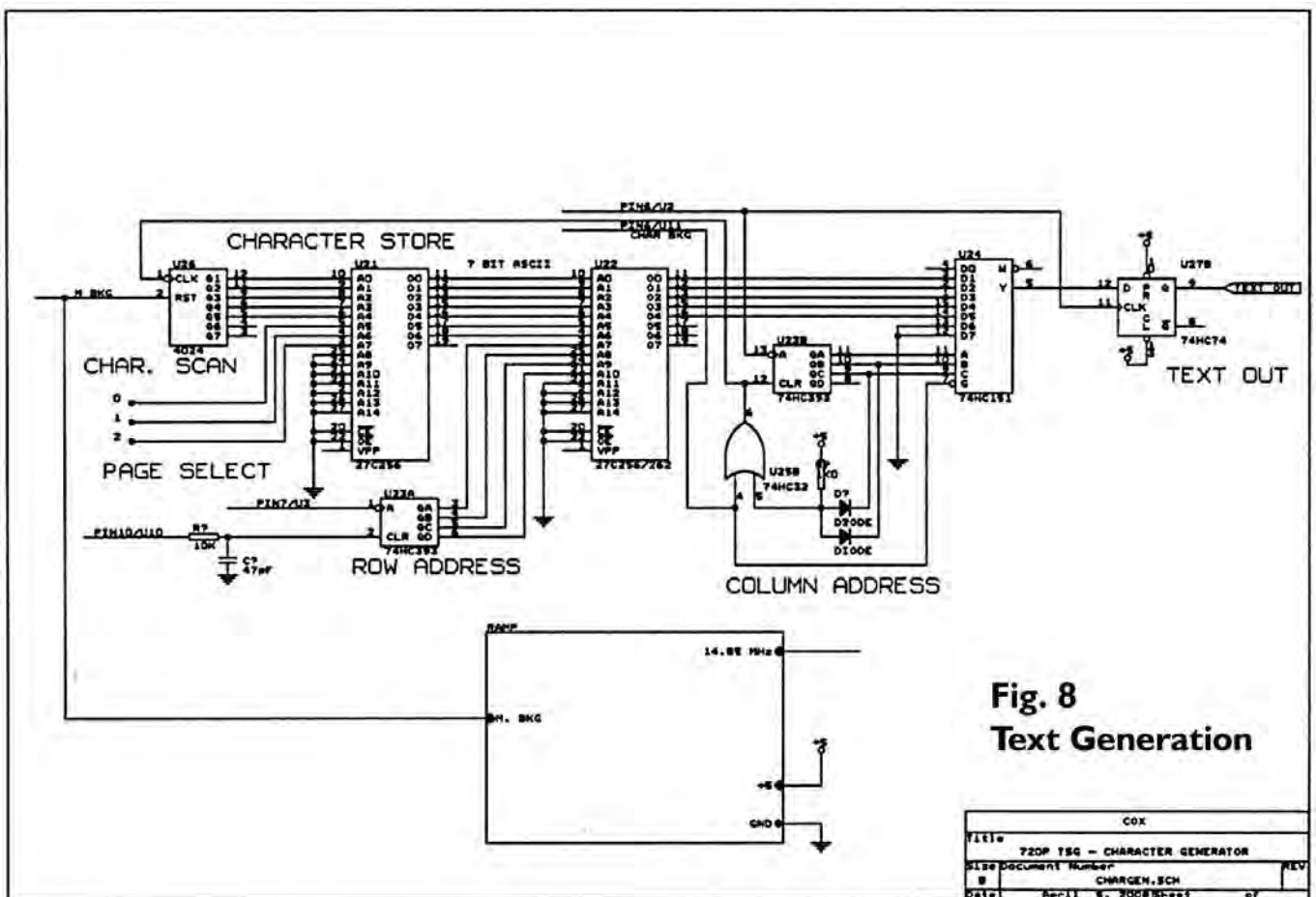
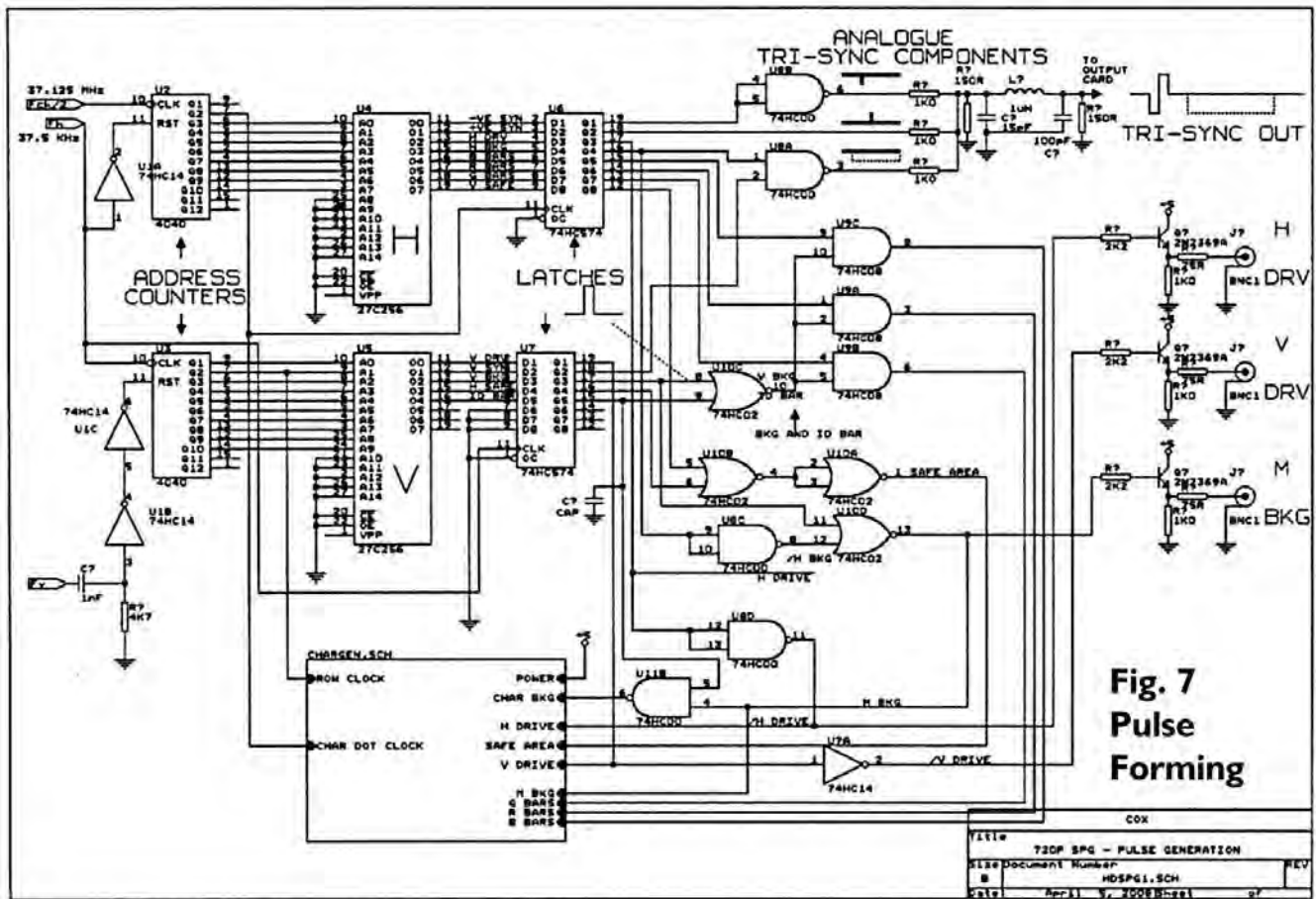
