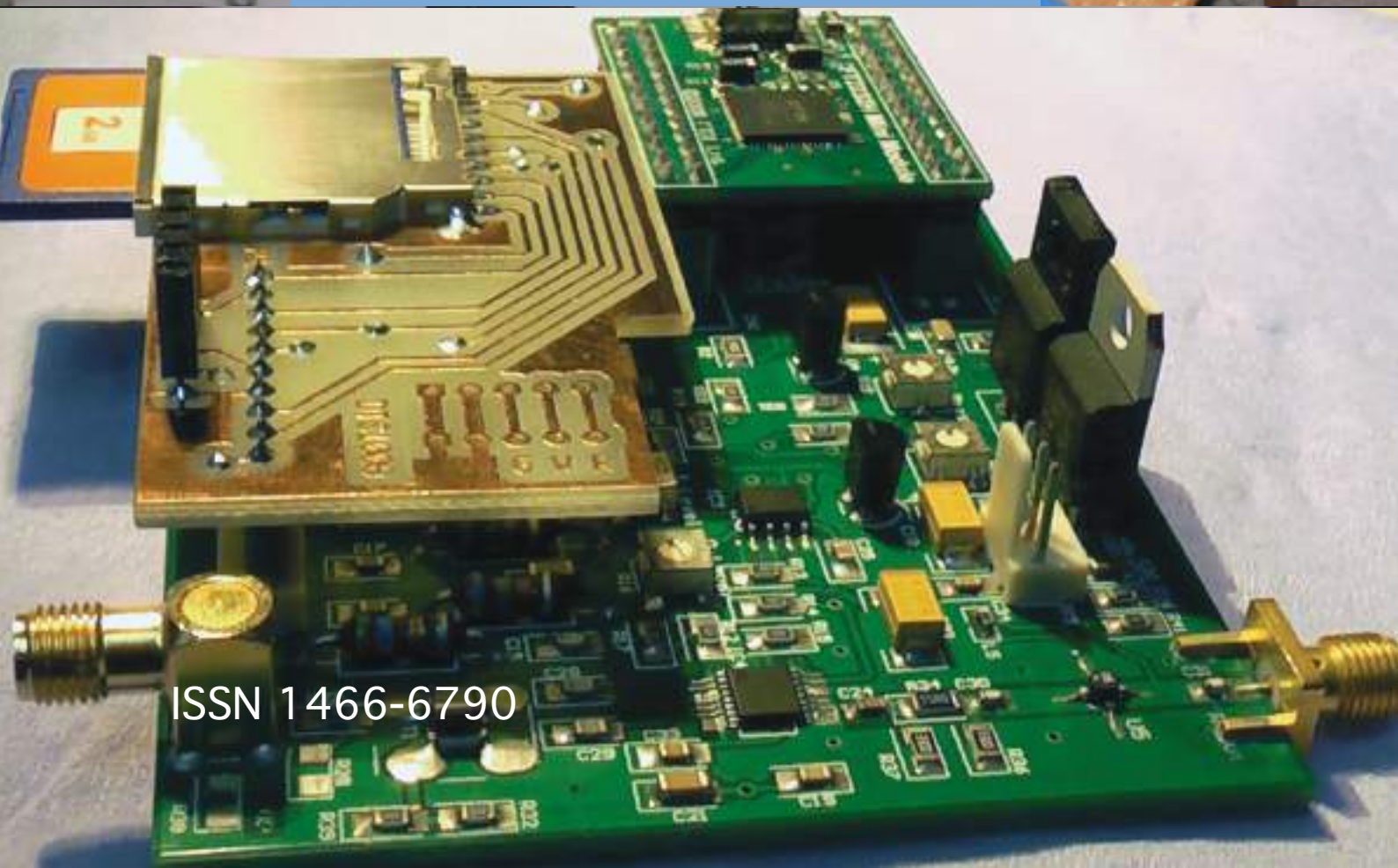
# CQ-TV

Issue 238 September 2012

## BATC BGM 2012

Digilite
Colour Lab
Bye Bye Sky
Funcube Dongle
Circuit Snippets
Shellwood Studios
Timeline - home NAS
(very) Low Light Camera



ISSN 1466-6790

# Caption Contest

Here are the entries for last months caption contest (photo below):

"We are gathered here today on the site of the former Marconi factory"
Trevor G8CJS

"I say that the aperture (in the trees) should be about 10ft wide.... Anyone got a chain saw ?
Best 73 ...de Mike G8CPF

It's no good looking down at him, you were warned! Small sections of 13cms for exclusive use only during the Olyimpics. Now pick him up, go away, and read the Ofcom advisory!
Peter G8DKC

"I tell you something fell out of the sky and landed here"
Mike G6HMG

"Its no use crying it looks dead to us"
Albert Allen G4DHO

...and the winner is Albert, G4DHO Congratulations, a caption generator will be on its way shortly.

