CQ-TV 216

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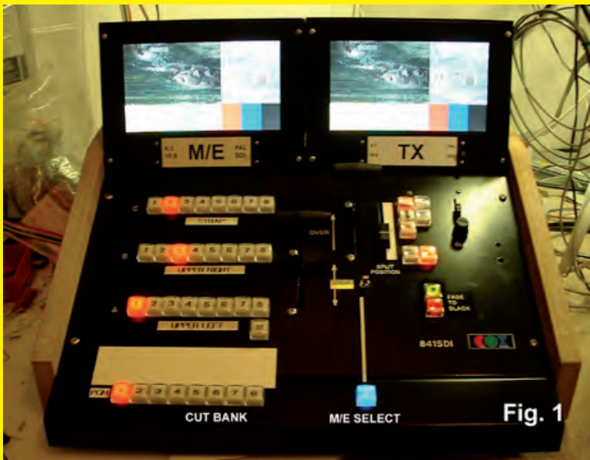
BATC

Circuit Notebook - page 11

Live DATV Demo - page 5



SDI Mixer - page 13

www.cq-tv.com

Caption competition

Can you think of a caption for the above picture? (see page xx) If you can, then send your entry to chariman@batc.org.uk. The winner will receive a Black Box caption generator.

CQ-TV 216

Contents

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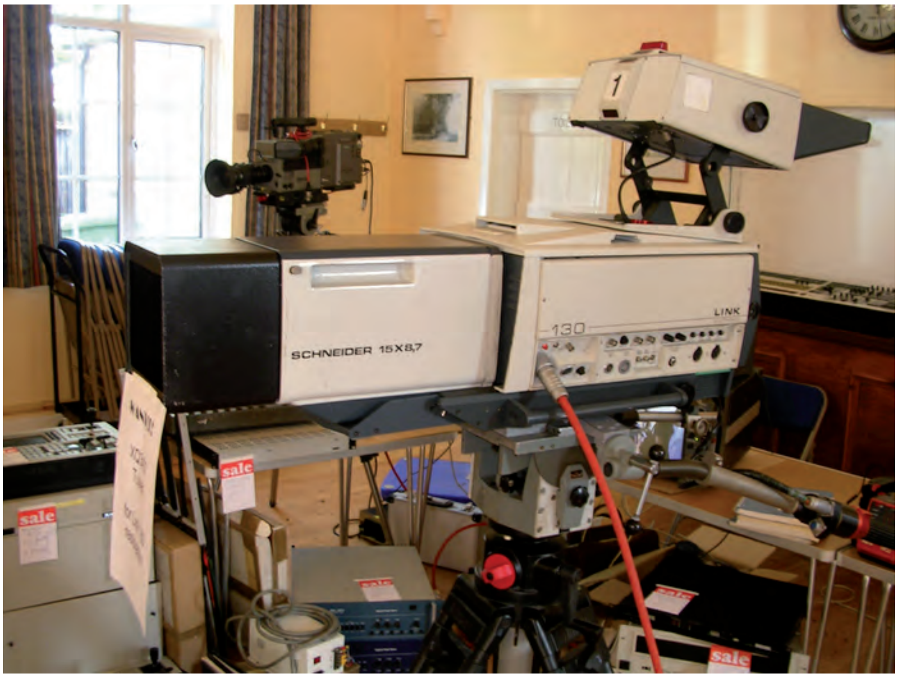
Chairman's Column

By Trevor Brown

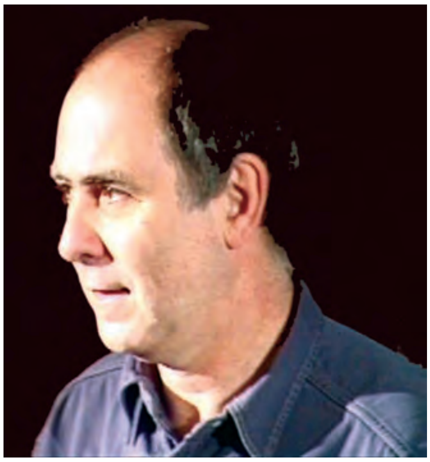
September 24 was the BATC BGM and along with a whole host of members I descended on the quiet Cambridge village of Stow-Cum-Quy. The pictures tell the story. Paul Reed brought along a Link 130 Studio camera and Paul Marshall not to be outdone brought along a CCD Ikegami HK355 studio camera.



Mike Cox set up a demonstration of some of the projects he has constructed. The star of the show was Mikes ARC called Noah. For those of you not familiar with this technology ARC stands for Aspect Ratio Converter. The technology designed to convert 4:3 pictures to 16:9, without what has now become famous as the Dixon stretch from the early days of wide screen TV where 4:3 pictures were stretched to fill 16:9 screens in their showroom windows.

The junk stands were also overflowing with surplus broadcast equipment from spectrum analysers to broadcast vision mixers. I think this is one of the few places that true TV equipment can still be located, as opposed to computer surplus which is taking over these events. A spectrum analyser changed hands for £20, something I would have thought every ATV experimenter would like to aspire to owning, and a Cox T16 vision in very nice condition failed to sell for £20. In September 1986, the list price of a T16+ mixer [PAL] was £26,295. You could add another £10K for extras. The component version was around £36K. I don't think £20 covers the cost of the bulbs in the control panel.

The lecture programme started with a DVD presentation by Ian Waters, of



his own personal view of ATV through the ages. As soon as Ian finished his presentation he rushed to the home QTH to fire off a live demonstration of DATV up converted from one of the AGAF units to 24 cms then linked to venue. Results were P5 and were received on a commercial set top box. What else would you expect from DATV. Perhaps we need a new way of grading reception for this new mode, as it's always P5 except when it freezes or goes blocky, but none of this was evident.

The second lecture of the day was an ATV repeater update given by Graham Shirville, for the first time ever we have no 24 cms repeater applications in the pipeline. One of

the interesting issues was to allow the M3 licensees onto 10GHz providing they use commercial equipment. This needs some investigation into what is available commercially, but is full of interesting possibilities

Just time for a quick liquid lunch, Mike Cox leading me astray, but I have to admit to rather a low yard arm these days and as a result did not need too much pressure to walk over to what proved to be a very pleasant local hostelry. This is my favourite part of the day a chance to reminisce and float new ideas.

We both had to cut it short to see Peter, our new incoming president give his inaugural lecture; not the first time

Peter's lecture was DATV, nothing like starting with a controversial subject.

Peter did not pull any punches and showed just what spectrum friendly TV is all about. To quote Peter "in a few years any wide band FM TV on the airwaves will only be from amateurs". Interesting as I always regarded Peter as the father of FM ATV at a time when AM was seriously being considered for 24 cms and above

When all the junk had changed hands and all the lectures and demonstrations finished it was time for the BGM. The future of the club is dear to us all. Bill Shepherd had flown in from Holland to ask where we are going with 70 cms and what we are doing to defend our air space. Training the newcomers in ATV was another hot topic. When all this died down it was time to elect the Committee members for the next two years and say goodbye to those that have decided to stand down including Peter Delaney who will be hard to replace.

Welcome the new comers, Dave Crump stepped in to the ATV contest manager's position and Graham Hankins took over from Paul Marshall as Club Secretary. Paul is continuing on the committee but only wearing the club archive hat. Ian Pawson stood down as Editor and after much discussion Brian Kelly took up the batten. This the most difficult position on the Committee and Brian needs all our help and support.

The Grant Dixon award for the best CQ-TV article went to John Lawrence for his 'Circuit note book' series, along with two special awards to Ian Pawson for his work as CQ-TV Editor and Mike Cox for all his help and support as the BATC President. Peter Blakeborough formally took over and I am sure we all wish him well in his new roll.

My thanks to everyone that attended, I think I speak for the whole committee when I say thank you for your support.

Bob Platts G8OZP
KITS & BITS

Just in case any of you where wondering, (Graham G8EMX), yes I am still about.

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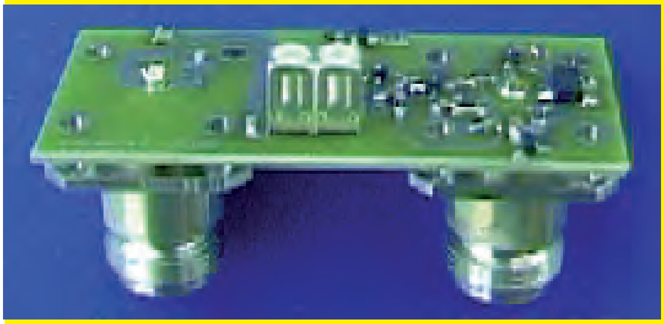

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Note. There is a web site for kits and bits, but it was not put on by myself and is basically history. Please ignore. (if you are the webmaster for this site, Thanks but it is now so out of date)

Subscription Rates

Please note that the **surface** rate covers postage within Europe, airmail rate is **NOT** required

If your subscription is due before the next issue of CQ-TV, you will soon be receiving a letter containg a personalised renewal form.

We hope that you will continue to support the Club and we look forward to receiving your renewal by post or via our web site.

Cyber membership is currently only available to members outside the UK. Cyber member will **not** receive a paper copy of CQ-TV, but will be able to download the electronic (pdf) version.

Please note that these files require the Adobe Acrobat reader version 7 or above.

Years	Surface	Airmail	Cyber
One	£15.00	£21.00	£10.00
Two	£29.50	£41.50	£20.00
Three	£44.00	£62.00	£30.00
Four	£58.50	£82.50	£40.00

Meet the Editor

I'm Brian Kelly, the last to step back when volunteers for the editor's position were asked to step forward!

Many of you will know me from the many articles I've written for CQ-TV and P5 over the years. A quick look at the back issues for my first appearance in CQ-TV revealed I've been on the scene since at least issue 153 over 16 years ago. By then I had already been involved with The Severnside Television Group for several years and helped to establish GB3ZZ as one of the most advanced and popular repeaters in the UK. There's nothing like digging through your old articles to remind you how old you are!

Since moving from civilisation to the wilds of North West Wales, my ATV transmitting activities have ceased completely. There is absolutely no activity whatsoever within range of my home and even 2 metres is silent for all but one or two occasions during the year. I have HF equipment and when I have time (ie. a new editor turns up!) I hope to dabble with SSTV modes. My one and only SSTV test transmission resulted in a QSL card from an SWL in Venice so I know it all works.

Without any chance of two way fast scan, I have concentrated more recently on less television orientated projects, particularly targeted toward solutions to ecological problems. I've done a lot of work on developing control systems to optimise the usage of solar energy, mostly using PIC microcontrollers. As my magazine articles demonstrate, I still keep up to date with television developments though, in both analogue and digital formats.

I also put together the occasional video production, mostly for private use or for small organisations. This keeps the creative and artistic sides of my persona in trim and ensures I don't miss out on any new editing or shooting techniques. I also run web sites for my own use and for some local businesses but confess to muddling through rather than being an expert in this field.

I am self-retired, not yet qualifying for a pension but not in permanent employment by choice. My background is in electronics, starting in the TV servicing environment and progressing to design and development work and my last employment was as senior engineer for a test equipment company. When I could see my job being slowly eroded by being moved, bit by bit, to Eastern European countries I knew it was time to look elsewhere or 'get out'. At the same time, a derelict building on a Welsh hillside caught my eye and the 'get out' option followed by a teach yourself how to be a builder/plumber/electrician and odd-job man looked like a good idea. So that's what I did and that's where I am to this day!

Editing anything, particularly an award winning magazine like CQ-TV is a daunting task and it will take a while for me to get up to speed. Ian did an excellent job and it will be difficult to match his skills so please be patient with me, particularly over the next few issues which are already behind schedule and have to be slotted into a timetable of major building works here.

Brian. GW6BWX

Why do we need digital ATV?

By Peter Blakeborough

I would like to explore the points in support of Digital ATV and the drawbacks articulated by a number of active users, and to put into perspective the challenge of digital systems compared to earlier major changes in the hobby.

A frequently heard point of view is digital ATV is difficult and complicated to implement, with the additional comment that the system delays make it unworkable.

Or the equipment entry cost for newcomers to ATV is too high.

I have some sympathy with the last comment, but, is the change to digital significantly greater than the early days of colour TV introduction, or in the RF domain the changes to the higher microwave bands?

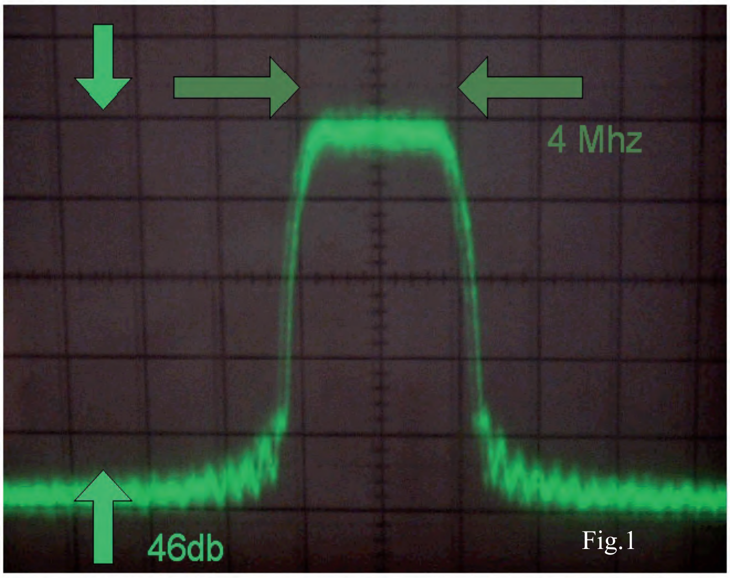


Fig.1

QPSK at FEC 7/8
3.5Msymbols/s

1. What are the drivers for change?

Pressure to make better use of radio spectrum have never been higher.

The current government mandate to its management agency, is to place a £ sign against all the usable segments of radio spectrum.

Private and government organisations, public service or not, find themselves being called to account in a monetary sense for the use of spectrum, or get off the frequency to make way for some one who will pay.

In the business section of the "Times" July 28th 2006 the by-line reads "BBC bid on licence fee hit by cuts". In the article we learn BBC, ITV, C4 must pay large sums of money for the privilege of using segment of the radio spectrum for terrestrial broadcasting at some point in the near future.

"Privilege" is an interesting word when applied to use of radio spectrum for broadcasting, but there is a "money food chain" motivating the policies and the spectrum pressures will not go away.

Do we have any rights moral, or otherwise, to maintain our access to a key aspect as our frequency allocations and what matters should we peruse in support of the hobby?

In general we are secondary users of the spectrum allocated to the Amateur service with many caveats and restrictions to avoid interference.

Such restrictions have been in place for many years, and I believe amateurs have a superb track record in sharing frequencies. We should build on this key aspect, by being prepared to conduct studies that demonstrate the practical aspects of frequency/band sharing.

Internationally agreed common allocations provide some measure of protection for our allocations and we need to be vigilant in ensuring they are maintained wherever possible.

2. New modulation techniques.

We need to embrace any techniques that make the optimum use of spectrum occupancy. The development of microprocessor technology makes practical multi-carrier modulation where the data is spread across a number of carriers, allowing several services to be carried in a fraction of the space used by analogue transmissions. Such techniques (COFDM) are to be found in the domestic TV broadcasting destined to replace the analogue transmissions. The parameters chosen for the domestic systems are aimed at squeezing the maximum number of users into a given space.

Number of users is not a key objective for ATV, nor is ruggedness to multi-path distortions, but even the existing TV COFDM with multiple services occupy only fraction of spectrum compared to the 18MHz of analogue FM ATV.

Developments in the Law Enforcement market have lead to the production of very compact single service transmission of 2.5Mhz with several hundred carriers much reduced from the 1705 used in the 8Mhz DVBT systems.

For many years the use of compact single programme per carrier QPSK modulation has found good service on satellite systems. Bandwidths of 4 or 5Mhz will carry excellent quality Other techniques employing minimum Shift Keying techniques are also being explored.

Thanks must go out to those amateurs who are already pioneering these techniques, please give support where ever you can to groups and individuals to help build and demonstrate these new techniques.

You may feel some of the detail is to much to take on board, why not ask for

Fig. 2 Compact digital video camera

a lecture and demo at your local club and gain the new knowledge in easy stages.

3. Digital Studios techniques.

The compact transmission discussed above rely on picture bit rate reduction coding techniques to take out the redundancy found in most images, and efficiently manage frame to frame changes.

MPEG1, MPEG 2 are well established words in the TV world.

The digital movie camera you recently bought for a few hundred pounds will have already employed one or more of theses video and audio coding methods albeit with different image sampling rates and coding algorithms such as MPEG4 /H264.

Willingly or maybe inadvertently we have embraced these new techniques mostly using analogue ports to deliver the images enhanced by digital editing packages.

How can we exploit the new image production tools for ATV?

One common element in the encoding process is the combining of the video, audio teletext etc in one multiplexed stream of data with all the appropriate data packet headers for the down stream decoder to work.

This common transport stream (T/S) is a well-defined interface and format for the input to modulators.

Second hand MPEG coding equipment will already have access to T/S, but a project to interface to domestic equipment would be a useful addition for ATV systems, and provide a bridge to digital modulators.

The coding and decoding, delay is seen by many as a problem for ATV . This is largely due to long Group of Picture sequences to deal efficiently with moving sequences seen in Broadcast transmissions.

Low delay encoders are used for ENG and Law enforcement in which the coding is changed to use I & P frames only 100mS or lower delays.

ATV transmissions could also exploit this method, as full resolution rapid image movement is not required t a full broadcast specification.

Cost of equipment is frequently mentioned as a major difficulty for those considering digital transmission equipment. The point is a reasonable one to make. A beginners low power microwave transmitter on 3cm, or commercial modules on 23 or 13cm will always remain a valuable ways to gain experience.

The digital transmission chain begins with MPEG coding, cost are dropping, and increasingly the camera and coding are integrated in domestic product.

At the end of the chain we have satellite QPSK receivers for Free To Air (FTA) services advertised for £50 or less. Capable of demodulation down to 2MS/s, and complete with software to search the transmission and extract and store the PID,s etc.

The RF modulation equipment in middle of the chain is not universally available and we need to address this aspect, however the need to build linear power amplifiers is relatively easy to solve even at 10Ghz.

In terms of today’s price is any one part of the transmission chain significantly more expensive than the first colour picture displays?

There is a challenge to be met, but amateurs have a great tradition of finding ways to achieve results by creating new ideas, in addition modification of product aimed at other markets.

Going digital is essential lets, get on with the process.