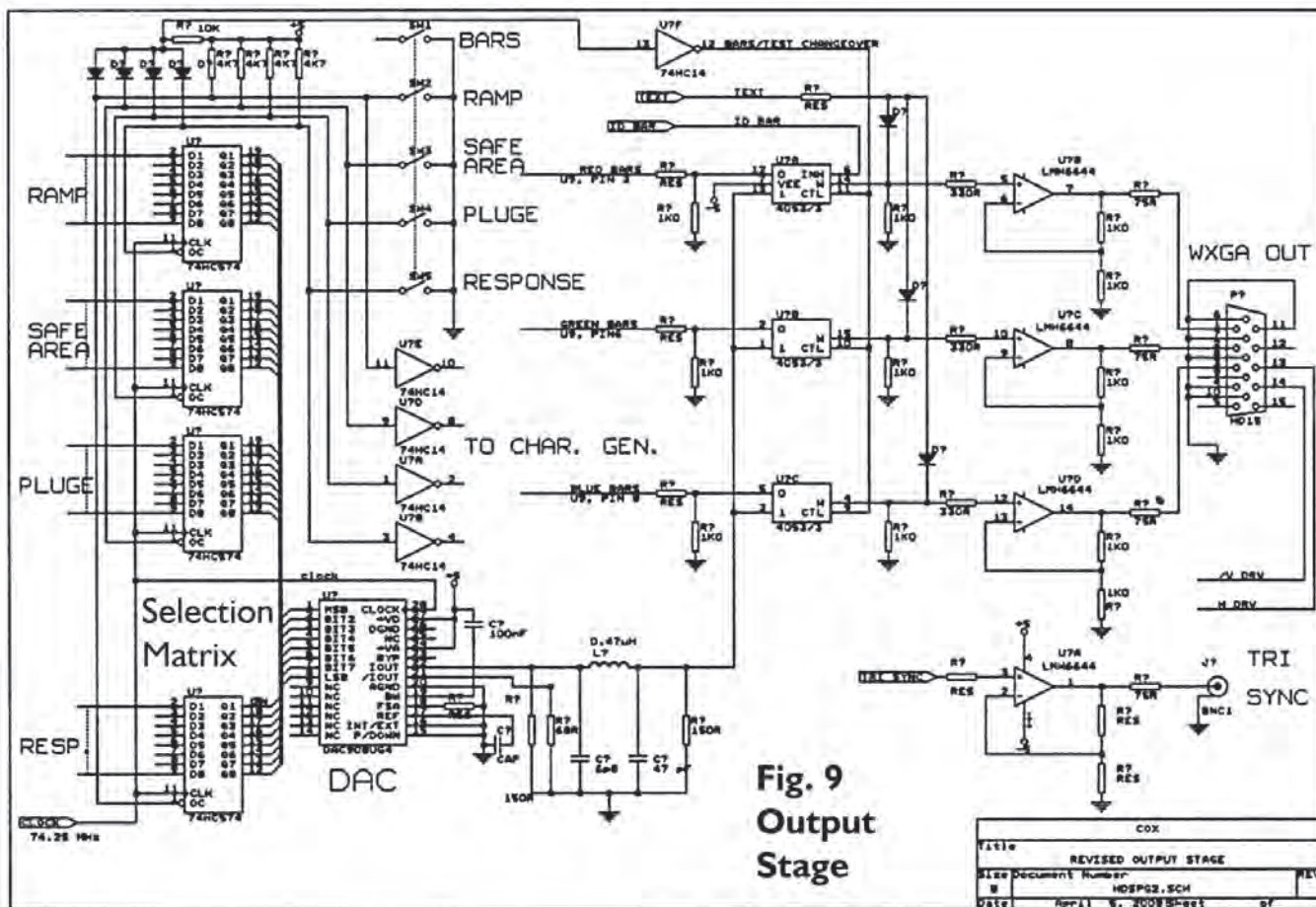