This months photo is below, comments please to: editor@batc.org.uk

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# Contents







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The preferred method of contacting a committee member is via email, all email addresses are printed above.

You can also telephone **01400 414243** but we cannot guarantee availability at any particular time. If you call you will be presented with a menu, so you can be connected to the correct person.

You can also send any committee member a text message on the above number, just prefix your message with their two letter keyword followed by a space, followed by your message.

Finally, you can always write a letter.

# 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

A fair bit has been happening in the background since CQ-TV 237:

Paul Marshall has resigned from the committee, although he will continue to handle publications (mainly because no-one else has a garage big enough to store all the material !);

Brian Summers has resigned as General Secretary. Brian only took on the dual role of Treasurer and Secretary as we were short of committee members when the previous Secretary resigned, it was only supposed to be a temporary post! Trevor has stepped in as acting secretary until the BGM, but we do need to elect a new Secretary... hold that thought;

Brian Summers has also announced his intention to resign as Treasurer, Brian has held this post for more years than he cares to count and feels it is now time to move on.

The current committee has been fairly static for many years now and it would be nice to have some "new blood" helping to run your club. So if you feel you could spare a few hours a month and are interested in any aspect of ATV (why else would you be reading this!), then please get in touch, ideally before the BGM.

We not only need a new General Secretary and Treasurer, there are other committee posts that need filling so no-one has to do more than one job.

I would like to take this opportunity to personally thank both Brian and Paul for their hard work and efforts and now they will both have a bit more spare time on their hands, I look forward to receiving lots of new articles for CQ-TV from you both !!

We have also been looking at our constitution, it was originally written some years ago and is in need of "modernisation". It is still a work in progress, but the latest version can be viewed here:
www.batc.org.uk/club_stuff/const.html

This is your clubs constitution, so please take a look and let me have any comments, suggestions, etc. We are aiming to have it finalised in time for the BGM where we will request that it be formally adopted.

CQ-TV is still in need of more copy, remember that we are offering cash for articles. If you think you have an article suitable for the magazine, please get in touch. The idea behind the payment for articles is in recognition of that fact that developing new ideas can cost money, e.g. for prototyping, PCB manufacture, etc. If you would like paying for an article let me know in advance, so when it is published we can make the payment quickly.

Ian Pawson has been working on creating alternative formats for CQ-TV and the plan is to provide download links to the latest issues as well as the older issues currently available. Feedback on these alternative formats is most welcome.

I hope you enjoy 238 and I look forward to seeing you at the BGM.
Chris, G1FEF


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

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' as well as the Lighting eBook.

The archive contains all past issues of CQ-TV and is updated 4 times a year, to include the current issue of CQ-TV.

The DVD is playable in a PC and the data files will 'auto-run' when the DVD is inserted.

The video section was prepared by Brian Kelly and contains videos from Bletchley Park 1999, one from Shuttleworth 2002 and one from 2004. The DVD is available to members for just £5 inc. postage to the UK and EEC. Note that these videos have been made with the H.264 codec and so you will need suitable software to view them.

http://www.batc.org.uk/club_stuff/pubs.html

# 2012 Convention and Biennial General Meeting

Formal Notice is given of the Biennial General meeting of the BATC. This Meeting will be held on Sunday 7th of October at 11.15 in the Everest Community Academy, Basingstoke. The Agenda is as follows:

- **Apologies for absence**
- **Minutes of the 2010 BGM**
- **Chairman's report**
- **Treasurer's report**
- **Membership secretary's report**
- **Editor's report**
- **Election and re-election of committee members**
- **Changes to the constitution**
- **Awards**

Final details are coming together for what is planned to be a very exciting BATC ATV convention and Biennial General meeting to be held in Basingstoke on the 6th and 7th of October.

- **7 talks on ATV and DATV topics including Digilite**
- **Live demo / ATV group demonstrations**
- **Specialist traders selling RF and video components**
- **The BATC shop with Digilite kits and 2012 convention memorabilia**
- **BATC members flea market**
- **A "test it and fix it" area where you can bring your projects to be tested on professional test equipment**

**Venue / timing**

The ATV Convention will be held at the Everest Community Academy in Basingstoke:
http://www.everest.hants.sch.uk/
on Saturday 6th (doors open at 12 noon and lectures start at 1:30pm) and Sunday 7th October (start at 9:30am - close at 4pm) with the BGM taking place at 11:15am on Sunday.