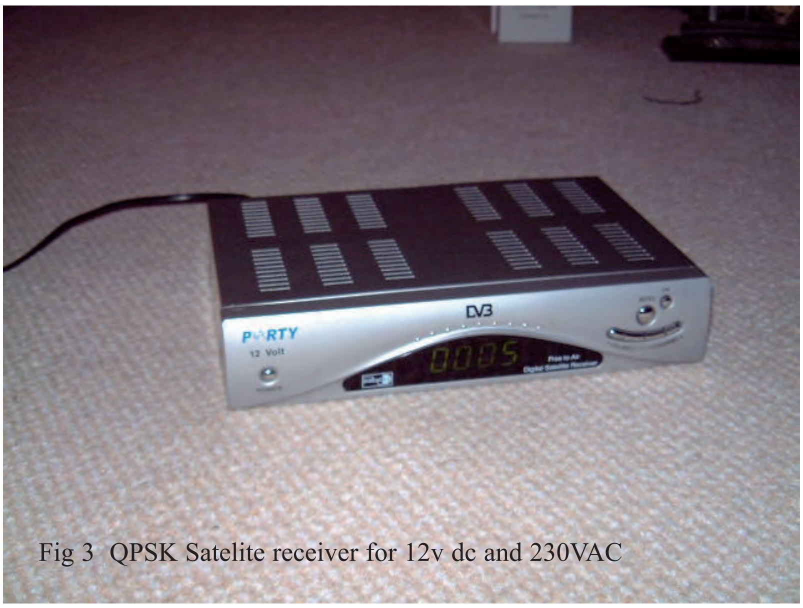


Fig 3 QPSK Satelite receiver for 12v dc and 230VAC

Circuit Notebook No. 91
Video Switch for Portable or Simple Shack Use

By John Lawrence GW3JGA

Fig.1 - video switch

The previous edition of Circuit Notebook (No.90) described a video distribution amplifier and suggested its use in a portable ATV station.

Here is an even simpler but practical unit using a single Veroboard distribution amplifier. The unit, shown in Fig.1, allows a video monitor to be connected to a receiver output to view incoming signals, or to the camera (which is feeding the transmitter) to view the outgoing pictures, without having to change over cables or parallel any coax connections. As most stations use a camcorder, the call sign can be keyed into the camera for station identification

The circuit is shown in Fig.2, the internal view in Fig.3 and the rear view in Fig.4. Video signals from the camera are taken through the CAM input to the changeover switch and to the input of the distribution amplifier. One output from the amplifier is taken to the transmitter TX connection and the other to the changeover switch. The switch selects RX or CAM and routes the signal to the MON, monitor output.

The unit is powered from 12V DC through a 2.1mm connector (centre +) and draws approximately 32mA. A DC-DC converter (Newport /Tresco 1205S) provides the +5V and -5V supplies for the video amplifier. The converter is mounted upside-down and fixed to the case using Superglue.

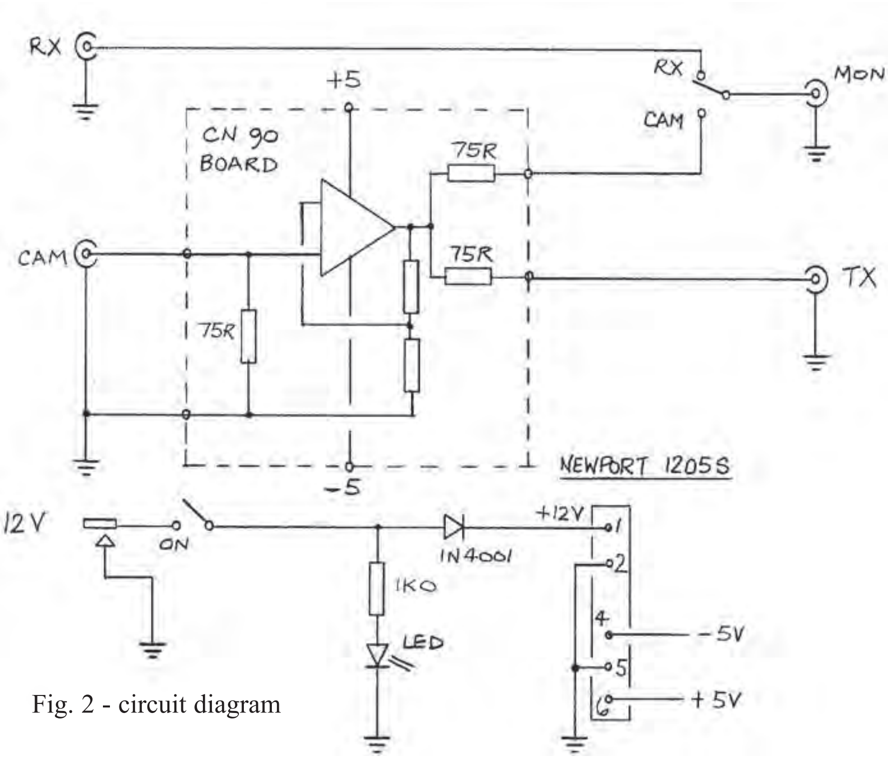


Fig. 2 - circuit diagram

Warning.

If a 12V plug-top power supply is to be used, it must be a regulated type. The output of a 12V 300/500mA unregulated type will probably rise to 18 – 20 volts when only a small current is being drawn and this could damage the DC-DC converter.

Reference

Veroboard Video Distribution Amplifier Circuit, Notebook No 90 CQ-TV 215 p.13.

DC-DC Converter 1205S
DataSheet:
www.rs-components.co.uk
Newport or Traco - Search 1205S

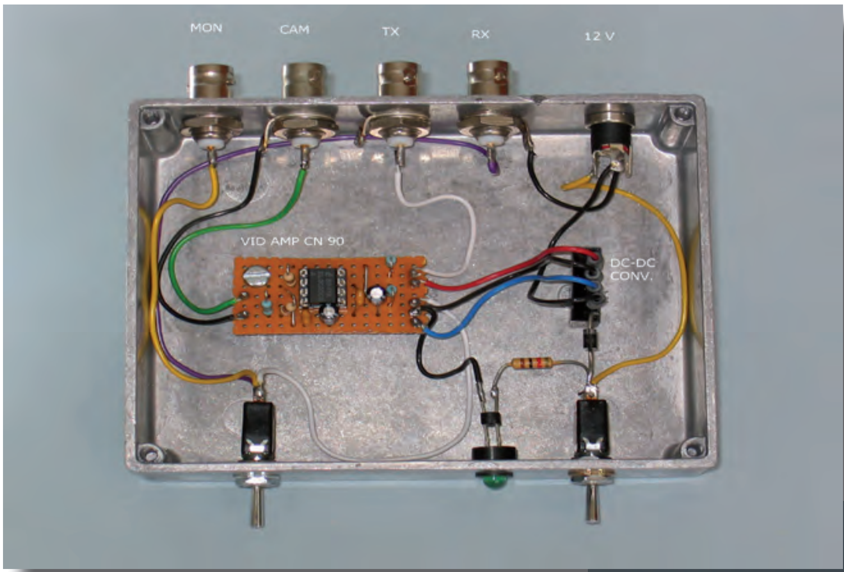
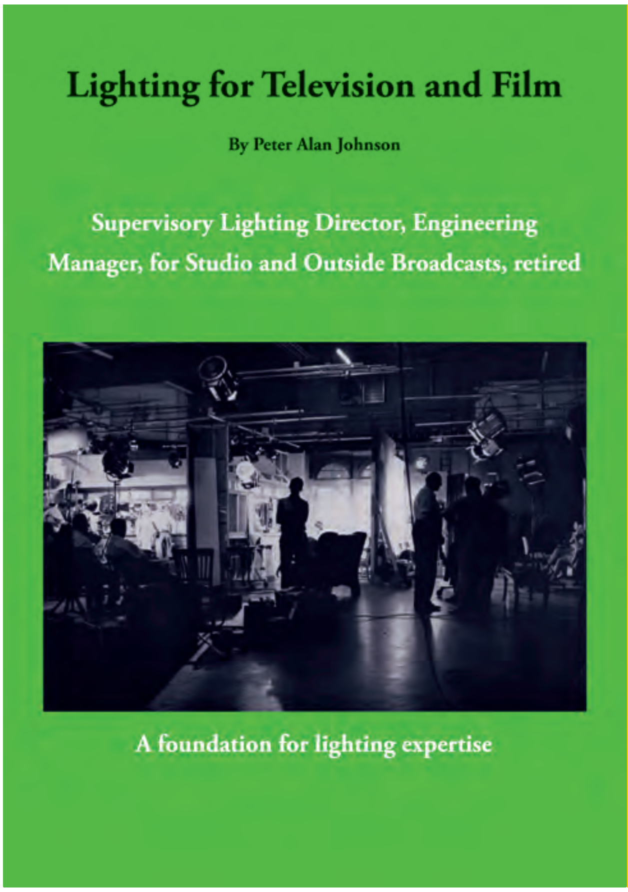


Fig.3. Internal wiring

Fig.4. Rear connections



For the person who requires a practical guide on how to light for television and film, without cumbersome reasons arguments, pros and cons, etc. This book provides proven examples of everyday lighting situations that may occur in any television or film studio and outside locations. One does not need to know how a television camera works or how a film camera works, but this knowledge is helpful and some attempt must be made to understand the basic principals.

To understand how the requirements for television and film in terms of the lighting luminaries, power requirements, the light intensities, and most importantly the colour temperature of the light sources, their directional angle and their quality as hard or soft light sources. Recognise the difference between hard shadows and soft shadows.

Let it be said that one does need a keen interest in the subject in order to master it.

This ebook is available on CD exclusively from the BATC at a cost of £5 including postage.

SDI Mixer Wrap

By Mike Cox

Where we are

In any experimental project, use suggests appropriate changes.

For IBC04, an 8 in, 8 out SDI Routing Switcher [qv] had been built, so the 841SDI's Aux. Bus had become redundant.

Operationally, a direct CUT bank would be more useful, as the Aux. Bus functions could be covered by the Routing Switcher.

A PCB was laid out to carry a set of Varitronix buttons to match those of the other banks, with an extra button to select the M/E system output.

The PCB fitted into a "speed bulge" at the front of the mixer panel. [Fig. 1]

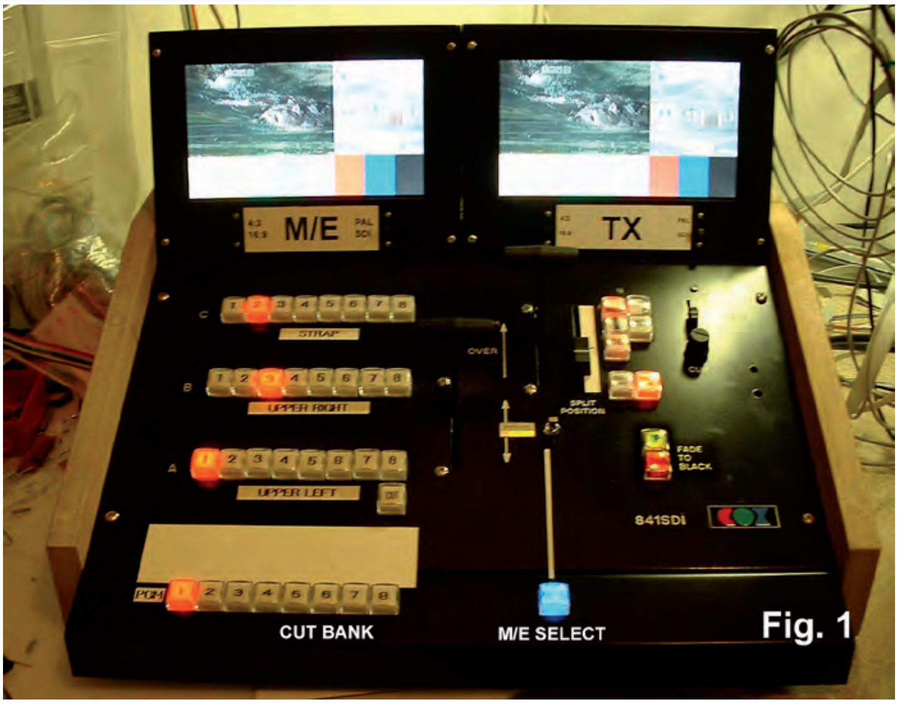


Fig. 1

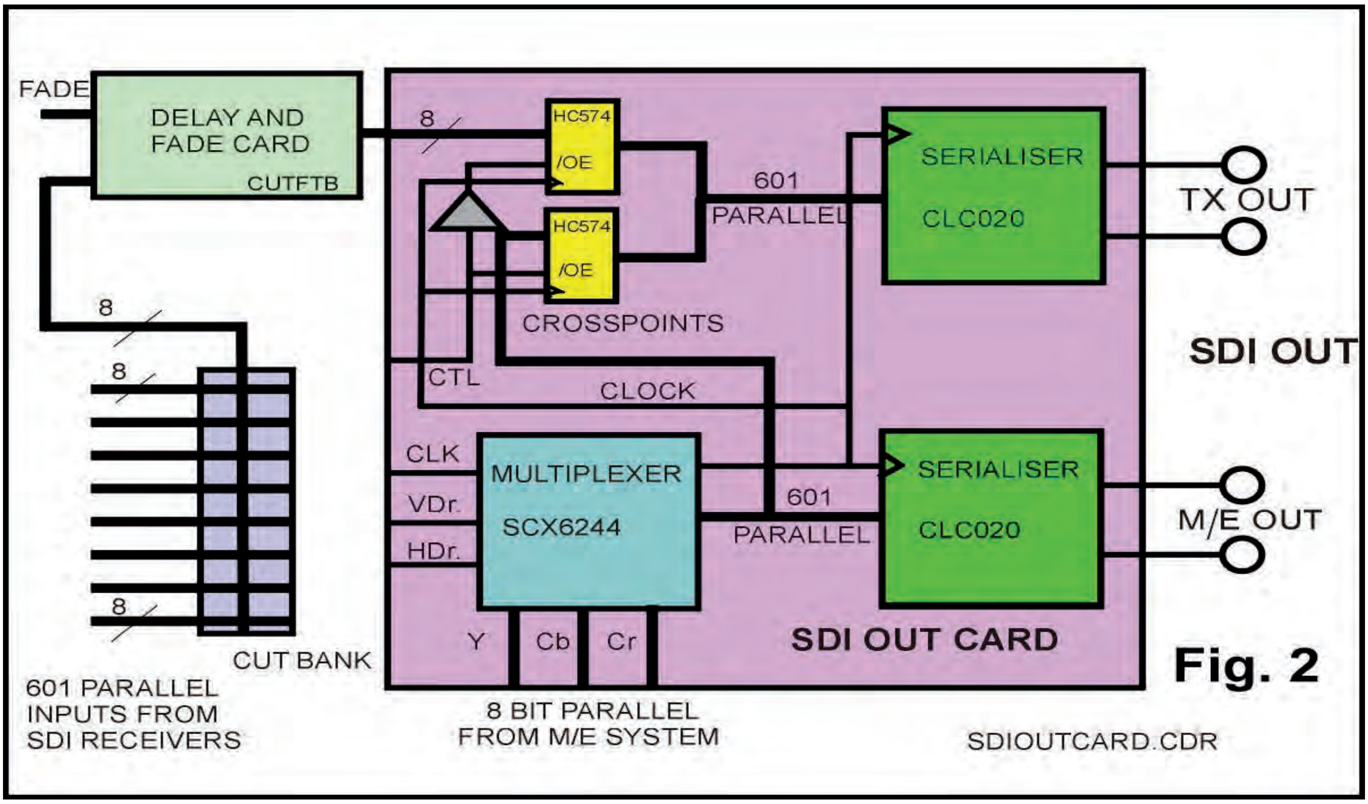


Fig. 2

For all things BATC, visit our web site at
http://www.batc.org.uk

Modification to the RS422 control circuitry was too difficult in the time available, so a separate cable was used from control panel to rack unit.

New Output Card

To select Cut bank or M/E output, an extra pair of crosspoints is needed, in the "601" stream either from the multiplexer or from the originally Aux bus crosspoint card. The output from these crosspoints drives the TX output serialiser.

To accommodate this, a new Output card was laid out. This also carries an extra serialiser to provide a direct M/E SDI output for previewing purposes. This serialiser is fed directly from the multiplexer. [Fig. 2, Block Diagram]

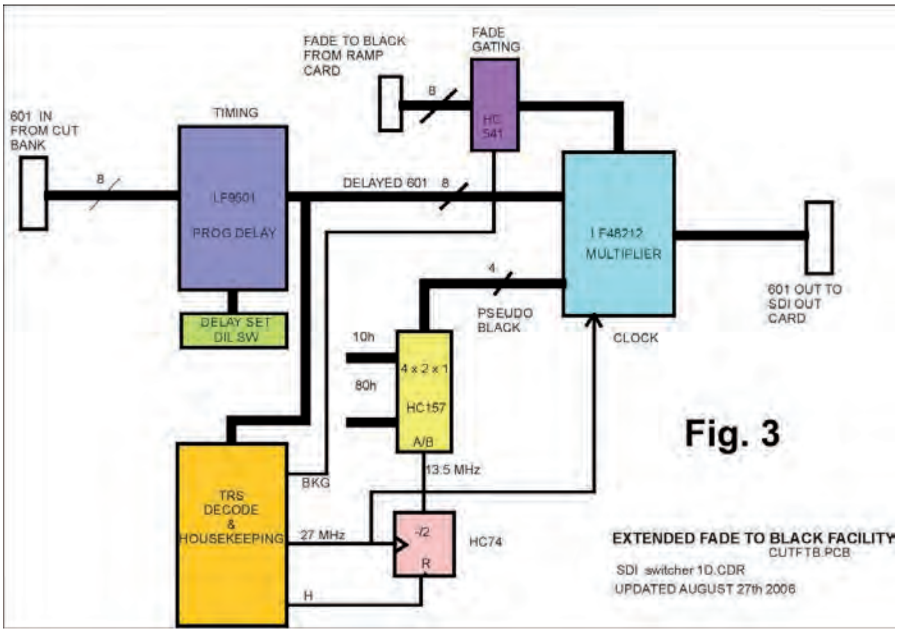


Fig. 3

Fade to Black

This arrangement worked well during IBC05, but a limitation was the Fade to Black facility, which did not operate on the Cut Bank output. To fade a source on the Cut Bank, the source had to be selected on all the other banks also, M/E selected and then the Fade button pressed.

Further work has resulted in a Fade facility operating directly on the 601 stream.