Fig. 6
720P
SPTG
SO FAR





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Letters to the Editor

Dear OM,

I have the complete set of the G1MFG ATV modules but I have lost for the Module Controller Board the papers to connect it to the other modules (TX and RX).

Can anyone help me with this???

Yours Truly
Nick K. Plumidakis

e-mail:sv1vs@otenet.gr
sv1vs@raag.org
sv1vs@arrl.net

21st Century ATV project for anyone.....?

Like most other loyal BATC members I have been a member for many years and always look forward to my copy of CQ-TV, but also I am guessing that also like many others worry about the decline in projects and articles published.

As I read about our brave new editor taking on the reins I got thinking, BATC is a members club run by members for members, so its up to me just as much as anyone else to do something about it. Yes, like many others I have a really busy life deeply involved in both a small business and a very active radio club, but is that really a decent excuse? Hence this letter....

Many of us enjoy making things, but of course the world has changed and computers with clever 'on the fly' compression and effects take the place of my old home made video mixer, caption generator and Sony Hi-8 tape editor (oh how I was proud of that!).

But even though you can buy amazing miniature colour cameras for £15 and 7" Colour screens for £30, live wireless ATV seems just as much of a difficulty as it ever was at traditional frequencies like 23 & 13cm. Whilst experimentation has always been at the foundation of our hobby, like others I find it difficult to persuade other new amateurs to

invest enough time and patience to get something working well enough for them to catch the ATV bug, not least because for most people living in built up areas you need a reasonably high mast with large quad loop or whatever just to receive and send a picture to a local amateur or repeater.

And yes, they tell you they can do it easily and reliably anytime with Skype or AIM over their broadband too...

So my thought is this...I wonder if something can be done at a lower frequency like 430MHz/70cm which just needs a colinear or whip to get started - that way it would also be highly mobile/portable and transceivers plentiful.

Yes I realise this was first done many years ago with monochrome analogue electronics, but if we can borrow a few chips offering video bandwidth compression and data technology made possible by the economies of scale of modern electronics as used in camera phones and cheap MP4 video players, surely it is possible to make a basic reference design which is within the technical and financial reach of most amateurs and yet still have plenty of scope for experimentation and improvement?

OK, so thats the idea, but what can I do apart from writing these few words?

Well I certainly don't have the knowledge to design a project like this from scratch, although have played around with enough cheap commercial electronics to feel its possible, but I think I may have the necessary engineering resources and backup to turn a crude home made prototype into a reliable but low cost kit accessible for virtually anyone to understand and build for the club.

So if this idea has inspired you to share an idea, sketch a design or make a prototype please get in touch and lets see if together we can come up with a straightforward but exciting 21st

century ATV project for the BATC.

Please give it some thought - maybe we could start by meeting at the BGM?

73
David G7URP
radio@dcpmicro.com

There is some DATV activity in the Cambridge area. Brian G6HFS is now on air using SR Systems modules. TX power is 10W on 1260 MHz, SR is 4165 and FEC is 7/8.ie a 4 MHz wide signal. Tests with Ian G3KKD show that power can be reduced over their 11 mile path to 300 mW before picture break up occurs. G3KKD continues to be able to transmit DATV, using his AGAF modules, with similar transmission standards. It has been said that digital coding delays would make a duplex QSO, with talkback on say 2m, difficult. This has not been found to be so in practice. Delayed speech can be heard coming back, but does not cause a problem.

A year ago a digital drive system, using AGAF modules, was assembled with the intention of adding an alternative digital output to the Cambridge GB3PV repeater. Unfortunately this has so far been frustrated by the inability of the Cambridgeshire repeater Group (CRG) to obtain the necessary authorisation. In addition to 3KKD and 6HFS several other stations including G0AYE, G1SAA and G6FKS are ready with STB receivers.

As reported previously the GB3PV repeater, like others, is now streaming pictures on the internet. <http://www.cambridgerepeaters.net> click on GB3PV. This address is being given to contacts during amateur radio QSOs. If a picture is then transmitted into the repeater they are able to see their contact talking to them. This has so far been used within the UK on 80m, but is potentially possible world wide."

73 Ian G3KKD.

Television - a warning from 'History'

Dicky Howett finds a high horse and gets on.

It's an acknowledged fact that in these modern times, most available information, previously reposing quietly and unobtrusively in dusty libraries, can now be obtained (at negligible cost) via the Internet. It's perhaps salutary at this point to offer a Cautionary Tale. This concerns the widespread dissemination of guileless historical television misinformation. Although not entirely blameless myself, any errors I might bestow are mercifully confined to a few hundred select readers. However, not so Web Gaffes. These have the potential to zap the entire globe in milliseconds, causing extreme befuddlement.

Recently, I had occasion to fulminate against the continuing inaccuracies of several website 'television histories'. This dubious TV Material, posing as 'fact', continues to litter cyberspace with a host of sites featuring all manner of video themes and arcane technological tub-thumping. Examples abound. One such is the oft-repeated tale that on Sept 1st 1939 the emerging BBC Television service closed for the duration with the sudden and alarming interruption in mid-animation of a Mickey Mouse cartoon leaving viewers with nothing to look at but a screen full of white noise and lots of 405-line 'snow'. This is demonstrable nonsense, easily corrected by reference to the available source material, and yet many books and TV documentaries have, (and continue to) present this Mickey Mouse episode as concrete fact. It was under these trying conditions that I had occasion to berate a Web TV 'historian' for reinterpreting another piece of TV history, namely John Logie Baird's first 'public' demonstration of television.