WARNING: this is a new building within a new development of houses and your sat nav is almost certainly not going be accurate! The venue coordinates are 1.285809,-1.095096 or go to http://goo.gl/maps/yIEA6 for a map to get directions to the hotel and conference from J6 and J7 of the M3.

**BGM**

The Biennial General Meeting will be on Sunday morning when your committee for the next 2 years will be elected, followed by a BATC open forum panel discussion where you can quiz the new committee on plans and thoughts for the future. Admission is free to all BATC members.

**Test and fix it area**

As DATV requires very different skills and test equipment from ATV, we will be dedicating a large area to a test and fix facility where we will have professional RF and video test equipment and a range of off air DATV signals. We will have experts on hand to help set up and test your digital transmitters and receivers if you have any special requirements, please let us know ahead of time and we will do our best to make it happen.

**Demonstrations**

The following demonstrations are now confirmed to be in the open meeting area:

- **Live 23cm and 70cm versions of Digilite and options cards G4KLB and G8HUY**
- **DATV Express G4GUO**
- **3D TV for ATV Mike Cox**
- **Tutioune DVBS receive and analyser software F6DZP**
- **Aerials for ATV G8ADM**
- **47 & 76 GHz DATV G3PYB**
- **Wide band SDR receiver based on low cost DVB-T USB sticks M0DNY**
- **Vintage cameras G8GQS**

**Traders**

As well as the members flea market, the BATC shop will be present selling Digilite parts and other items from the on-line shop plus 2012 Convention memorabilia. We are also inviting a few specialist traders including:

- **Justin G8YTZ - SR systems units (with working demos) and boxes**
- **G4DDK - pre-amp and kits (Sunday only)**
- **Alan Melia - tin plate boxes etc (Sunday only)**
- **Jason G7OCD - USB microwave power meters**
- **G4HUP - DDS kits and LC meters**
- **CSTech - DTMF & CTCSS encoders and decoders**
- **RFdesignuk - Filters, noise source and RF bits**

We could potentially do with a few more traders to make the event a success so if you have any favourite suppliers who you think would be interested in attending please contact Noel G8GTZ, email: bgm2012@batc.org.uk.

**Lecture program**

The focus of the ATV Convention will be a lecture program with talks on Saturday afternoon and Sunday. The main themes of the talks will be Digital ATV, in particular the Digilite project, and how to get going on 70cms DATV.

The final draft program for the weekend is below, but is still subject to change:

**Saturday**

12:00 Convention opens
Demos and networking time

13:30 Conference opens
Welcome and introductions G8GTZ

13:40 DATV introduction & update
Refresh on DATV basics, who's doing what, repeater status etc G3PYB / G8GTZ

14:00 DATV express
The DATV Express project - an alternative to Digilite G4GUO

14:45 Coffee break

15:15 BATC streamer
Update on future plans with this very successful club project G1FEF

15:45 MPEG4 & DVBS in a chip
Stand alone MPEG 4 encoder / modulator project G7OCD

16:30 Tutioune software
DVB-S analyser / receiver software - overview and in practice F6DZP & G7LWT

17:15 Close

19:45 Dinner
Conference dinner at the Apollo hotel

**Sunday**

09:30 Cheap wideband SDR rxrs
Using DVB-T sticks as wideband SDR recievers M0DNY

10:00 Digilite
Theory and in practice G4EWJ

10:45 Coffee break

11:15 BGM followed by "ask the panel" BGM for members only

12:15 Lunch

13:15 Low noise pre amps
Designing and using LNAs for ATV G4DDK

13:45 Radio astronomy
Hydrogen Line Astronomy from the back yard G4NNS

14:30 ISS DATV downlink project
Update on the project plus ideas on software based DATV repeaters G7LWT

15:15 Close

**In detail**

**DATV express - G4GUO**
DATV-Express is a single board 950 - 1575MHz 20 mW Software Defined Transmitter with 1 Hz resolution capable of transmitting signals of up to 8 MHz bandwidth. It uses a USB2 interface to communicate to a PC where most of the complex signal processing is done. Although originally conceived as an inexpensive digital TV transmitter it is capable of much more than that. It is an open hackable platform which the designers hope will encourage others to develop great new things.