Black level is represented by a Y value of 10h, and a Cb or Cr value of 80h.

This can be synthesised by switching between the two values every 37 nS. [27 MHz]

This is achieved using a quad 2 x1 multiplexer such as a 74HC157.

To carry out the fade, synthetic black is fed into a port of a multiplier, the "601" stream into the other, and a gated up/down ramp signal to the control port. This is the same ramp signal used for FTBk in the M/E system. It is gated by a digital blanking stream, which is in turn derived from the TRS signals in the "601" stream. Hence all the TRS and ancillary data signals in the original stream are preserved.

With the Cut Bank in use, there is a considerable timing difference between a source selected on the Bank and the same source via the M/E system, due to the considerable number of latches in the path, mainly in the multipliers.

Accordingly, a programmable delay card was originally fitted to give up to 2.96 uS of delay, using 8 wide 16 section registers [TMC2111A]. The success of the Fade technique suggested a new card, incorporating a different delay chip [LF9501], together with the multiplier [LF48212] and the housekeeping circuitry. This was very little bigger than the original delay card, with the same fixings. [Fig. 3, Block Diagram, Fig. 4, photo of board]

It works, and IBC06 will prove it in action.

If any member wants further particular of this project, please get in touch. I will do what I can to help.

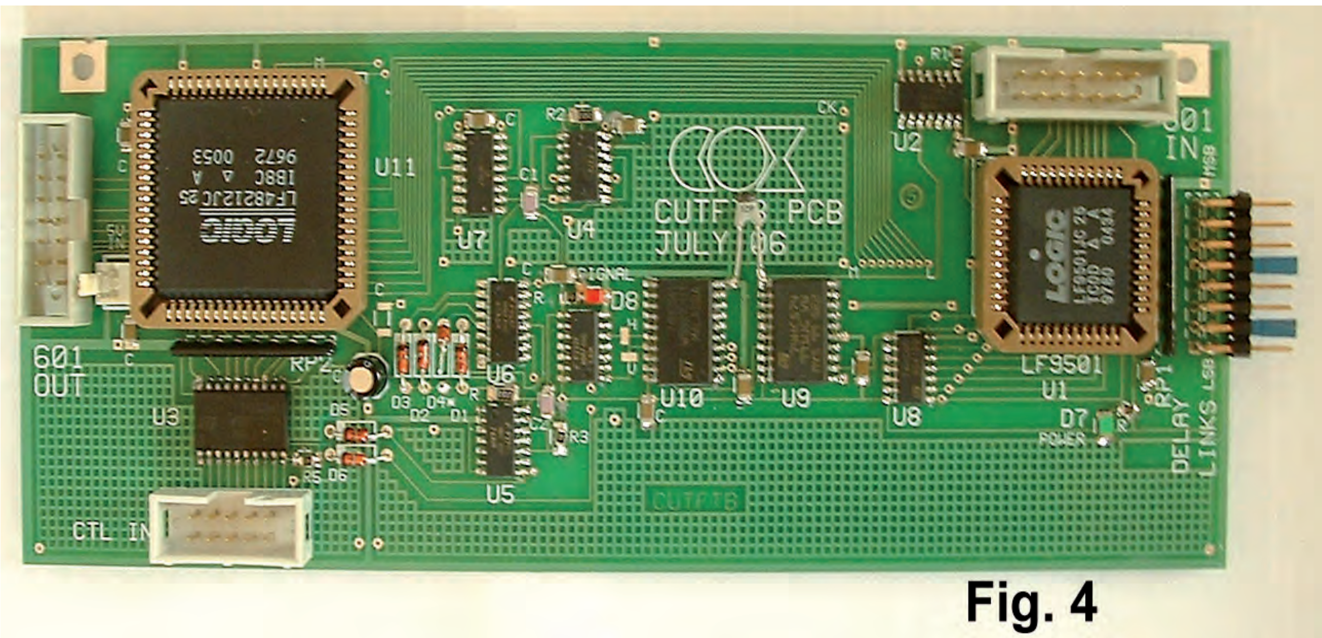


Fig. 4

Members Services

All prices in UK pounds (£)		Each	P&P	Qty	Total
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3	One inche Vidicon base	£1.20	£0.30	....	....
4	2/3 inch Vidicon base	£0.80	£0.30	....	....
Video and I^2C Circuit Boards/Components					
7	Sync pulse generator PCB	£14.00	£0.43	....	....
40	I^2C CPU PCB	£10.00	£0.43	....	....
41	I^2C VDU PCB	£10.00	£0.43	....	....
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The latest handbook full of detailed information on how to set up your ATV station, plus lots of new video and RF construction projects.			
The BATC handbook featuring construction articles on video units, 24cm and 3cm ATV, a Digital Frame Store, and much more.			
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A compilation of the best construction articles from CQ-TV's 133 to 146			
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CQ-TV is published quarterly in February, May, August and November each year. The deadlines for each issue are as follows: -

Please send your contributions in as soon as you can prior to this date.

February	*30th December*
May	*30th March*
August	*30th June*
November	*30th September.*

Will all prospective contributors please be sure to read the 'Notice to Contributors' on page 3 so that you understand the implications of submitting an article for publication.

If you have pictures that you want including in your article, then please send them, in the highest possible quality, as separate files.

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Caption Competition Winner

Entries for the caption competion in CQ-TV 215 were:

It does what !"
Dave Kemplen G1NSV

"And if you look very closely, you can see some analogue components..."
Giles G1MFG

"...And this button is very popular. It rings a bell in the pub next door for more beer".
Peter Stonard

After careful thought, and despite the appeal of a beer button, the winner this time is Giles. Congratulations!

Fancy a nice Black Box Caption Generator? - take a look at page 2 and tell us what the gesturing is all about.

IBC2006 – A Higher Definition View

By Mike Cox

IBC2006 was larger than ever, and an extra Hall [12] had to be created by shifting a Restaurant elsewhere, and putting Registration in a temporary building at the front.The overriding Theme was High Definition. This year, the show follows the first major HD outing in Europe, the 2006 World Cup. Much will be made of this experience, but before anyone gets carried away, just when they are getting to grips with 1080i HD-SDI at 1.485 Gb/s, 1080p is demonstrated using either 2 HD-SDI links, or a single 3Gb/s link. Gennum are already showing chips for this, and JVC had a camera running 1080p. The EBU have now stated that the preferred production standard is 1080p at either 50 or 60Hz. Other standards can be down-converted from this. Doubtless 1080i will come to be known as "cooking" HD.

Last of the BNC?

A new smaller coaxial connector was seen on the NVision stand. [Fig. 1 and 2] Smaller than a BNC, and without the spigots, it is a push-on, pull off connector, rejoicing in the name of DIN 1.0/2.3 Coax connector. Made by ITT Cannon, it allows 60 % more connectors to the rear of a routing switcher panel, without increasing the number of U. Go to www.nvision.tv, click on Product information in the first article about the NV8288 Router on the home page, and download an information document on this connector. Not cheap; Canford Audio sell the plugs for around £2.50, compared with under £1 for a BNC. They crimp on to the same 4 mm OD cable commonly used in studios and OB trucks, presently used with BNCs. I suspect that the impedance characteristic of this new connector will be better maintained at 1.5GHz than the BNC.

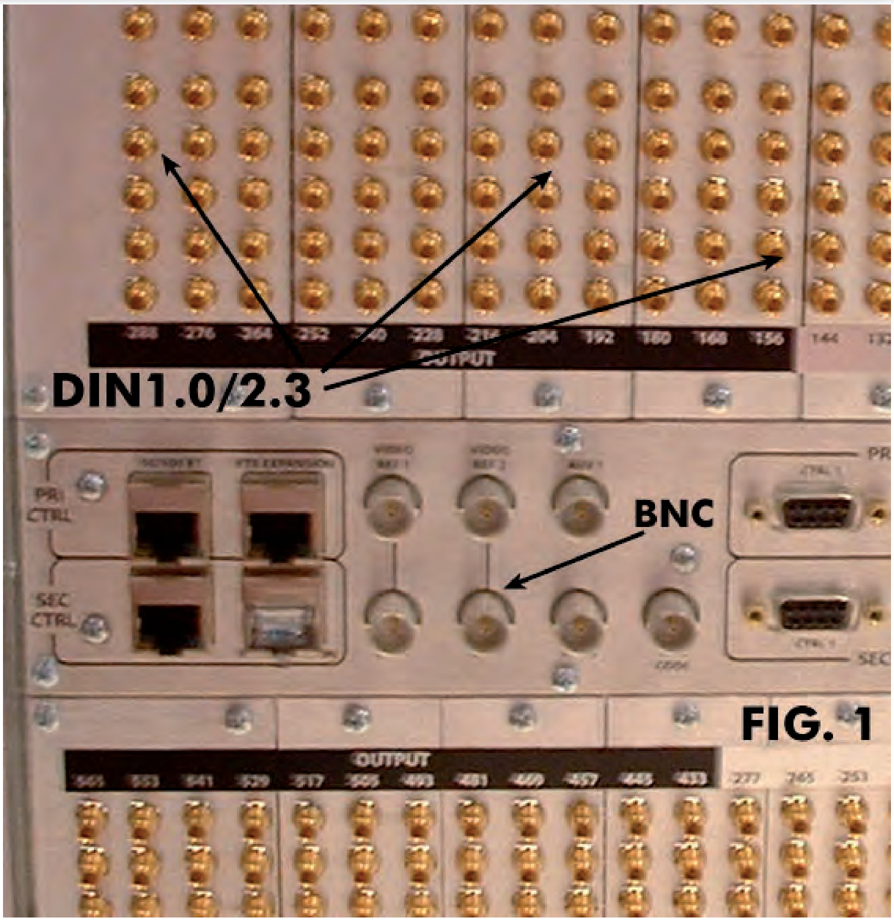


FIG. 1

Super HD

Visitors will be egged on to even better things if they see the NHK 7680 x 4320 pixel HD camera in action. This is 4 times the linear resolution of HD television. Maybe it will kill 720P!I did not manage to see the screened demonstration on a full but the equipment outside the theatre was impressive. The CCU for the camera was about the size of a Marconi Mark 7. [Fig. 3, 4, 5, 6] One demonstration showed a "pan and scan" out of the full picture, showing a 1080p subset, as a digital zoom effect. Astro were showing a 60" LCD display with 3840 pixels x 2160 pixel resolution, and on it was a quarter resolution version of the NHK pictures. It was stunning! They were also showing smaller LCDs with 4K x 2K resolution as camera control displays.

Mobile Zone

The Mobile Zone was doubled in size this year, reflecting the number of companies who are working in this area. There are two emerging methods of getting video to small portable displays/ mobile phones: DVB-H, a smaller scale version of the DVB-T system used for terrestrial digital broadcasting, and DMB, which uses spare capacity in the DAB radio system to send pictures. DMB has been widely adopted in South East Asia and China. BT Movio is about to start a service in the UK using this system. DVB-H is being used in Italy. Small DMB receivers are being developed for use separate from a phone. [Fig. 7]

Info Channel

The Info Channel worked well, particularly as we had the use of the new Aston 7 character generator. This is a remarkable unit, which can do most things except make tea, and I expect the people at Deepcut are working on it. My kit worked OK, but I discovered an interesting problem. We had the use of an EVS server to play out commercials. This unit had provision for embedded audio in its SDI output. Some of the SDI decoders used in my monitors fell over when fed with this signal. They displayed black bars running through the frame. As soon as a clean [i.e. no audio provision] SDI signal was offered, they were OK. This is to be investigated further when I can get hold of an SDI test generator with embedded audio provision.All in all, an amazing show.Contrary to rumours the industry is far from dead. Despite all the mergers and acquisitions – Harris swallowing Leitch, Probel swallowing Vistek, Evertz swallowing Quartz, new companies are springing up, with many from China and Asia.There will be another IBC next year. See you there.

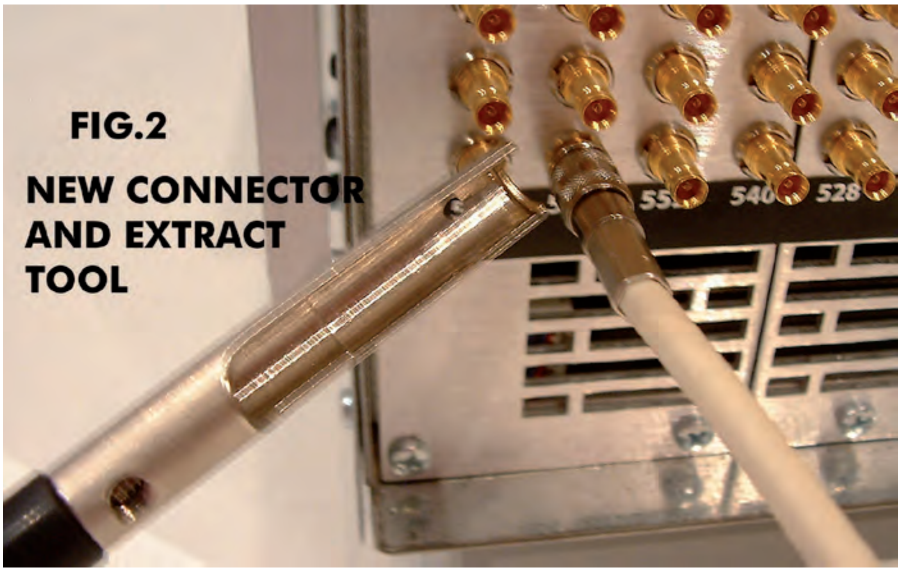


FIG.2
NEW CONNECTOR AND EXTRACT TOOL

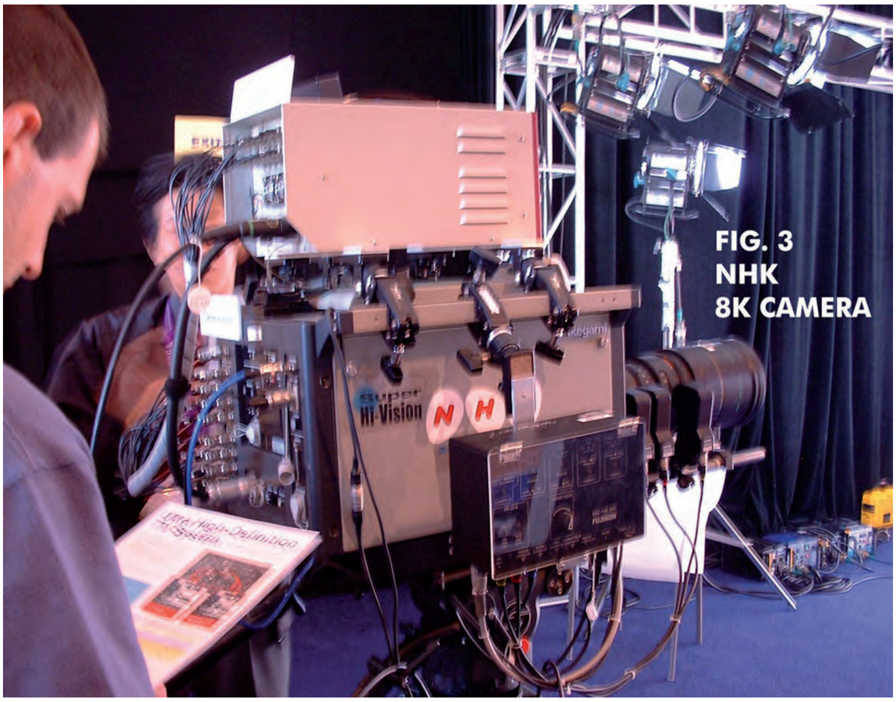


FIG. 3
NHK
8K CAMERA

FIG. 4
NHK CCU

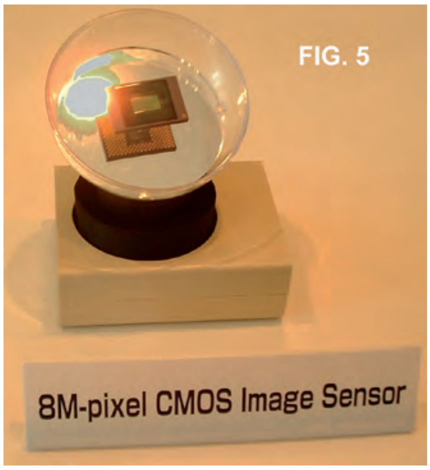


FIG. 5

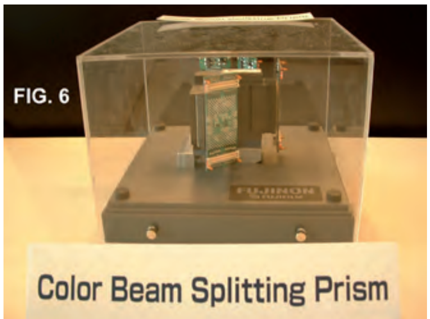


FIG. 6

FIG.7
DMB RX

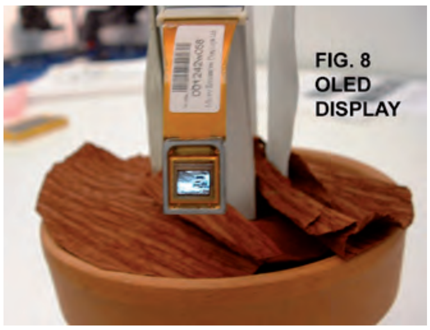


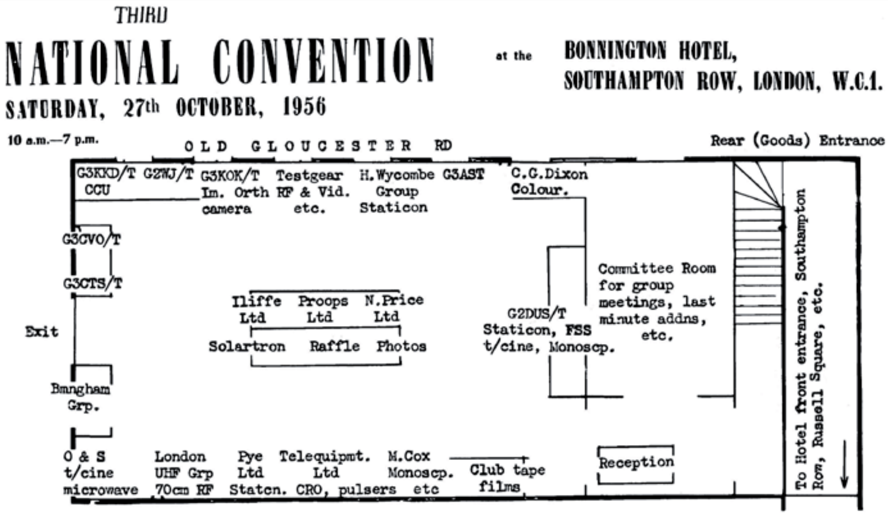
FIG. 8
OLED
DISPLAY

"Turning Back the Pages"

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

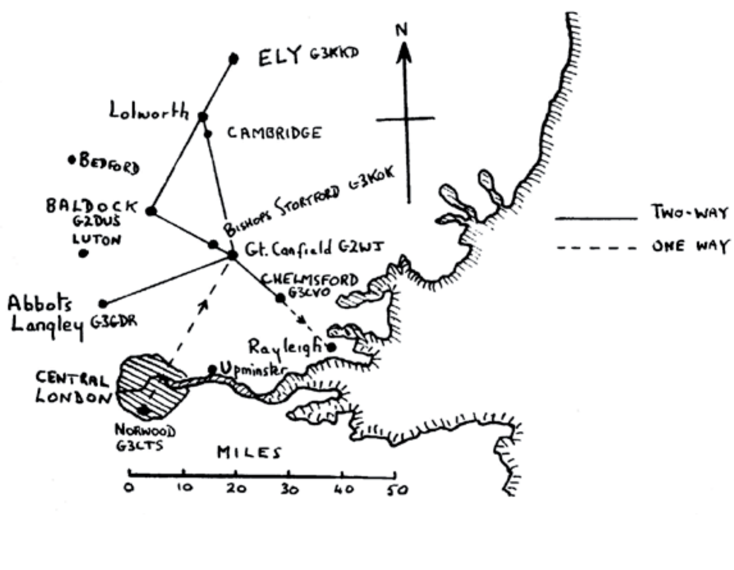
CQ-TV 30 - "Autumn 1956"

The main part of the Editorial was about the forthcoming Convention. A plan was included, with a note that "Some of the exhibits have not yet been confirmed, and extra ones may arrive on the day. As this is a pretty ambitious show, and we do not expect to hold another Convention for a year or so, all members are invited to make a special effort to attend. Besides the vision exhibits, a particular effort has been made to obtain examples of UHF gear, so that members who are some distance from UHF amateur radio activity can see for themselves how the units should be built. Several commercial firms are showing items, including our good friends Messrs Proops, who are always willing to lend a sympathetic ear to the problems and requirements of BATC members. We are also glad to see that Mr. Banthorpe is to bring some parts of' the Television Society transmitter G3CTS/T."