This TV web tale recounts how on January 26th 1926 Scottish inventor and entrepreneur, John Logie Baird gave in his London laboratory, the first recorded example of 'true' TV. This formative exhibition was mounted for members of the Royal Institution (oft mis-titled, the Royal INSTITUTE) presented as a

'sneak preview' of Baird's successful attempt to transmit half-tone TV images. So the story goes, at one point an injudicious elderly scientist got his 'long white beard' caught in the whizzing machinery. Suddenly, it seems that dear old Santa Claus had invaded the proceedings.

I opined that this 'long white beard,' story was nothing but a fabrication, conjured for the benefit of the popular press. It seems rather unlikely that Baird would have exposed important persons to the dangers of moving parts. It's recorded that Baird had suffered previously, partial disintegration of his 'camera' when spinning components became unglued and rocketed around the lab at devastating high speed. Because of this, during the London, Frith Street demonstration, Baird's entire apparatus was 'covered' by 'screens'. This protection would have been essential to Baird who was fully aware of the competitive 'race' to achieve television and thus would not have exposed his techniques fully to the glare of potential competitors. Also, Baird on this occasion, was using (or so it is alleged) a known image scanning technique called the flying spot. This particular technique is recalled by noted television historian Albert Abramson in his book, 'The History of Television 1888-1941.' Here he mentions Baird's flying spot (or Spotlight) system,

"On January 26th 1926, Baird gave a demonstration of his television apparatus to some 40 members of the Royal Institution at his laboratory in Frith Street, Soho. All of Baird's publicity indicated that Baird had invented a super-sensitive photocell which he kept a secret. No one ever saw his transmitter or his cell. His apparatus was always covered with screens of one sort or another, with the excuse that "extraneous light was not wanted and would interfere with the image." There was even a story that Baird had been experimenting with a cell made of visual purple, which was nonsense. It was also claimed that Baird had invented some "exotic" circuit using a transformer

that magically solved his problems. Later it was stated that Baird was very frightened of industrial espionage, but it would be more truthful to indicate that Baird and his financial backers wanted to keep his simple (but most effective) method a secret for as long as possible in order to head off any possible competition. For it was soon realised that the "flying spot system," while patentable, could not be protected."

However, the above extract is somewhat contradicted by R.W.Burns in his book 'British Television - The Formative Years'. The extracts reproduced below clearly don't describe a flying spot system. Burns writes,

"Following the demonstration at Frith Street to members of the Royal Institution, arrangements were made for a private demonstration to be given to a Mr E.G. Stewart. Mr Stewart's very interesting report, written in April 1926, only came to light in 1948. Stewart, a perspicacious engineer, was able to describe and give details of the equipment and impressions which were not mentioned by The Times reporter.

"The subject, which in the demonstration was limited to a size about 10 inch x 8 inch is brightly illuminated, about 500 candle power being used at one foot distance, and placed before an optical device of revolving lenses which continuously explores the whole surface in 32 vertical bands, each 1/4 inch width is thus treated as being uniform.... at the demonstration the received image was one ninth the area of the subject being 3 1/2 inch x 2 1/2 inch before magnification."

E.G.Stewart went on to describe the quality of reproduction:

"I found it possible to distinguish between two human faces I had previously seen in the life whilst opening and closing of the mouth, protrusion of the tongue, orientation or the head and passing of the hand over the face could clearly be followed. At the same time it would be very difficult to recognise

an individual previously unknown from the television representation. The inventor agreed however that the image was distorted and attributed it to, (1), inferior optical equipment and, (2) to insufficient sub-division of the pictures. He assured me that his lenses now were only lantern condensers and cycle lamp bull's eyes. This would certainly not add clarity to the picture and it would be interesting to see the effect of properly ground and treated lenses."

E.G.Stewart further adds in Burn's book that Baird's equipment was, when giving his early demonstrations '*entirely enclosed except for the input lens*' (my italics) Stewart also wrote

"...he has definitely decided to give a minimum of information upon the details of construction and operation to anyone. In particular the light-sensitive cell which Baird used was a closely guarded secret of the inventor and he told me only sufficient of its construction to demonstrate that it was entirely different from existing cells on the market."

So Baird's apparatus WAS screened although it would appear not to conceal a flying spot mechanism. At least not at the time of the visit of Mr. Stewart. Also, as Mr.Stewart confirms, Baird gave only the bare minimum of technical information. Most revealing, as it does tend to confirm that a secretive Baird wouldn't have relished a bunch of sceptical and hairy scientists to poke around during a live test.

Whom do we believe? Only one historian Albert Abramson has suggested that Baird used a 'secret'

flying spot system (now discounted) at the 26th January demonstration. However, it's perhaps significant to recall that Baird, six days before his 26th Jan demo actually applied for a patent involving the flying spot principal. Also, it might be pertinent at this point to remind ourselves that Baird was a bit of an obscurantist and not exactly the fount of all accuracy. In his autobiography 'Sermons, Soap & Television', Baird surprisingly mis-dates his momentous Frith Street Royal Institution demonstration as being on Friday 27th January 1926, when reports state that it was Tues 26th January 1926!

Alfred Dinsdale's contemporaneous book 'Television-Seeing by Wireless' also gives the erroneous Friday 27th date, as does Sydney Moseley's later biography of Baird. Any wonder obfuscation exists? And what of that other old chestnut, that Baird acquired a human eyeball and wired it up in his 'camera' in order to use the substance known as 'visual purple'? Alfred Dinsdale's 1928 book 'Television' attempts to elucidate,

"The early television experimenters endeavoured to construct artificial eyes by substituting selenium for visual purple and building an artificial retina out of a mosaic of selenium cells, each of these cells being connected by wires to a shutter. For every selenium cell used there was a shutter, and each shutter was arranged to open when light fell upon the particular cell connected to it. As each shutter opened it allowed a spot of light to fall upon a screen at the receiving end of the circuit. In this way each selenium cell controlled a spot of

light, the image being produced by a mosaic formed of these spots. Apparatus modelled on these lines was actually made by several inventors. Rignoux and Fournier, two French scientists, constructed such a machine in 1906. This apparatus was intended only to demonstrate the principle."