Charles first became interested in Amateur Radio after hearing a local AM net on 160m. He was later licensed at the age of 17 in 1976 as G8LXJ later to become G4GUO, Charles also held the experimental callsign G9BNZ in 1979 which was granted for 5 KHz operation as part of his A level Physics project. In the early 80s he was active on 70 cms analogue TV with the Worthing ATV group and later built a Solent transmitter for 24 cms TV with which he was active from Chelmsford. His current hobby interest is Amateur digital TV in all its forms and in particular digital signal processing using FPGAs.

**BATC streamer update - G1FEF**
Chris will provide an update on the current streamer and plans for the future.

**MPEG4 and DVBS in a chip - G70CD**
Jason will do a presentation on his plans for a combined H.264 encoder & DVB-S transmitter using an off the shelf prototyping board, bringing low power, PC-less HD to the DATV table.

**Receiving and measuring a DVB-S signal - F6DZP**
Jean Pierre will be covering the following topics:
†
How a DVB-S/QPSK demodulator works with diagrams of a reception/ demodulation of QPSK signal up to the video/audio decoding.

Possible measurements on a DVB-S QPSK signal and their usefulness ñ including Signal level, signal to noise, phase noise, jitter, Digital SNR (done on digital IQ), MER and EVM.

Measuring Digital Stream Error Rates including BER, VBER, CBER and UNC and what methods could we adopt with DATV to give a report?

An overview of TUTIOUNE, software for reception and measurement of DVBS/QPSK signals including TiouneMonitor (web monitoring software) and how to use TUTIOUNE including which tuner cards can I use.

**Cheap wideband SDR and spectrum analyser using USB DVB-T stick Philip - M0DNY**, will look at the potential using the recently available DVB-T stick to form the basis of a wide band SDR and spectrum analyser covering 50 - 1700 MHz.

**Digilite theory and in practice - G4KLB and G8HUY**
The Digilite team will be covering some of the technical theory behind the project and then bringing us to speed on the most recent development of this BATC sponsored project.

**Low Noise pre-amps - G4DDK**
Using lossless negative feedback it has become possible to produce very low noise UHF and SHF preamplifiers with good input return loss and high stability. The latest generation of VLNA preamplifiers has a noise figure below 0.3dB on both 23 and 13cm and below 0.4dB on 70cm, where a typical antenna noise temperature of around 350 kelvin makes the need for lower noise figures questionable. Strong signal performance is enhanced by the use of a bias-stabilised high dynamic range second stage device.

For those needing a low cost, low noise, high dynamic range, wideband preamplifier the SPFAMP covers 50MHz to over 4GHz with a typical noise figure of below 0.7dB on 144 and 432MHz and better than 0.9dB at 23cm. At 2.3GHz the noise figure is typically 1.1dB. The SPFAMP is frequently used as an intermediate driver amplifier between modulators and PA modules on 70 and 23cm.

Sam was a member of the RSGB Microwave Committee from 1985 until it was disbanded in the early 2000s. In 1999 he was responsible for the formation of the UK Microwave Society with the help of Lehane, G8KMH, and Steve, G4KNZ. He held the role of Chairman of the UKuC from 1999 to 2001. He served on the committee of the UKuC from 1999 until 2012 when he stood down to make way for a new committee member. Sam has been the Rad Com GHz bands columnist since 2004.

**Some Hydrogen Line Astronomy "from the back yard" - G4NNS**

A brief introduction to Radio astronomy will be followed by an explanation of how observations in the plane of our Galaxy, the Milky Way, around the frequency of Hydrogen line radiation at 1420MHz can be used to show that ours is a spiral galaxy. As we can only view the Milky Way edge on and from within it this is not so easy for optical astronomers to do but is a simple observation for the back yard radio astronomer.

**ISS DATV downlink project and software based DATV repeaters - G7LWT**

Darren will give us an update on the exciting idea of a DATV downlink on the International Sapce Station, which looks to be a real possibility in the near future. He will also look at the possible future trends for DATV including the use of software based repeaters particularly for the new narrow band DVB-T modes and MPEG4.

**Register now and save money!**

Online registration is now open at https://batc.org.uk/biagm.php and you will receive a discount for registering before the event. (BATC members receive an additional 10% discount for pre-registration).

Please note that attendance to BGM only, will be free for members

**Hotels / Convention dinner**

A special BATC rate of £65 B&B (single) and £75 (double) has been arranged at the Apollo (4*) hotel which is within 1 mile of the convention venue http://www.apollohotels.com/ please ring hotel reservations directly on 01256 796700 (not available via the web site) and quote BATC to get this rate.

It is intended to hold the ATV Convention dinner on Saturday evening at the Apollo. Please indicate your interest when registering on the BATC website.

**More information**

For more information, visit:

www.batc.org.uk/club_stuff/convention/

where you will be able to see updated information on the event and register your attendance.