The 'What the Other Chap is Doing' page included a map showing the activities of' the East Anglian TV net. It noted that these were not relay - links as yet, but that was one of the aims for the future. G2WJ/T boasted a true 405 line interlace, although the difference was only noticeable in the shack or at G3GDR/T. Jeremy had built a new sync generator using 6SN7s with a genlocking facility, which enabled him to generate his own syncs from incoming signals (or BBC-ITA of course, it added!) and so hold weak signals better. Over the path to G3CVO/T, Ralph found that an extra 6 ft of height on the 64 element array made several dbs improvement in the signals. "Great things have been happening at G3CVO/T. Despairing of ever possessing a Rolls-Bentley, the garage has been turned over for use as a TV studio", G3KOK/T , G3KWD and Mike Cox, all of whom worked at Marconis during the week, being installed there as well. Between them they had an image orthicon camera, monoscope, slide and film scanners, two 405 line sync generators, and all the necessary power supplies and monitors. Full sound mixing and talkback gear was available, and two co-axs and 7 lines went from the studio to the transmitter hall (!) in the house. G3CVO was then free to concentrate on the TV tx without worrying about the video side. The big transmitter was due for an overhaul (mainly power supply issues). A portable TV rig using 12AT7 Squier EF91 doubler 5763 (145 MHz) and QQV03/10 tripler is also running, and a CV67 had been slung under a small horn radiator for use as a grid-modulated AM microwave link. Much of the gear was to be shown at the Convention. No less than 25 members worked at Marconis, and Don Reid, who lunched with Eddie Barrall G2BCB, had persuaded him to start work on a new sync generator, whilst G3CVO, who lunched later with G3VI, was getting the latter to build some TV conversion equipment. The Butchers G3KPJ and G3CUH also had a TV converter and a flying spot scanner under construction, G3KRA/T was making a new transmitter and T. Pegrem a sync generator. (All ATV had to built or converted from 'surplus equipment' in those days, of course).

Other notes recorded that over 200 copies of "An Introduction to Amateur Television Transmission" had been sold, each with a copy of CQ-TV and a note as to the nearest BATC member. Of the 16 new members listed, three were in Italy and one in the Netherlands. Whilst "we are pleased to note" (the magazine reported, " that Ian Waters G3KKD/T and Ivan Howard G2DUS/T have been awarded the Courtenay Price Trophy by the RSGB for 'outstanding work in the field of Amateur Television, culminating in consistent transmission of live pictures over a 38 mile path using home constructed equipment'. The main technical articles in that issue concerned flying spot scanning, a 405 line counter circuit and monoscopes.



ATV Repeater Project

Readers have often commented on the lack of construction articles in CQ-TV. This should address their needs!

What is described here is an advanced repeater control unit for ATV use. Although the design is relatively complicated, all of the construction uses 'home brew' techniques and no expensive or difficult to find parts are used. The original equipment was designed and built at home and is now in 24-hour use at a repeater site in the UK.

All the circuit boards are single sided and easy to construct using the methods described in CQ-TV issue 200. Where non-pinned chips have been used they are fitted in sockets to convert them to 'through hole' outlines to make construction easier.

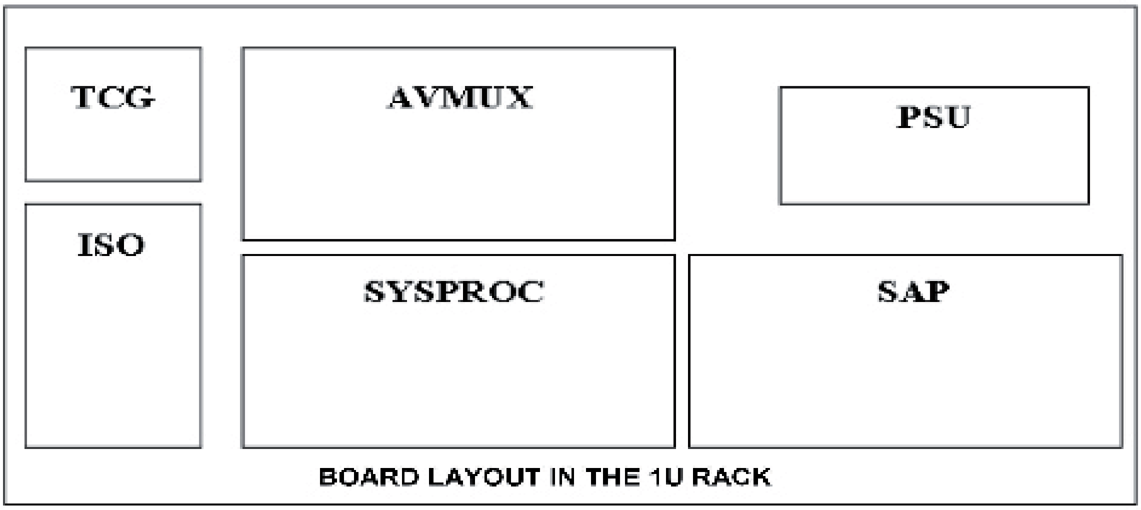
Regular readers may recognise some sections of the unit which have been published before as individual articles, for example the idenification tone generator and the test card generator but here they are shown in their final placement, integrated into a single design.

Much of the repeater is optional and can be omitted to make a simpler unit. Even the controlling microprocessor, the heart of the repeater can be omitted and any other computer used in its place. The oportunities to customise the design and its operation are endless and left to the imagination of the user. However, built exactly as described, apart from customising the callsigns, a fully functional and self-contained repeater can be put together for little cost and in a short time.

This article is adapted from the hardware and user manuals written to go with the original repeater unit. Some of the text and picture formatting does not easily convert to the standard page layouts of CQ-TV and may be a bit out of character from other articles.

The hardware will be described first and in later articles, the simple language used to control the repeaters functions. No program is provided for external computer control but it should be within the capabilities of most users to write their own from the language description. It can even be controlled directly from a keyboard!

Design and construction by Brian Kelly, GW6BWX



Summary of board functions.

TCG – (Test Card Generator) Generates the testcard pattern used when the repeater is in idle mode.

ISO – (ISOlator) Provides an isolated bi-directional link for audio, video and control signals between the repeater and an externally connected computer.

AVMUX – (Audio Video MUltipleXer) Routes the audio and video signals from the TCG and the sockets on the outside of the box to the internal sync detector, computer interface and transmitter and monitor interfaces.

SYSPROC – (SYStem PROCessor) Is the decoder and 'distribution centre' for control signals to the ports around the system. It also houses the on-screen caption generator, the Morse ID generator, the relay driving ports, the antenna selector port, the weather satellite port , the infra-red VCR control port and the MF tone detector.

SAP – (Stand Alone Processor) Is the controlling computer when there is no external computer attached. It automatically goes into standby mode when a suitable plug is inserted into the computer interface socket on the front panel. The board also houses the infra-red modulator and power switching circuits for controlling the VCR.

PSU – (Power Supply Unit) Is an 'off the shelf' switch mode power supply providing the +5V, -5V and +12V power feeds to the other circuitry. There is also provision for an alternative linear power supply on an unused section of the SAP board.

ISO

The isolator board provides a barrier between the repeater electronics and an externally connected computer. Without it, there is a strong likelihood of ground carried noise from the computer and its power supply, reaching the video and audio outputs of the repeater. It also gives a degree of protection against voltage spikes that could be transmitted through the computer from a phone line.

The isolator has two digital inputs, two digital outputs, one video input, one audio input, one video output and one audio output.

The digital signals are used to convey command and response information to the RS-232 serial port on the front panel. This would normally be connected to a matching serial port on the computer. Data flows at 57,600bauds (bits per second) in both directions. Circuitry on the isolator board produces a non-ground referenced +5 supply which feeds the computer side of the isolation barrier. The higher voltages needed for the serial port are generated by charge pumps around the MAX232 device.

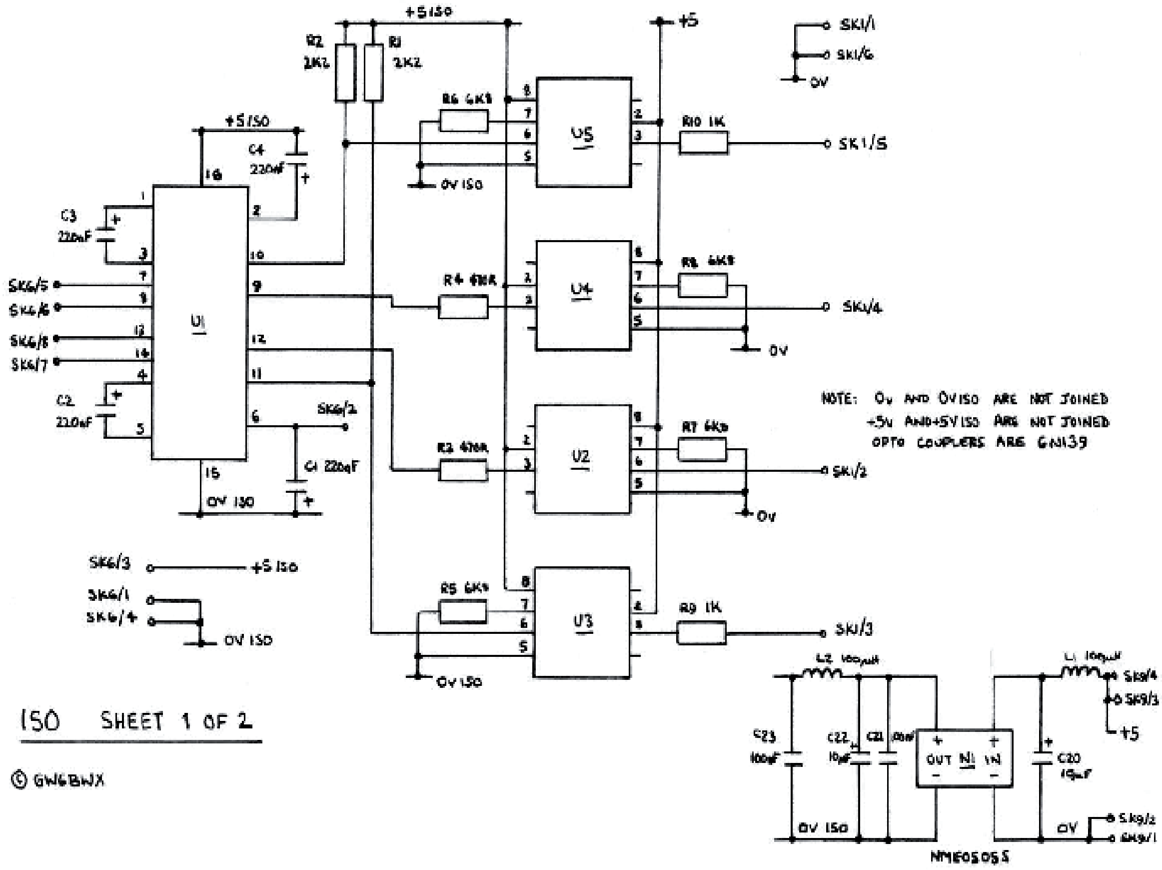
The actual barrier is formed by four 6N139 high speed opto-couplers which are biased for maximum switching speed.

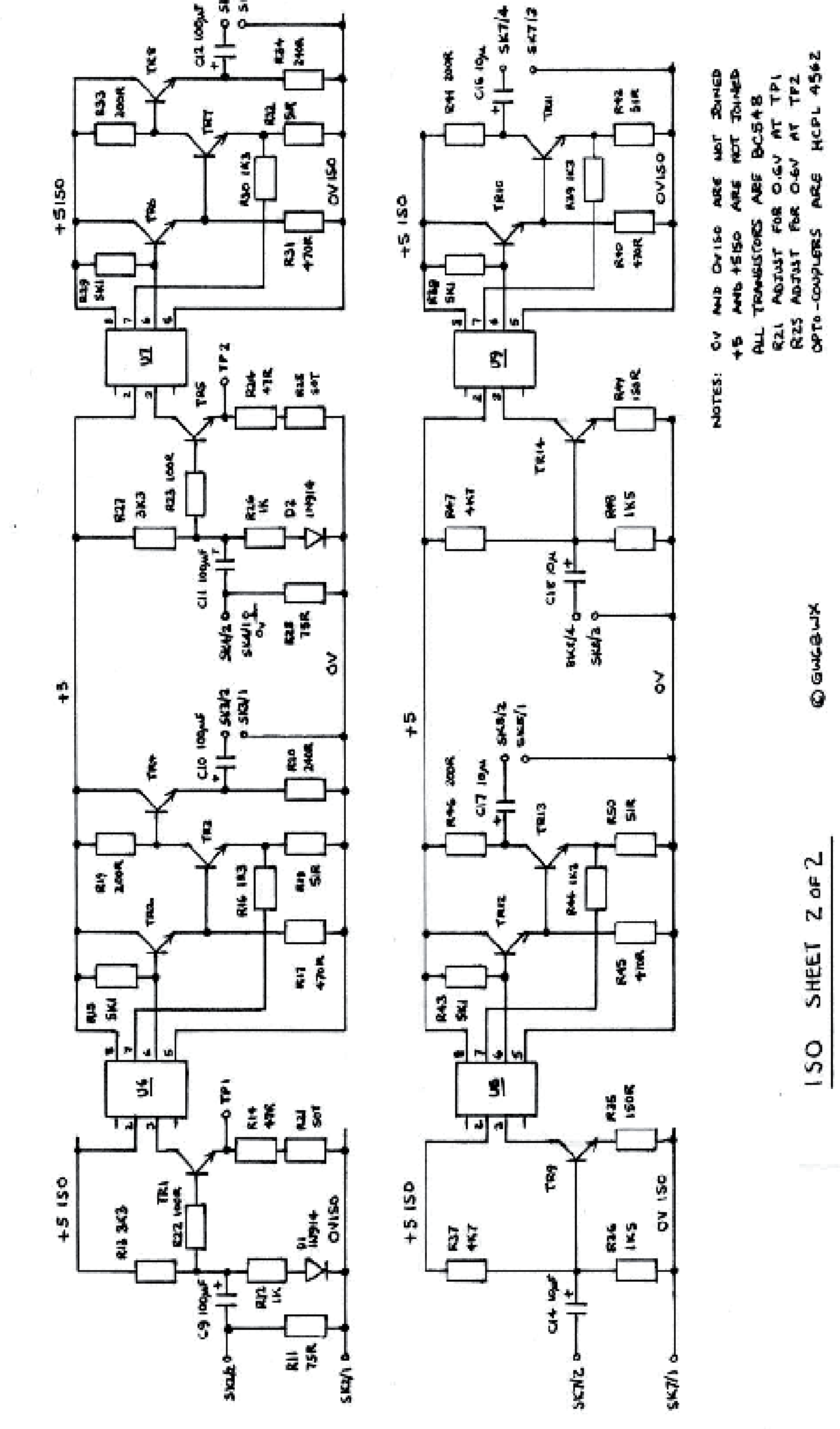
Analogue signals are isolated by HCPL4562 opto-couplers. These are linear devices and have their LED parts biased to mid operating range by single transistor driver stages. The efficiency of the couplers is quite low so their detector sides are fed to amplifier stages. The audio amplifiers utilise two transistor amplifiers, the video amplifiers use an additional stage to enable them to drive 75R loads.