So that explains it. Will we ever know if John Logie Baird became suddenly a televisual Dr Frankenstein and actually wired that eyeball? And finally, did all those years ago, an unfortunate elderly boffin get into the record books as being the first man to get his whiskers trimmed by the magic of television?

One thing is absolutely definite. We know that television was 'invented' on Tuesday 26th January in Frith Street.... or was it Friday 27th? Or perhaps..... BBC Television once broadcast an historical series called 'You Are There'.

If only that was really possible!
Dicky Howett 2008



ATV Newsletter

The ATV Newsletter is a weekly publication covering World ATV News that I find interesting as well as events, projects and activities sent to me by my readers. You also get the latest Local ATV News from the repeater networks here in Southern California. And it's free. Plus information on Digital-ATV/ATV GUIDE, for weekly scheduled ATV events via Streaming Video/ATV Website Links/and more. To subscribe send me an email with your first name and call to atv-newsletter@hotmail.com and I will add you to the mailing list. You can also include any info about your ATV activities in your email, if you wish. I just might put it in the newsletter!

Bryon Foster - N6IFU
Editor & Publisher of the ATV Newsletter

Turning back the pages

A dip into the archives of CQ-TV, looking at the issue of 50 years ago.

By Peter Delaney

CQ-TV 36 - "Spring 1958"

This issue of CQTV was edited by John Tanner, as Alwyn Stockley was somewhat busy, having just moved from London to take up a new teaching job in Yorkshire.

In CQTV221, our editor suggested that a 'club project' for the future might be a test pattern generator. Later in the same issue, Mike Cox describes a digital test signal generator, using the very latest digital technology. CQTV36 included details of a test pattern generator using the latest technology of the time - if fact it was the very first piece of entirely transistor operated equipment to be described in CQ-TV. The designer was -- Mike Cox - yes, the very same!

The transistors and diodes used were available on the surplus market, and the power consumption was only a few

milliamps from a battery (exceptionally low for an atv circuit of the time). The pattern generator provided an output of about 8 vertical and 8 horizontal bars, together with line sync pulses at about 1V across 300 ohms. The master oscillator, T1, was an R.F. type transistor (the surplus transistors of the time just being classified as AF or RF) connected to a tuned transformer, and ran at about 80 kHz. Peak voltage pulses were developed across 2.2k resistors in the positive and negative feeds, the negative pulses driving a step-by-step counter T2, whilst the positive pulses were clipped to give the vertical bars. T2 ran at line frequency, using a standard blocking oscillator transformer, whilst T3 ran at approximately 4000 Hz, using a frame transformer. The clipped pulses from the three units were added, and the combined output from "X" fed to the output stage, T4, connected as an emitter follower. This had a fairly low output impedance, and gives about 1V across 300 ohms.

Transistors being then very 'new', the article continued to point out that due to

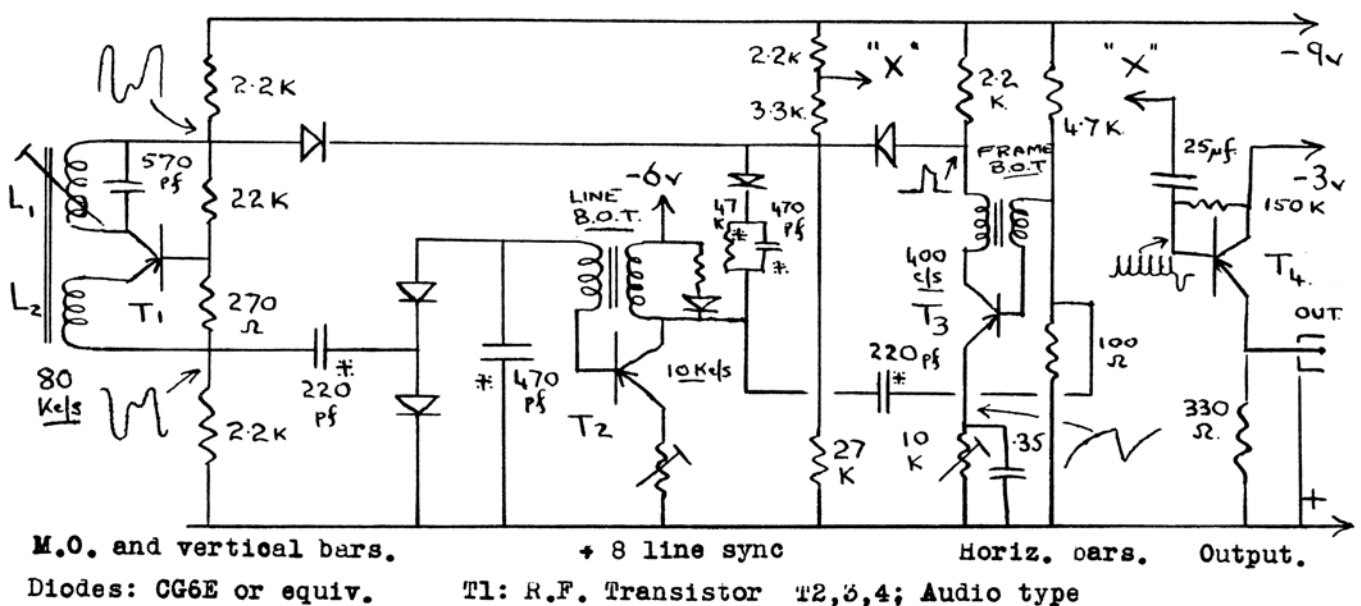
the variations in individual components and transistors some alterations might be needed, the most likely being marked * which might have to be adjusted on test for the best results. It was also necessary to point out to people who were not used to transistors the comparatively low value of resistors and high values or capacitors used, due to transistors being inherently low impedance devices "(that is, the ones WE can afford!)".