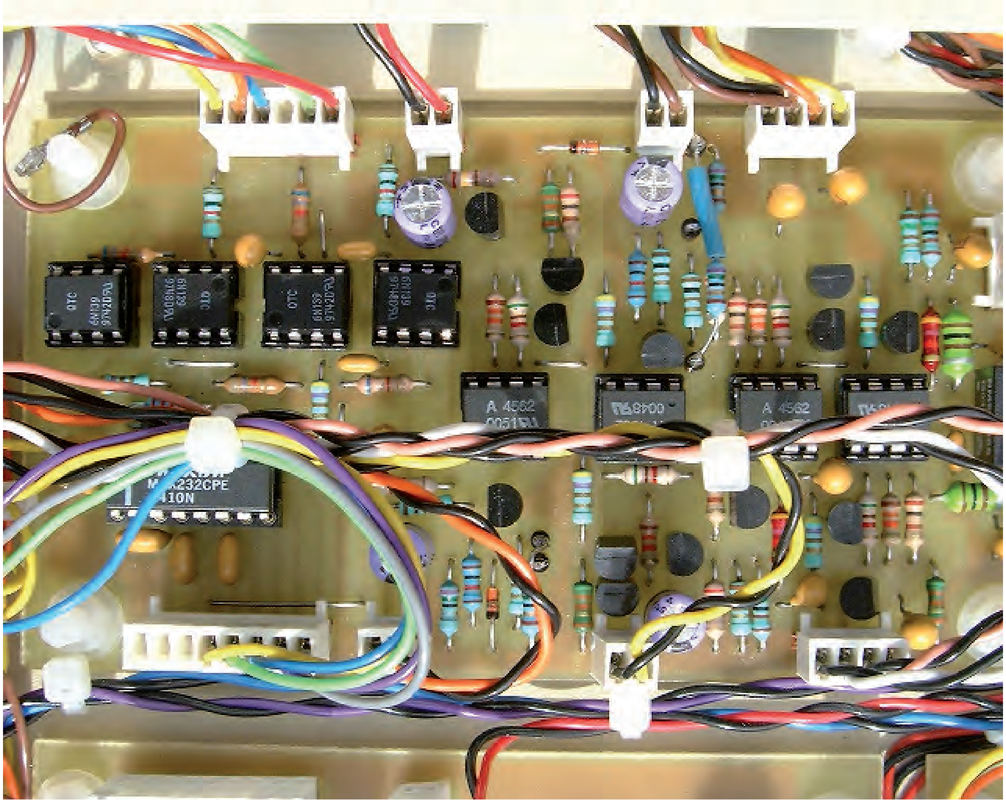
The board is fed from a single +5V supply which directly feeds the repeater side of the data and analogue channels. It also feeds the isolated supply generator module through a filter network to minimise the amount of switching noise it generates reaching the other circuits.

The theoretical breakdown voltage between the repeater and computer interfaces is 1KV but in view of the possibility of arcing at the front panel socket and across the surface of the isolator board substrate, a more conservative rating of 750V is advised.

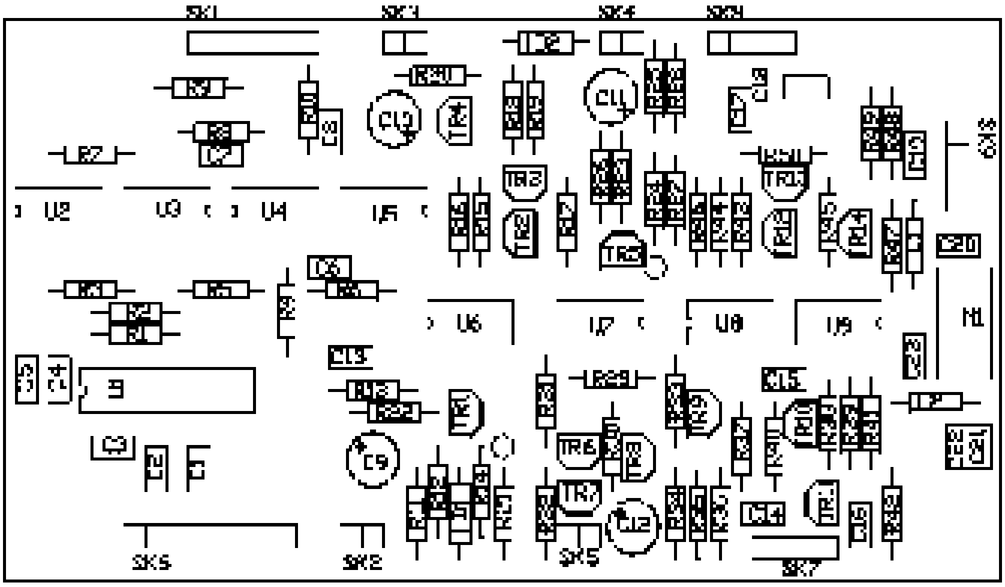
The intention of the analogue channels is to allow the computer to generate video and audio for transmission and to digitise incoming signals for time shifting or archiving on hard disk. The ability to perform this function depends on the specification of the computer.



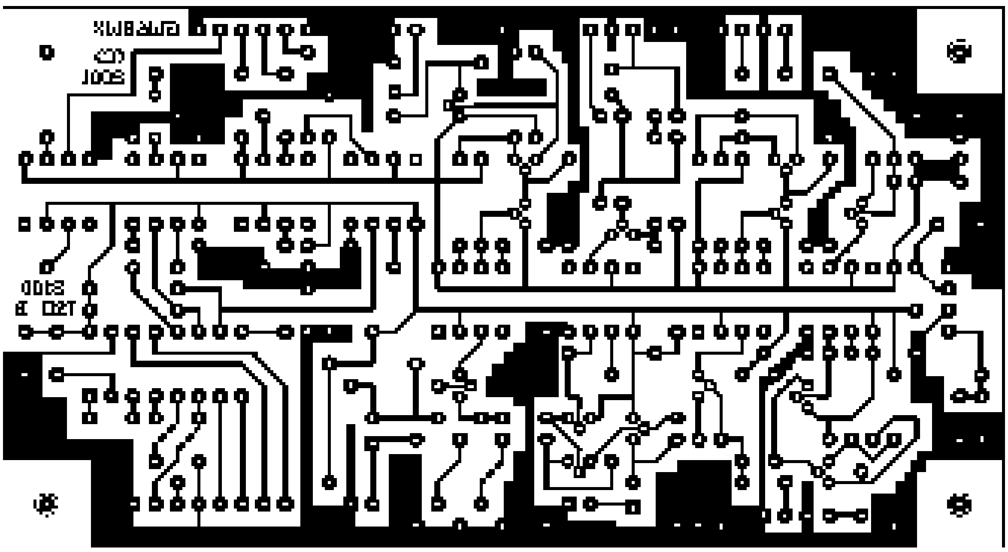

NOTES: 0V AND 0V ISO ARE NOT JOINED
+5 AND +5 ISO ARE NOT JOINED
ALL TRANSISTORS ARE BC548
R21 ADJUST FOR 0.6V AT TP1
R25 ADJUST FOR 0.6V AT TP2
OPTO-COUPLERS ARE HCPL 4562
ISO SHEET 2 OF 2



Photograph of the completed ISO board. Note that plastic screws have been used to mount it to the chassis so that no electrical connection can exist between the two isolated sides of the circuit.



Component position overlay for the ISO board. The small circles near the centre of the board are test pins. these are used to allow R21 and R25 to be selected and fitted while the board is in-situ.



Copper trace layout. Note that there is no connection between the top and bottom halves of the board tracks. The pattern is deliberately reversed so that when used as a photo-plot, the printed side is flipped to be in contact with the copper side of the raw PCB. This helps to eliminate light creepage through the thickness of the plastic film.

AVMUX

This is the signal routing section of the repeater although some other functions are also located on this PCB.

A MAX459 video switch controls the video routing. This device has eight inputs, any one of which can be routed to one or more of its four outputs. Provision has been made on the PCB for all the video inputs to pass through low-pass filters although none are fitted at manufacture. Of the four outputs, one feeds the isolator (ISO) board for subsequent use in a computer application, one feeds the rear-panel monitor socket where it is anticipated it would connect to a local monitor screen. The third output feeds the transmitter output after passing through circuits to add the on-screen captions and to restore the picture black level. The last output is connected to the sync detection circuits. The switch is driven in parallel mode – see the MAXIM data sheet for the MAX459 device.

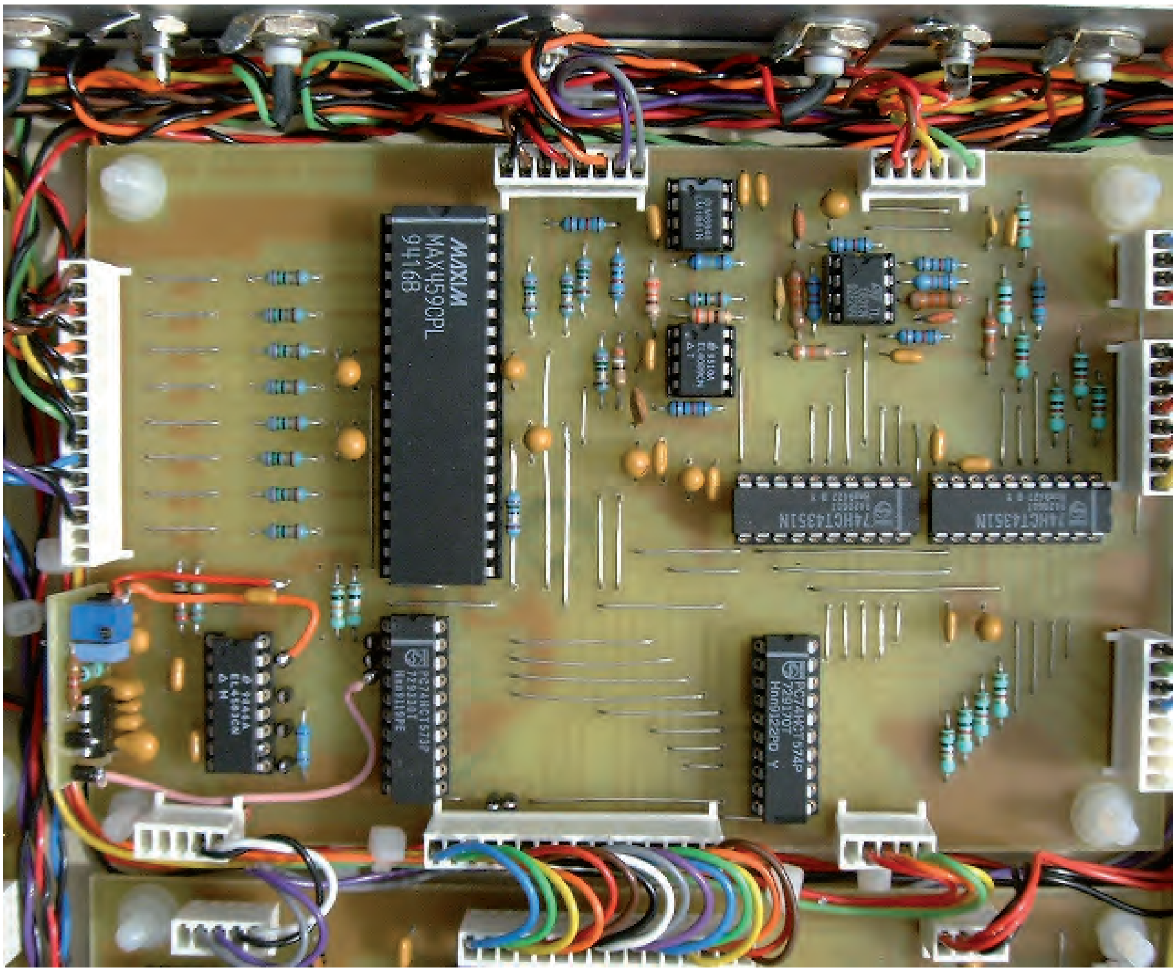
Audio selection is through an eight input to two-output switch. One output feeds the monitor socket, the other the transmitter socket. The audio paths include a mixer where the identification tones and beeps are added and a low-pass filter. The filter gives a flat response to about 10KHz then falls off rapidly. It is intended to remove remnants of horizontal sync that may be present on received signals. The transmitter and monitor outputs can be independently switched to any of the inputs but ID tones are added to both channels.

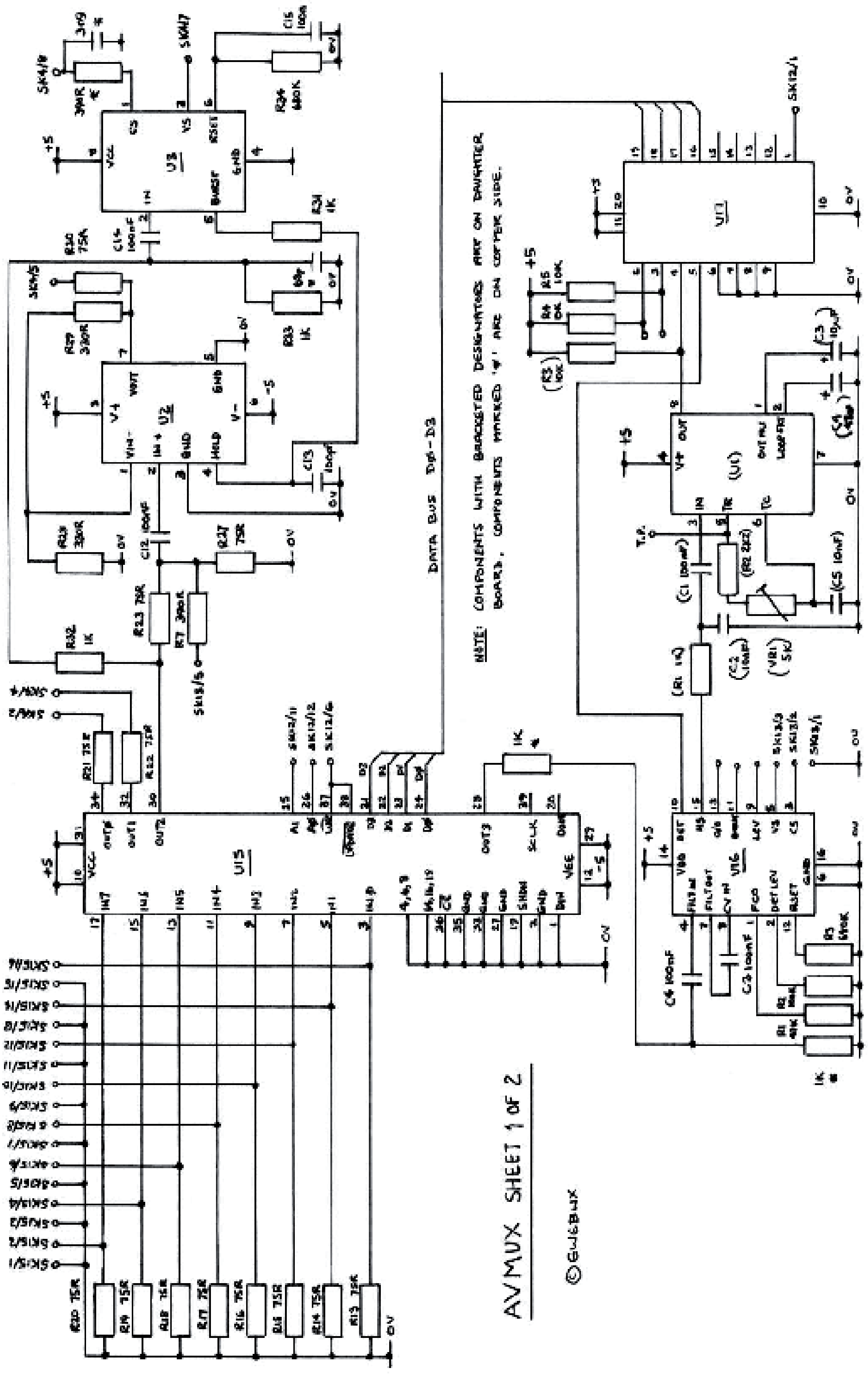
The sync detector is a two-stage device. The least significant bit (bit 0) of the sync status is derived from the ‘video detected’ output of an Elantec EL4583 device. This is an improved version of the industry standard 1881 device, incorporating additional circuits to filter out chrominance signals prior to sync stripping. The ‘video detected’ signal is produced by measuring the amplitude of the horizontal sync pulses in the video stream. This output will detect the presence of video or random noise. The second stage of the sync detector feeds bit 1 of the sync status. It monitors the horizontal sync output from the sync separator and uses it to lock an otherwise free-running oscillator. If sufficient signal at 15625Hz is seen in the sync output, the oscillator locks and this locked state is fed to the sync status. This PLL detector circuit is located on a small daughter board, mounted vertically on the main PCB.

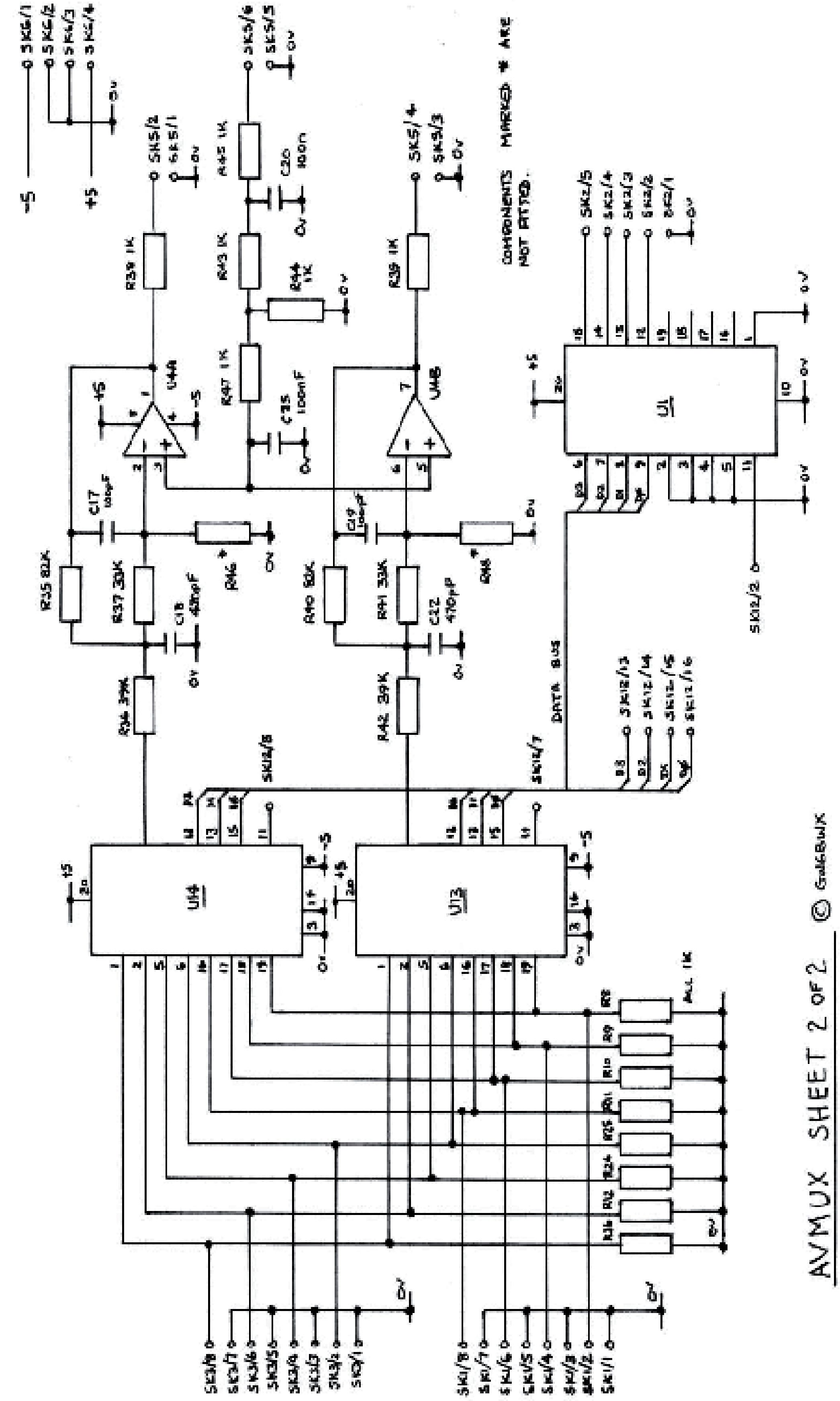
Note: This daughter board has the only adjustable part in the repeater. To set the potentiometer, turn off the auto sync function and route the TCG signal to the sync detector. Using a dual-trace oscilloscope, monitor the horizontal sync input to the board and the only test point. Adjust the control so the horizontal sync pulse aligns with the middle of the low part of the signal on the test point.