The photograph on the inside back page shows Mike Cox describing the pattern generator at the Radio Hobbies Exhibition, which had been held the previous October.

From the earliest time in the club history, BATC has supported the RF and the video aspects of the hobby, and in CQTV36 appeared a design for an RF power meter by E C Mitchell and D L Jones - which could still be of use today. It was designed for use on 70cm, with the meter separate from the load part. The diagrams show latter comprising an outer shell made from copper or brass 2 5/8" diameter and 1 1/4" deep,

A TRANSISTOR PATTERN GENERATOR.

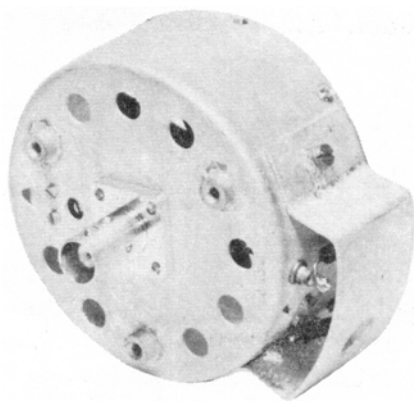
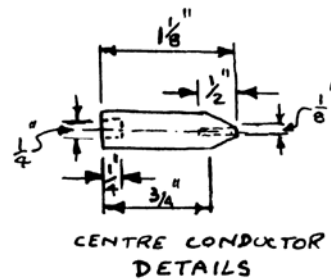
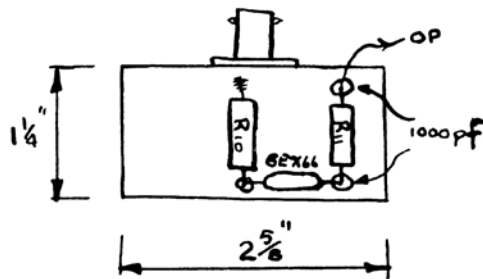
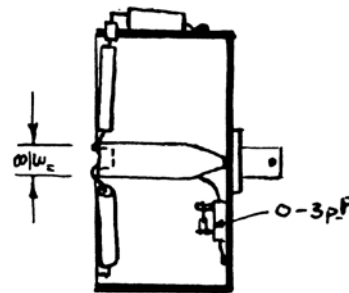
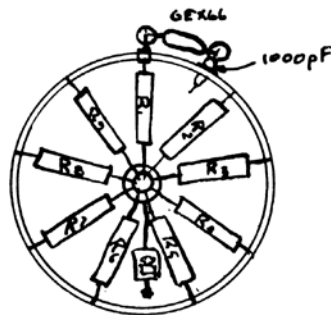
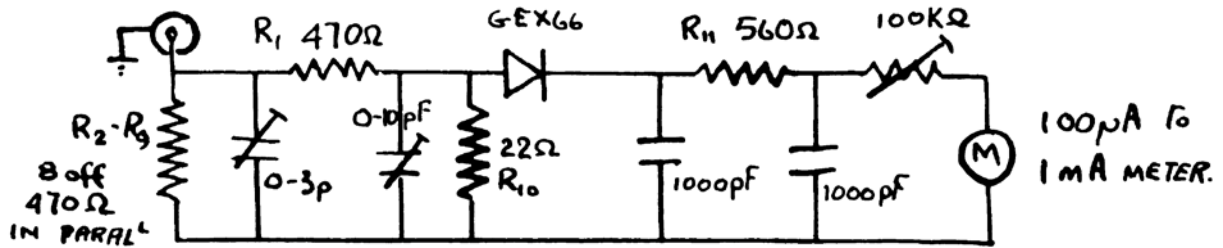
By Mike Cox.



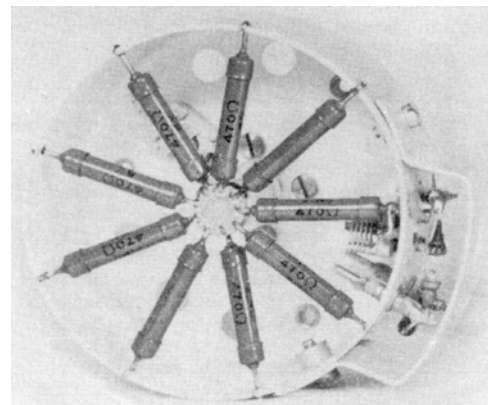
with an inner conductor $3/8''$ diameter, $1\ 1/8''$ long, tapered $3/4$ of the way from the back to a front end of $1/8''$. A $1/4''$ diam hole, $1/4''$ deep accommodated the inner ends of resistors R1 - R9, with slits in the outer shell to accept R2 - R9, and a hole insulated with a ptf

or similar insulator (such as from a co-ax cable inner) allowed the outer end of R1 to pass through the outer shell. The resistors used were Painton type 73NS, as they were made of a ceramic rod coated with a resistive metallic film.