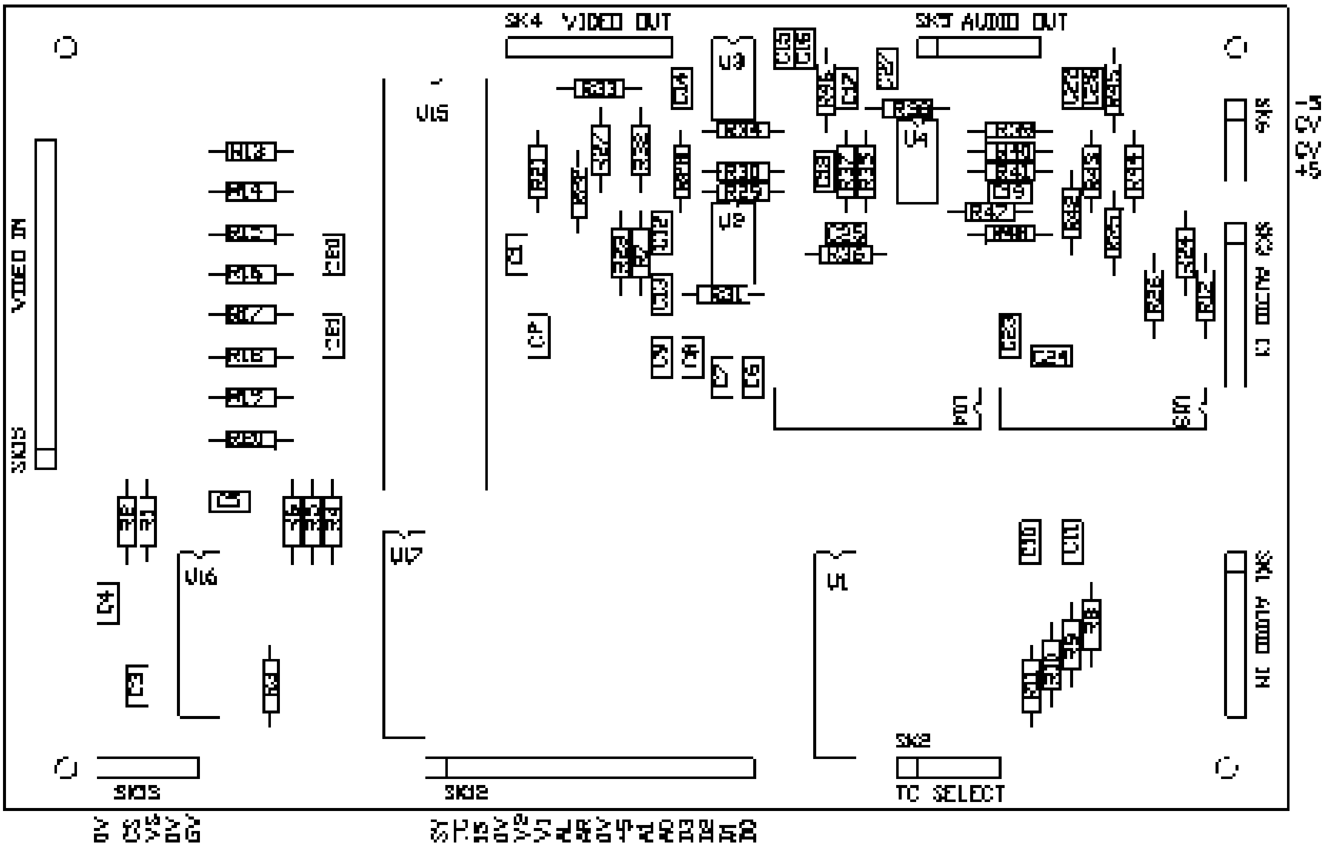
Sync status is read on to the system data bus through a 74HCT573 latch. In addition to the two sync detector signals derived from the on-board circuits, two more inputs are available (bits 2 and 3). These could be used for example, to signal the presence of DATV signals if suitable additional hardware is attached.

The TCG paging signal is latched from the system data bus through a 74HCT574 device. It is connected to the TCG board where it selects which testcard page is to be displayed.



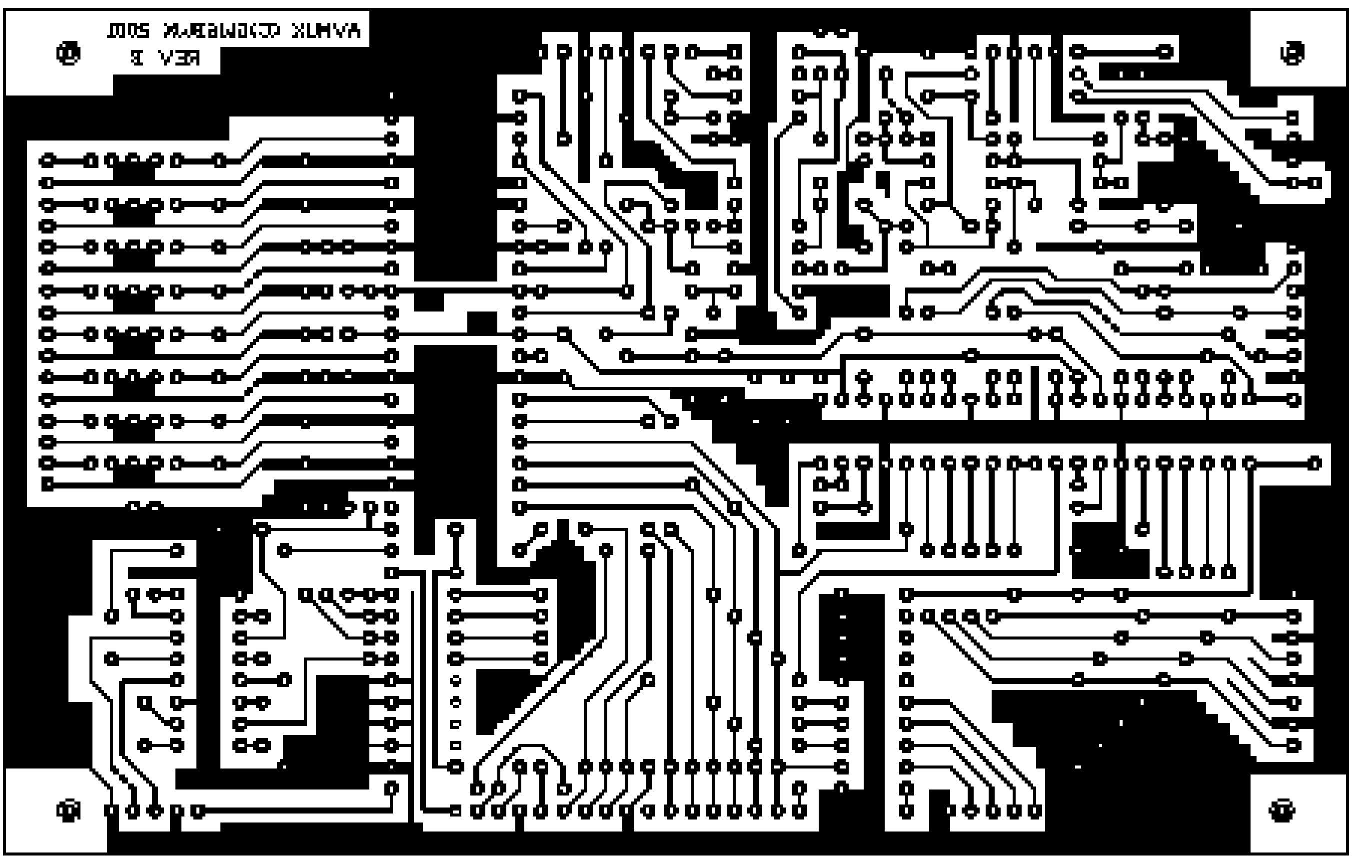

AVMUX SHEET 1 OF 2
NOTE: COMPONENTS WITH BRACKETED DESIGNATORS ARE ON DAUGHTER BOARD, COMPONENTS MARKED '#' ARE ON COPPER SIDE.
DATA BUS D0-D3

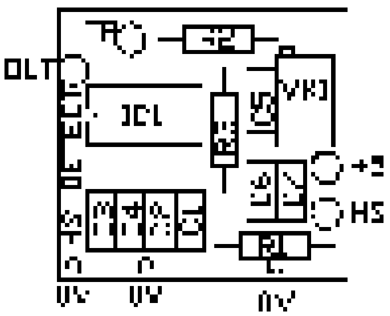

AVMUX SHEET 2 OF 2
COMPONENTS MARKED * ARE NOT FITTED.
DATA BUS
ALL 1K
U14
U13
U1

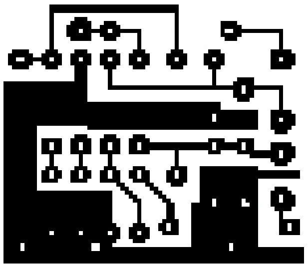


Above:
Component placement overlay for the AVMUX board. The gap between the row of resistors R13-R20 and SK15 is prepared for a bank of video filters if they are required.

Below:
The copper trace layout for the AVMUX board,







Layout and PCB traces for the sync detector sub-board. The three '0V' holes at the bottom allow it to be mounted by wires directly to matching holes on the AVMUX board.

'TP' is a test point, used with a dual-beam oscilloscope to set the centre of the capture range of horizontal sync frequencies. The sync output of the TCG board is accurate to about 0.5Hz and can be used as the sync reference.

VR1 points upwards to make it accessible. Use an insulated screwdriver to minimise hum injection to the wiper via the spindle as this makes adjustment more difficult.

On all the boards there are several wire links, their positions are easy to see on the photographs. Although adding links is a bit fiddly to do neatly, it does dramatically reduce the cost of making the circuit boards which would otherwise have to be double-sided.

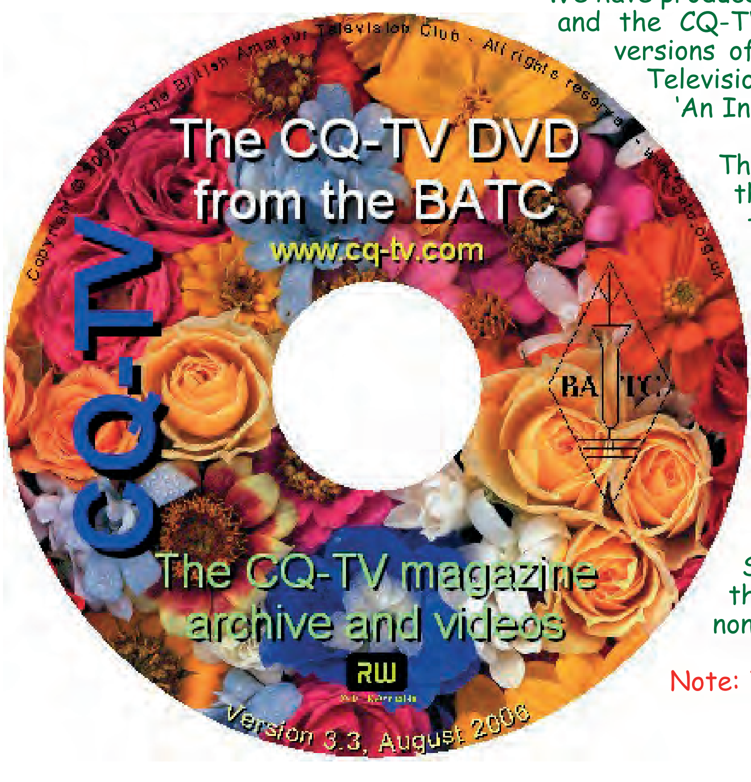
The links are spaced apart and if 'tight' to the board should pose no shorting risk. The only exception to this is on the SYSPROC board which will be covered in the next issue. On that board, one of the links should be sleeved to insulate it as it runs very close to component legs.

Other than the links, everything else is simple to assemble and solder. Use sockets for the ICs and opto-couplers wherever possible. On the ISO board, use raied test point pins where the 'select on test' resistors are fitted. It is far easier to fit resistors with the board in-situ than to keep removing it while the optimum resistor values are selected. The best values are likely to be in the tens of Ohms range and are best discovered by initially using a 220R variable resistor. Inject a signal, ideally a sine wave or a triangle wave into the opto-driver input. While monitoring the output of the board on an oscilloscope, increase the input level until the tips of the waveform start to clip. The variable resistor is adjusted so the clipping is about equal on the peaks and troughs of the waveform. It may be necessary to increase the input level to re-establish clipping as the optimum value is reached. Under test, the board could carry about 2V p-p before the onset of clipping, giving a substantial overhead for the normally expected 1V p-p levels. When the optimum resistor value is found, remove the potentiometer and substitute the nearest value of fixed resistor across the test points.

The PCB layouts were produced using a program called 'Autotrax'. This is a rather dated but very capable program from Protel (now Altium). The version used is now available for free download from Altium's web site although some of the part outlines are from my own 'library' of component shapes. Full details of where the library components can be obtained and the original board artworks will be disclosed in the next issue. Before then, you can download Autotrax from:

http://www.altium.com/Community/Support/Downloads/

Note: This is not the same program as AutotraxEDA from Kovac Software which is a far more advanced but expensive product!



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 211 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.

Contest News by Dave Crump G8GKQ

Introduction

As a long-time participant in ATV Contests, I have volunteered to take over from Richard G7MFO as Contest Manager. I would like to thank Richard for his hard work and enthusiasm over the past 6 years.

I first tried an ATV contest in the 1970s (yes, 405 lines), and have been hooked since. I have operated from many parts of the country and from Germany, using various callsigns including G6RAF and DA4DG. Most recently, I teamed up with Dave G8ADM to operate in the September IARU Contest from Dunstable Downs with 70cm, 24cm, 13cm and 3cm; perfect weather and a good selection of contacts made for an excellent and rewarding day out. The photo shows Dave operating from his well-equipped Land Rover. I did notice that many of the stations we worked had not been involved in Contests before, mainly due to the move towards repeater-based activity.

Contesting Using Repeaters

I am proposing to organise a new contest this year, which will specifically encourage contacts through ATV repeaters. This means that not only will there be an individual winner for each band, there will be a winning repeater for each band. I will publish the rules in the next CQ-TV, but would appreciate any ideas on how the scoring should work before then!

I know that Richard has received 4 entries for the September IARU Contest, and I will be publishing the results in the next issue.

Contest Preparation

In the meantime, start thinking about how you can prepare for next year's contests:

• Have you got a low-bandwidth 70cm receiver for digging those numbers out of the noise?

• Can you set your 24cm receive frequency accurately to wait for the numbers to rise on aircraft flutter?

• Is your 144.75 talkback as good as your TV set-up?

Contest Calendar

Next year's contests are provisionally:

24/25 March 2007 – ATV Repeater Contest

9/10 June 2007 – Summer Fun

8/9 September 2007 – IARU Region 1 Contest

All contests 1800 UTC Saturday until 1200 UTC Sunday

Contacting Me

Like Richard, I reserve the right to participate in the Contests that I organise. However, I will soon be dismantling my shack (specially tidied for the photo!) to move to Italy for 6 months before moving again - probably overseas as well. So, although I will always be contactable by e-mail (contests@batc.org.uk) and occasionally by Skype (broadband permitting – search on my callsign), I cannot give you a postal address at this time; I will publish one for each contest.

To AC-Couple or Not to AC-Couple? That Is the Question!

This article explains the historic, technical, and economic reasons for choosing either an AC- or a DC-coupled video output.

Maxim's DirectDrive™ video technology, which has the characteristics of an AC-coupled connection but the simplicity of a DC-coupled connection, is introduced. Using this information, a design engineer can decide better which style of video output to use in future projects.

Introduction

For analog video circuits, the question of whether or not to design an AC-coupled output depends as much on company policy and industry standards as technology and cost. An AC-coupled output includes a series capacitor (**Figure 1a**), while a DCcoupled output does not (**Figure 1b**). A designer new to video output circuits may find such a choice confusing because adding a capacitor to the output path increases cost, requires space, and distorts the video signal. However, the choice may have already been made due to historical, technical, or economic reasons.