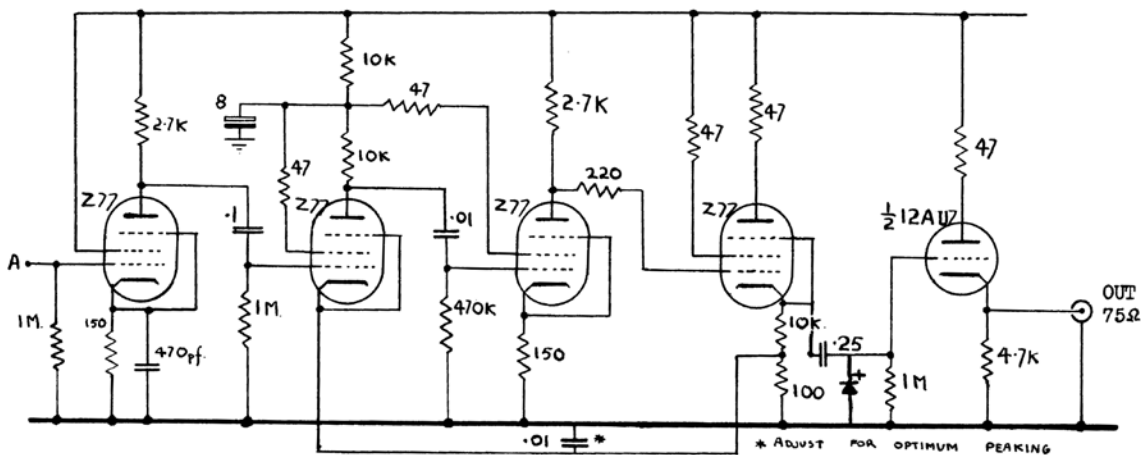
The 0-3pF trimmer was adjusted for min s.w.r, and the 100k pot for full scale deflection on the meter at maximum power from the transmitter (with a maximum of 25W output, unless the resistors were fan cooled).



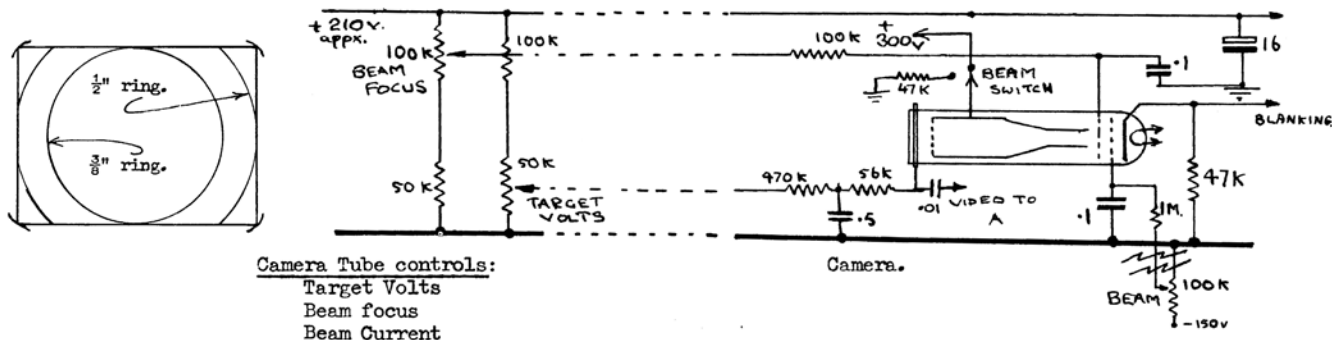
Power Meter outside view



Power Meter inside view



Vidicon head amplifier. Lead 'A' to be as short as possible.



Camera Tube controls:
Target Volts
Beam focus
Beam Current

The controls were:-

John Tanner wrote that “more and more members of the club are thinking about building a camera. The vidicon / stacion type tube is the only one currently available to amateurs. This tube is easy to run with only a very small amount of equipment”. John explained how the circuits could be split between the camera itself and the camera control unit (CCU) and power supply. The camera held the vidicon and its scan coils, the head amplifier, (to amplify the very tiny signal from the camera tube to drive a coax cable), focussing device and a switch to cut the beam in case of emergency. This, John explained, was in case the bias supply failed and hence the beam current rise to its maximum value, causing damage to the tube. At this time, scan protection circuits were not included. The power unit gave out 300 volts unregulated, 210 volts regulated, -150 volts stabilised, and 6.3 volts a.c. - it being added the regulation need not be especially good. The CCU contained the timebases, line and frame drive amplifiers, camera tube control circuits and the video amplifier.

- a) Beam current
- b) Target volts
- c) Beam focus
- d) Height
- e) Width
- f) Frame hold
- g) Frame linearity
- h) Line scan reversal
- i) Frame scan reversal
- j) Beam on/off switch.

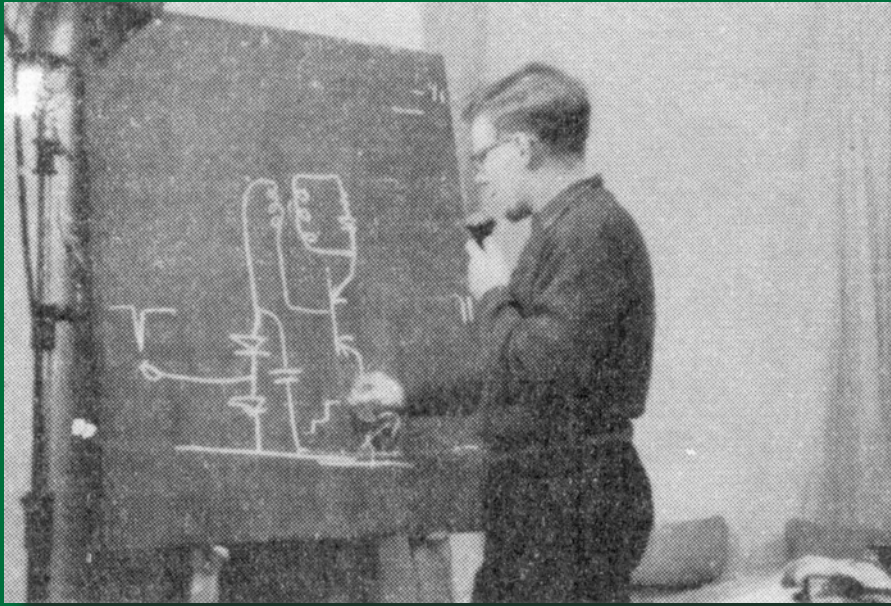
(The line linearity control and the optical focus were in the camera itself).

The scans needed to be set to an area of 1/2" x 3/8" and this was done with the aid of a 1" diameter perspex disc onto which were scribed two rings, as shown in the diagram. The disc was to be mounted centrally in front of the tube, illuminated by a 60W lamp about 2 ft away, and the line scans adjusted to the 1/2" ring and the frame to the 3/8" ring. The circuit diagram shows the vidicon head amplifier and the camera tube controls. Elsewhere in the magazine Eric Cornelius described another video head amplifier, said to be less noisy than the one shown here.

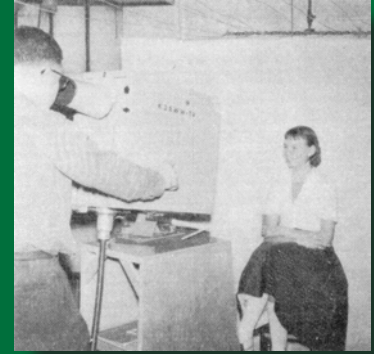
The ‘What The Other Chap Is Doing’ page included mention of Bob Mangold in the USA, who had an image orthicon camera with a 5FP4A viewfinder, and a 525 line 60 frame sync pulse generator.

The picture of it was captioned as showing “his image orthicon in his studio with a very attractive set” G3KKD/T had reported that activity in East Anglia ‘is widespread at the moment’ - Ian himself having had to get his 50ft mast up again, having been blown down in the gales of the previous November. Ivan Howard had completed a converter to watch BBC colour transmissions on a frame sequential receiver, and was planning to transmit frame sequential pictures, whilst Jack Terry in Chelmsford was also working on colour equipment. In the Midlands, there was a regular 11am Sunday sked from G3KBA/T and G3DFL/T. Several members were noted as building vidicon cameras, and there were reports from New Zealand, Australia and Brazil, as well as the USA and across the UK.

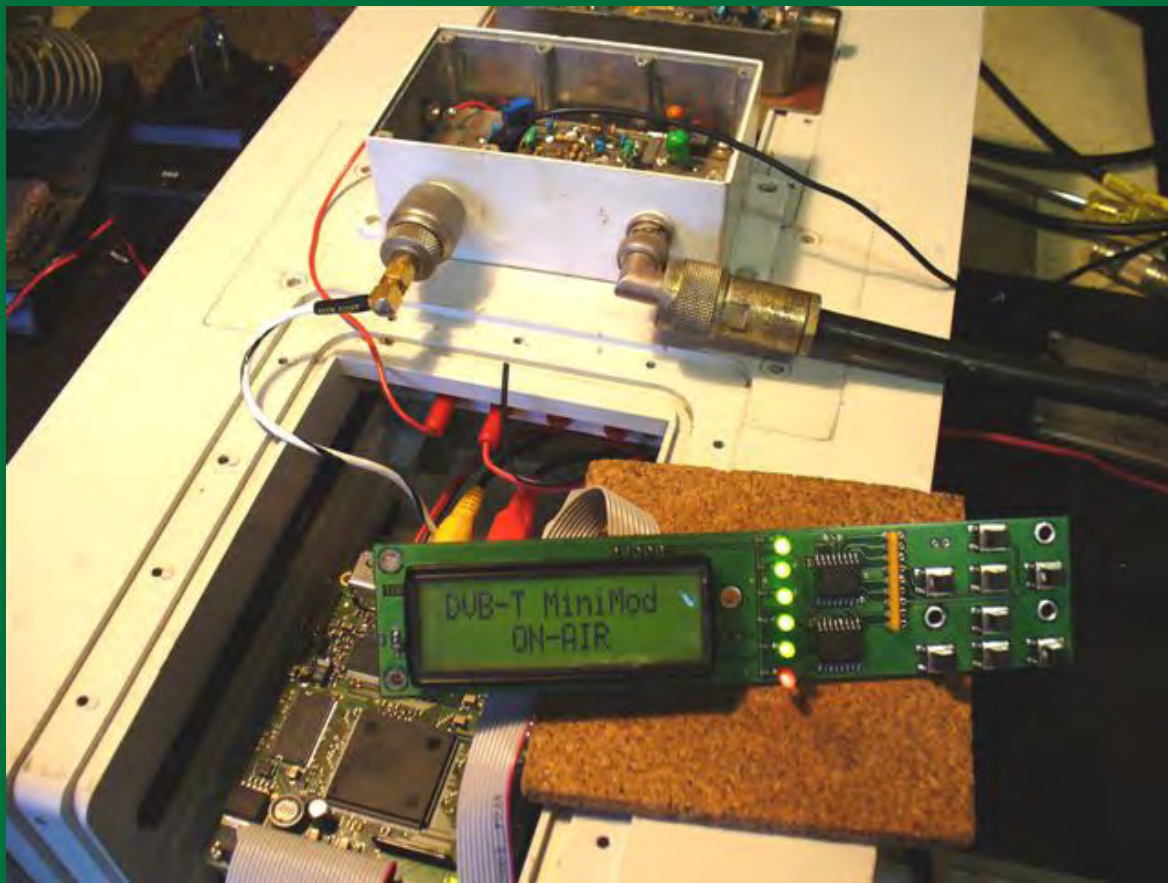
Mike Cox explaining how the test pattern generator works



A very attractive set !



Dicky Howett writes:
“I won't have a bad word said about digital television. My tv aerial blew down last year and I never noticed! The pictures on Freeview came through loud and clear. It was only when I switched to old style 'analogue' that I was presented with a lot of 'noise and snow'.”



SR-System MiniMod for DVB-T which is going in the VK4RKC repeater at Ocean View Brisbane, Australia to convert to digital on 428.5 MHz.