AC-Coupled vs. DC-Coupled Outputs

Figure 1a1 shows the input and output waveforms for an AC-coupled output. Notice how the output waveform "tilts" up and

"tilts" down with respect to the input waveform. Hence, the name of this kind of field time distortion is "field tilt." The

oscilloscope trace in Figure 1b2 shows a DC-coupled output. In this case, notice that there is no field tilt. The NTSC video test signal used is named "Regulate." **Figure 2a** shows what the white portion of the test signal looks like on a video monitor. **Figure 2b** shows what the black portion of the test signal looks like on a video monitor. The Regulate video test signal draws

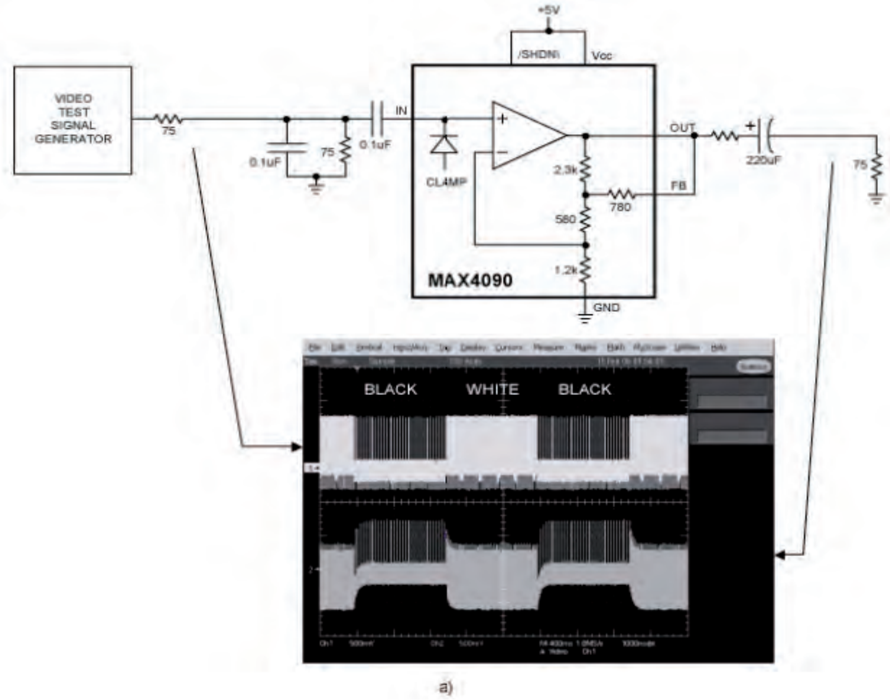


Figure 1a. AC-coupled output connection.

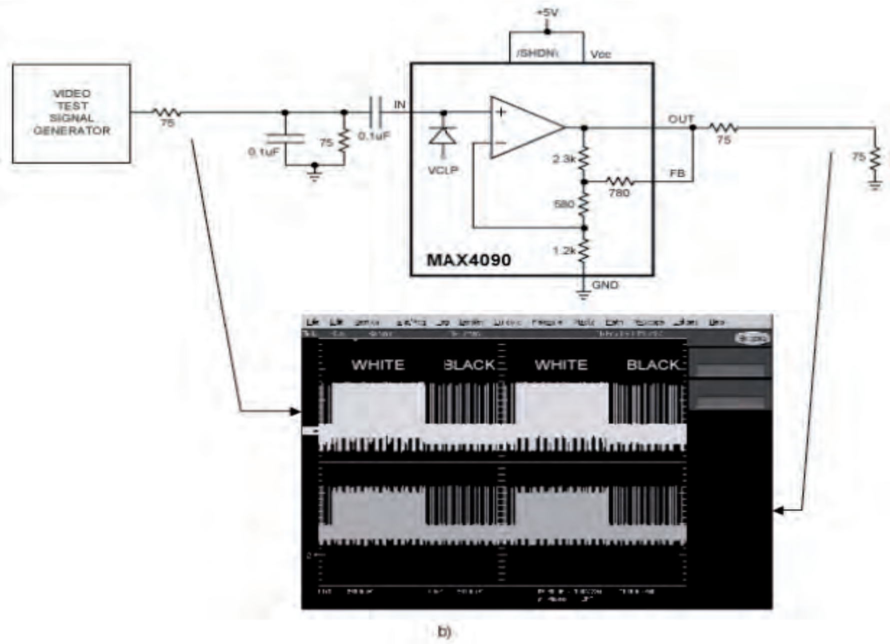


Figure 1b. DC-coupled output

a white border on the edge of the screen during both the white portion and the black portion.

Historical Use of AC-Coupling

Given the drawbacks of AC-coupling, why did it ever get used? The simple answer is protection. **Figure 3** shows a simple video-output circuit that might have been created before integrated circuits were widely used. The capacitor prevents the NPN transistor from damaging itself in case the output connector is shorted to ground or a supply voltage.

Figure 2a. White screen of Regulate video test signal.

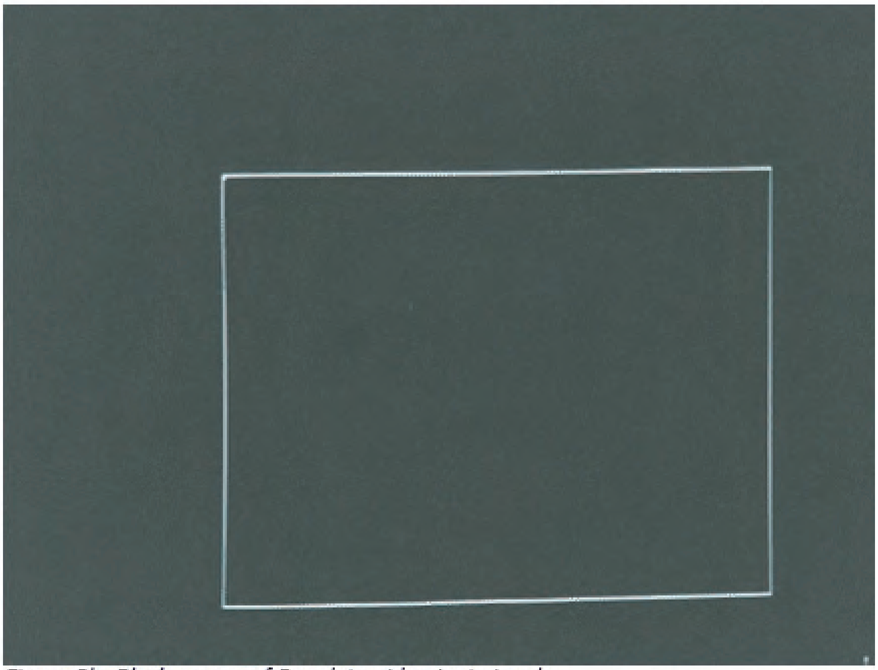


Figure 2b. Black screen of Regulate video test signal.

Contemporary integrated video amplifiers have robust short-circuit protection circuitry so that they are not damaged in the event of a short. Nonetheless, the use of the capacitor has become entrenched in some companies, especially those with a long history of making video equipment. Design engineers may be told that they must add a capacitor to comply with company policy.

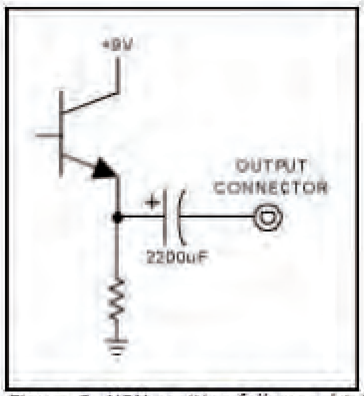


Figure 3. NPN emitter follower driving v

In addition, industry standards can implicitly force the design engineer to use a capacitor. The Japan Electronics Industry Trade Association (JEITA) has a specification that requires that the voltage magnitude must be less than 100mV on an connector (Figure 3). If the normal DC bias at the NPN emitter is 4V, then the output connector would also be approximately 4V if the capacitor and bleed resistor were not present. The easiest way to meet the JEITA specification is to add a capacitor and bleed resistor to ground.

Technical Concerns

One of the concerns about AC-coupling is that the capacitor is usually large—220μF or higher. The reason is that the frequency of the pole formed by the capacitor and 150R load (the total resistance of the back termination resistor and the input termination resistor) should be significantly less than the frame rate of either 25Hz or 30Hz. A 220μF capacitor forms a pole at 5Hz, which is barely adequate. Broadcast equipment typically has capacitors in the 2200μF range. **Figure 4** shows the highpass response of an AC-coupled output connection with a 220μF capacitor.

With the advent of small, portable devices that have video outputs, using a large, AC-coupling capacitor becomes prohibitive, primarily for space and cost reasons. SAG compensation, shown in **Figure 5**, can reduce space and cost while maintaining AC-coupling. The single large capacitor of the standard connection is replaced by two, smaller capacitors. A technical analysis of SAG compensation is beyond the scope of this article, but a short, intuitive explanation can be given. The problem with a single, AC-coupling capacitor is that the signal is attenuated at frequencies below the pole frequency—the smaller the capacitor, the higher the pole frequency. SAG compensation boosts the low-frequency response in order to compensate for the low-frequency attenuation (Figure 5). At low frequencies, the capacitors can be treated as opens. The low-frequency gain is approximately 6. At high frequencies, the capacitors are essentially shorts, and the high-frequency gain is 2.

In the consumer electronics industry, the pressure to reduce cost is intense, and for small devices, the pressure to

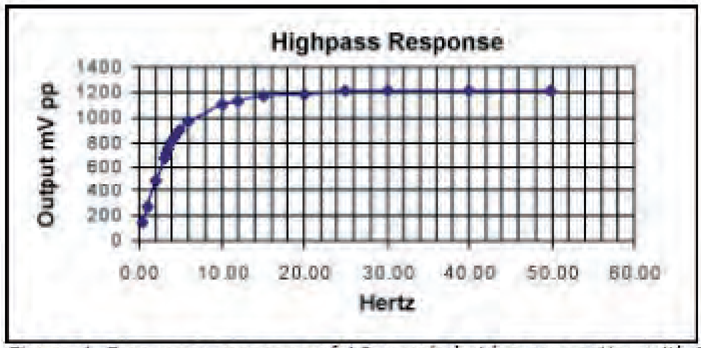


Figure 4. Frequency response of AC-coupled video connection with 220µF capacitor.

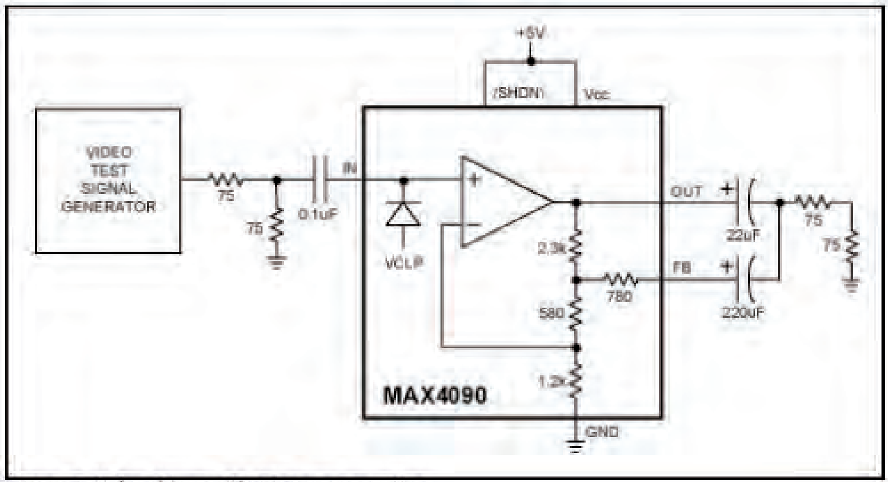


Figure 5. Video driver with SAG compensation.

miniaturize is just as intense. Companies, even some with a long history of designing video equipment, are now opting for DC-coupled video connections (Figure 1b). The main difference to note with a DC-coupled output is that the signal has a positive DC bias due to the fact that most systems have eliminated negative supplies. In order for the amplifier to remain in a linear mode of operation, the output signal must be biased between ground and the positive supply.

Design engineers who are contemplating a switch from an AC-coupled output to a DC-coupled output are concerned with compatibility. The vast majority of equipment is compatible with either style, but there is still a small percentage that is incompatible with an AC-coupled output, and yet another small percentage that is incompatible with DC-coupled outputs.

Figure 6a shows the input stage for a modern television. The video signal is AC-coupled into a DC restoration circuit: hence, the input video signal can have any DC bias. This input circuit is compatible with both AC- and DC-coupled video sources.

Figure 6b shows the input stage that uses a polarized capacitor. If the DC bias of the incoming video signal is too high, then the polarized capacitor could be damaged. This input stage might have problems with a signal from a DC-coupled source.

Figure 6c shows an input stage that uses a PNP emitter follower. If the input signal is too negative, then the PNP emitter follower might saturate. Therefore, a DC-coupled video source might saturate the PNP emitter follower, especially if the local ground of the source is lower than the local ground of the receiver.

The problem with televisions is that there has never been a commonly accepted way of designing the input stage. Some models of the numerous televisions designed over the years have marginal input stages that could have problems with either AC- or DC-coupled sources. It is not possible to maintain universal compatibility when there are so many different kinds of receiving equipment. Most low-end video sources, which represent the greatest volume of transmitting equipment, tend to use DC-coupled outputs for cost reasons.

DirectDrive Solution

For those design engineers who still want to include an AC-coupled video output, Maxim offers DirectDrive technology, which eliminates the need for large output-coupling capacitors. The MAX9503 is the first Maxim part to incorporate DirectDrive technology for video signals (see **Figure 7**).

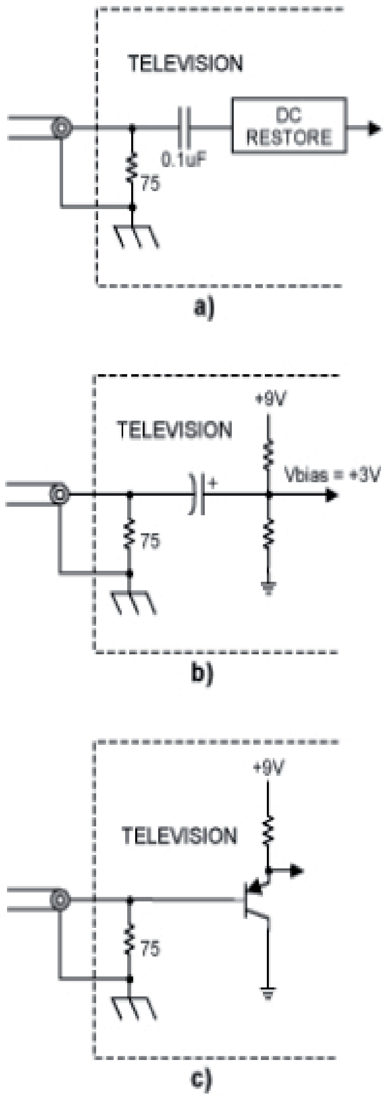


Figure 6. a) Modern TV input stage, b) polarized capacitor c) PNP emitter follower in input stage.

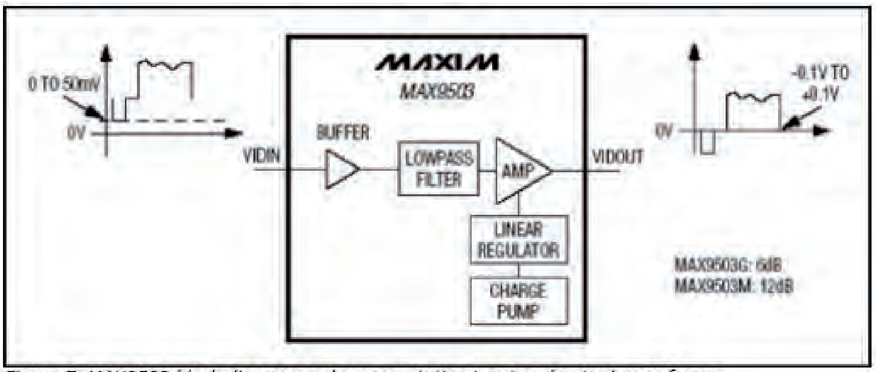


Figure 7. MAX9503 block diagram and representative input and output waveforms.

The MAX9503 filters and amplifies standard-definition video signals. The input of the MAX9503 can be directly connected to the output of a video digital-to-analog converter (DAC). An internal reconstruction filter smoothes the steps and reduces the spikes on the video signal from the DAC. The MAX9503 level shifts the video signal to a lower voltage such that the blank level is approximately at ground at the output. DirectDrive requires an integrated charge pump and a linear regulator to create a clean negative power supply to drive the sync pulse below ground. The charge pump injects so little noise into the video output that the picture is seemingly flawless.

application circuit includes a 75 back-termination resistor

that limits short-circuit current if an external short is applied to the video output. In addition, the MAX9503 features internal output short-circuit protection to prevent device damage in prototyping and applications where the amplifier output can be directly shorted. Hence, the MAX9503 is robust in the face of most common fault conditions.

The major benefit of DirectDrive is that for the addition of just two small, 1μF capacitors for the charge-pump circuit, the design engineer can eliminate the single, large, output-coupling capacitor in a standard AC-coupled video output or two medium-size, output coupling capacitors in a SAG network. Output video quality is improved because field-time distortion is eliminated.

Notes The 0.1μF capacitor across the 75 input- termination resistor to ground filters out higher frequencies in the video waveform, removing aliasing in the black portion of the video test signal. The 400ms time scale of the oscilloscope shot is very long compared to a horizontal line time (~64μs). Without the 0.1μF capacitor, the aliasing during the black portion of the video test signal would make the black portion of the input signal nearly indistinguishable from the white portion. The black portion of the output signal would be filled in like the white portion.

2Just as in Figure 1a, there is a 0.1μF capacitor across the 75 input-termination resistor to ground for the same reasons. Without the 0.1μF capacitor, the aliasing during the black portion of the video test signal would make the black portion look the same as the white portion.

Figure 8 shows a Regulate video test signal applied to the MAX9503. Notice how the blank level of the output waveform is held near ground and that there is no field time distortion, in contrast to the normal AC-coupled waveform shown in Figure 1a. The Regulate test signal at the MAX9503 output maintains a much more well-defined output voltage range than that from an AC-coupled connection.

Figure 8. Regulate video test signal applied to the MAX9503—input waveform is on top, output waveform is on the bottom.

One of the reasons to use an AC-coupled video output is for protection against shorts to ground and the supply voltage. The MAX9503 typically operates from a 3.3V supply. The MAX9503

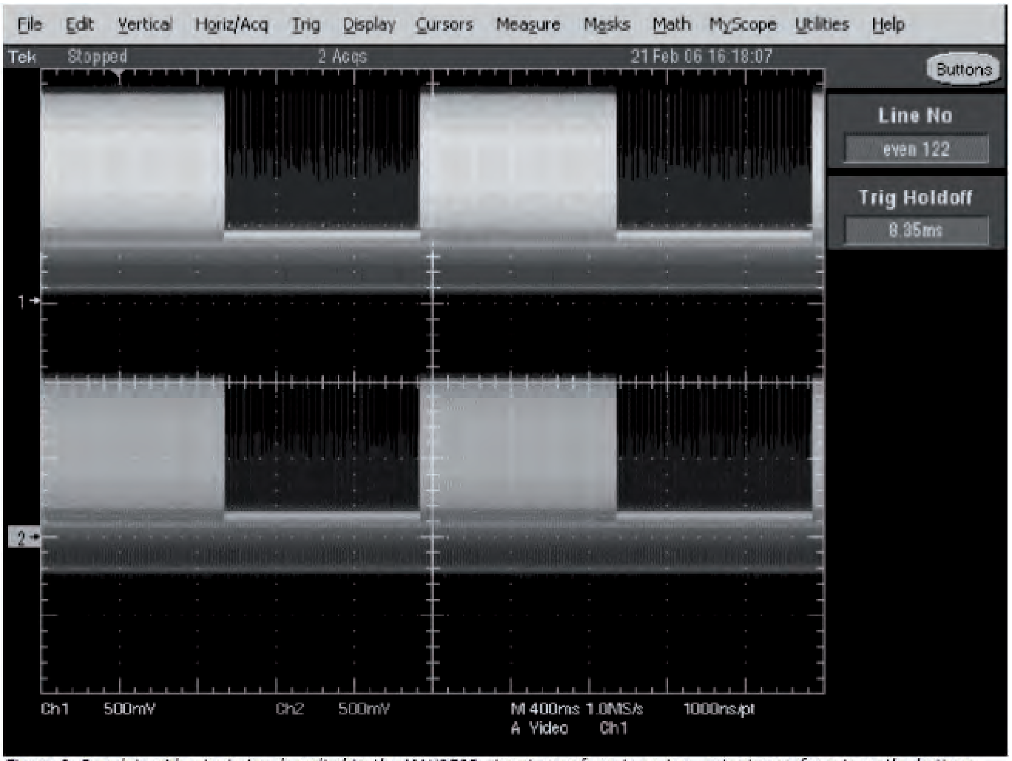
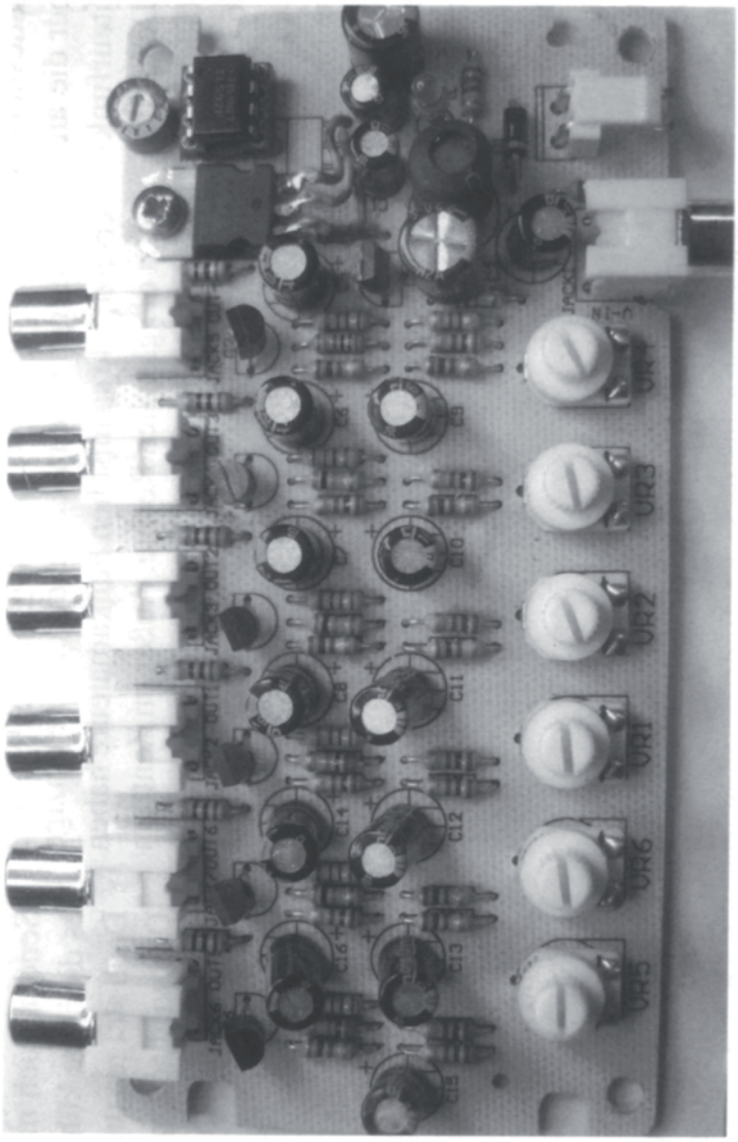


Figure 8. Regulate video test signal applied to the MAX9503—input waveform is on top, output waveform is on the bottom.

Test and Modification of a 6 Channel Video Amplifier

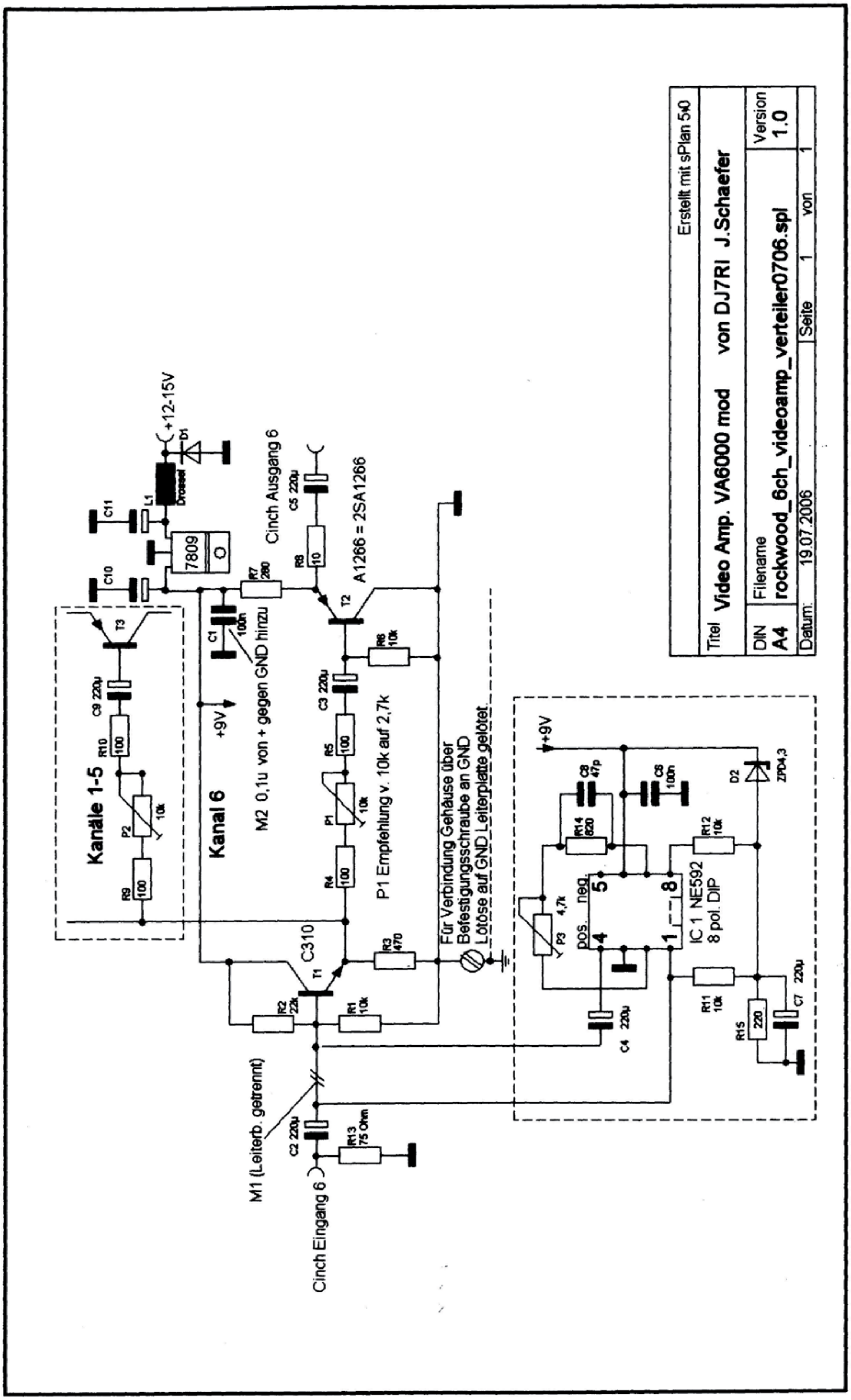
This affordable commercial device is made for video distribution to 6 outputs, for instance to several flat-screens. For access to the new gain potentiometer P3 (picture “fig 1”, right hand above) we have to drill a hole into the casing. The device is delivered with a separate power cable incl. circuit breaker. Parameters seem to verify a proper distribution: supply voltage 12 V DC, cinch sockets, input level 1 V p-p, output level variable 0,5 - 1,5 V p-p, power LED, casing 155x21x80 mm.

Video systems are using 75 Ohm impedance which guarantees a loss free transfer even with using long cables. A video source with 75 Ohm impedance will submit about 2 V p-p standard level without a load and about 1 V p-p across 75 Ohm load impedance (voltage divider). To measure this you need a tee feeder at the oscilloscope input, and with a 75 Ohm load resistor at the second input the test signal voltage should drop to half value. The original VA6000 has a much higher input impedance than needed and thus already reduces the colour subcarrier and overall sharpness using only 1,5 m cable length. It´s output impedance is much lower than 75 Ohm which is no fault but needs observation. The overall “gain” is only 0,7 as the involved cascaded emitter followers cannot realize more voltage gain. Only with very short input cables (20 cm) the standard output voltage of 1 V p-p at 75 Ohm load is possible. The coupling capicators have 220 uF, which is just acceptable, but 1000 uF would be better for a stable black level.



As I needed to use a longer input cable, I decided to modify the VA6000 input (losing any guarantee). The circuit diagram is showing only channel 6, 1 - 5 is indicated above. In order to mount a small amplifier IC NE592 on the VA6000 motherboard the voltage regulator 7809 had to move aside some millimeters (see photo “fig 2”). Several circuit parts around the new IC were attached at the solder side (i.e. 75 Ohm input load) or glued to the board (IC socket, potentiometer).

Testing the VA6000 output with an oscilloscope I noticed self-oscillation at around 80 MHz which demanded additional blocking capicators (see diagram: “M2 0,1uF von + gegen


Kanäle 1-5
Kanal 6
+9V
M2 0,1u von + gegen GND hinzu
P1 Empfehlung v. 10k auf 2,7k
Für Verbindung Gehäuse über
Befestigungsschraube an GND
Lötöse auf GND Leiterplatte gelötet
Cinch Eingang 6
M1 (Leiterb. getrennt)
Cinch Ausgang 6
A1266 = 2SA1266
+12-15V
C310
7809
IC 1 NE592
8 pol. DIP
Erstellt mit sPlan 5.0
Titel
Video Amp. VA6000 mod von DJ7RI J.Schaefer
DIN
A4
Filename
rockwood_6ch_videoamp_verteiler0706.spl
Version
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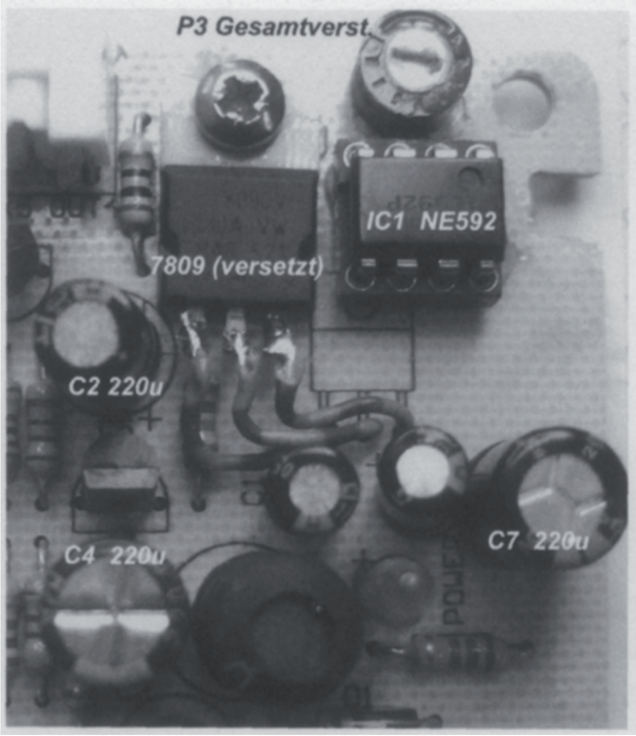
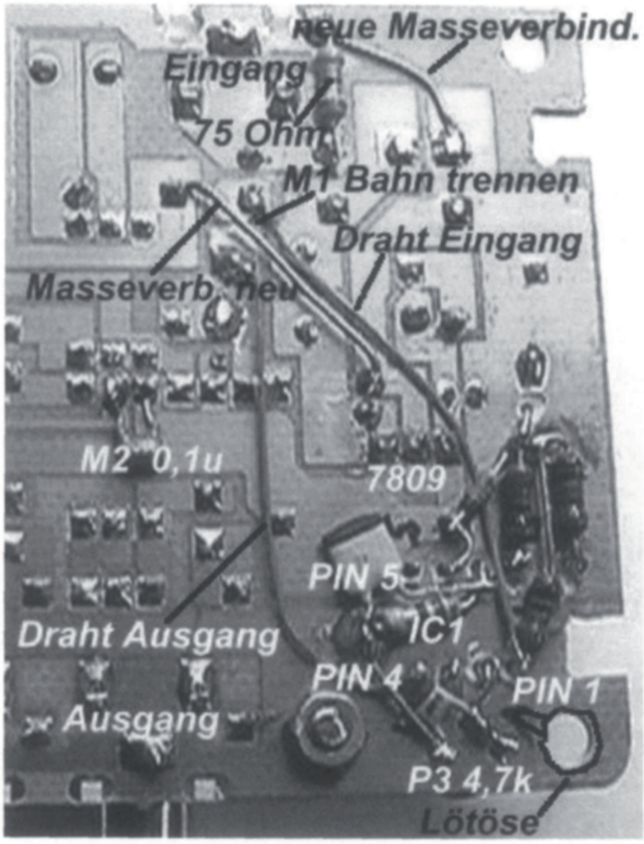
Datum: 19.07.2006
Seite 1 von 1





GND”). The varnish had to be removed at casing points where screws attached the motherboard. Finally 2 additional ground wires (see photo “fig 3”, “Masseverbind.”) suppressed any self-oscillation.

The video input track is interrupted and bridged by the input/output wires to the new NE592, see photo “fig 3”, “M1 Bahn trennen” and diagram “M1 (Leiterb. getrennt)”. The output voltage 1 V p-p at 75 Ohm load is adjusted with P3 near IC NE592, a fine adjustment of all outputs to equal values could be achieved better with lower “P1” values of around 2 kOhm instead of 10 kOhm. Power consumption is about 200 mA at 12 V DC. *Translations: Klaus, DL4KCK, AGAF e.V. www.agaf.de*

“Grande Bleue 2006”

For more than 10 years some radio amateurs from countries around the western mediterranean sea have gathered in July to make ATV and SSB contacts on the microwave bands. Nearly each year distance records have been broken. In 2006 stations from France, Italy, Malta, Spain and for the first time Algeria took part besides a Swiss team under IS0/HB9IBC portable on the isle of Sardinia. In northern Sardinia (JN40CT) HB9AZN and HB9RXV received several ATV repeaters over a distance of 300 to 500 km. Nearly every day contacts in ATV and DATV succeeded to EA3XU over 550 km and to F4CXQ over 350 km. Very nice video views were exchanged with TK/F5BUU on the isle of Corsica. A planned contact on 1255 MHz to Algeria with 7X2FB and 7X2RF failed because of interference by the local airfield radar.

The biggest success was an excellent

contact in ATV and DATV on 10 GHz over 561 km to Malta (9H1), maybe a new record in digital ATV after a former 450 km success. This needed a suitable location for both stations. The Swiss team drove to the southern tip of Sardinia to a parking place about 60 m above sea level. Output power in DATV (QPSK, SR 7500, FEC 3/4) was 1,5 W, in FM-ATV 25 W into a 90 cm parabolic dish. The Malta team (9H1ES, 9H1VW, 9H1AK, 9H1LO, 9H1M, 9H5CZ) received the 10 GHz FM-ATV signal with a 1,2 m dish rather quickly after a talk back contact on 2 m. The DATV contact wasn´t quite as easy, but after employment of a spectral analyzer the signal was found and a good video received. The DATV picture quality appeared superior to FM-ATV, HB9AZN was using MPEG encoder and QPSK exciter boards from the german AGAF development team. Other hf modules in his station were from Kuhne-electronic, ID-elektronik and Dirk Fischer (Germany). Several more ATV contacts were made from the sardinian south (JM49SD), for instance to I8EMG (Italy). Details in french language are available under www.swissatv.ch

authors: DJ9PE and OE5BDO after a report by HB9RXV

‘TV 70’. Dicky Howett Reports On An Anniversary

On Thursday 2nd November 2006, members of various tv history/ preservation groups, including the Test Card Circle, held a ‘live’ broadcast at Alexandra Palace in Studio A celebrating the opening in 1936 of BBC Television’s electronic service.

To cover the event, three restored Marconi 4-1/2” inch image orthicon cameras (Mks IV&V) shot a varied programme including a ‘guest interview’ spot hosted by Tony Currie and featuring Sylvia Peters, Vera McKechnie, Patricia Driscoll and antiques expert Paul Atterbury (his mum pulled Andy Pandy’s strings).

Many archive clips were shown during the programme, presented before an invited studio audience. The proceedings were also streamed on the internet and relayed by Radio Six International. The transmission was recorded for posterity on high quality video formats.

The fully-equipped monochrome production ‘control centre’, parked on the terrace below the studio and within sight of the famous transmitter tower, is an ex-broadcast ob vehicle, provided by Paul Marshall and operated throught the day with great skill by his team.

(Right) On the terrance, the OB truck (in Tyne Tees livery) linked by cables up the wall to Studio A, Alexandra Palace. (Below) Senior cameraman Dicky Howett operates a Marconi Mk IV during the live performance. Turret lenses were 2” 3”, 5” & 8” inches.

The ‘TV 70’ set during line up. Margaret Howett sits in

More photographs of the Ally Pally anniversary event , this time from the camera of Dave, G8TVW

Guest Sylvia Peters and host Tony Currie at Ally Pally

Part of the set reconstruction at Ally Pally.
(What! - no widescreen plasma TV - editor)