If you have any ideas you would like to see included, if you are willing to come and tell others about your experiences in ATV, have something you want to demonstrate or just want to get involved in organising your convention please contact Noel G8GTZ

email: bgm2012@batc.org.uk

# ATV News

**50 years since the Launch of Telstar**

Telstar or ,Telstar 1 to be precise, was built as an international collaboration between AT&T, Bell Labs, NASA, the British General Post Office, and the French National Post, Telegraph, and Telecom Office. The satellite launched on a Delta rocket on July10,1962.

The aluminium satellite was wimpy by modern standards. It used 14 watts of power - roughly one-seventh that of a modern laptop - generated by the 3,600 solar panels on its outer hull. It could only carry 600 phone calls and one black-and-white TV channel. Telstar 1 was placed in low Earth orbit and circled the planet every two and a half hours, it was only in the right position to beam transmissions between Europe and the U.S. for 20 minutes each orbit. This is in contrast to contemporary communications satellites, which fly in geosynchronous orbit, staying above one spot on the Earth.

**Der TV Amateur goes Cyber**

Included in the latest issue of Der TV Amateur is a letter in English to all foreign members. They have just had all their overseas magazines returned with demand for another 3 Euros postage.

AGAF recognise the importance of supporting ATV beyond the German boarders but the only way they can continue this support is by adopting electronic distribution for both internal and overseas members.

**Campbell Swinton Biography**

Paul Marshall has just been awarded half the Shiers Trust Award money by the Royal Television Society for research towards a biography on A A Campbell Swinton, the first to suggest the use of CRTs for television ('distant electric vision' as he called it). His proposal, made in Nature magazine, is widely credited with triggering developments leading to all-electronic television in the mid 1930s.

**Another Cyber Publication**

AGAF are not the only people to have been hit with postal increases, VHF communications are also pointing out the problem to their readers in the latest issue and asking for feedback on the proposal of electronic distribution. BATC have offered the option of electronic disribution for several years now and at the time of CQ-TV going to press around 60% of our readers have chosen this option. It is not only about postal cost, electronic publications have several advantages other than cost saving, such as full colour, active hyper links and of course the poor old environment.

*(Although personally I prefer to hold a magazine and leaf through its pages, I find the electronic versions a lot less convenient and somehow less "readable"- ed)*

**Bush House closes after 71 Years**

At noon on Thursday July 12, the BBC World Service broadcast its last news bulletin from Bush House. This is not the end of the world service, it will move to a new home and will also be financed by the BBC out of its licence fee instead of the current arrangements with HMG.

It appears that 6MHz is going begging in the vhf allocation from 143Mhz and upwards. Should BATC make a pitch for 1MHz for say H264 in 1Mhz or two 500Khz blocks from 146 to 147? With work on modulators etc with several stations 1.5MBit qpsk would be quite feasible. Quite respectable 1024MS/s are often received on the south coast from France on 70cms. A second point might relate to the ISS platform, it appears they are again looking at a qpsk down link for TV, no details yet but it may also be H264 encoding and 500K or 1MS/s. It will be on 2.4GHz but the technology is similar. The Realtek SDR will cover 1MHz at least with a qpsk demod and a 2mtr allocation is would be a whole new interest and would produce new comers to ATV. DATV on 2m would really be something. Thoughts to G3VZV gshirville@btinternet.com

EME, short for Earth Moon Earth communications, involves using the Moon as a passive reflector to enable beyond the horizon communications on frequencies where this would not normally be possible. The international conference on this fascinating subject was held on the 17th and 18th of August in Cambridge see www.eme2012.com batc had a camera crew there but at the request of the organiser there was no live streaming, but it was recorded and uploaded to the archives on www.batc.tv

**A new Colorado record for DATV on 70cms**

Bill, K0RZ's70 cm phased array of eight 22 element yagi antennas. Gain = 27 dBi (photo courtesy of K0RZ)
November 21, 2011. The distance was 75 miles from Cheyenne, Wyoming to Boulder, Colorado. A live,high definition, (1080i, 16:9) DTV picture was transmitted on 70 cm by Jim Andrews, KH6HTV from a ridge line on I25 just south of Cheyenne to Bill McCaa, K0RZ, on Davidson Mesa, south-east of Boulder.
The secret to the success of this 75 mile DATV contact was Bill's really big antenna. Bill used an array of eight 22 element yagis with a 0.3dB noise figure preamp mounted at the antenna. The antenna gain was 27 dBi.

**CQ-TV Download for Mobile Phone and Tablets**

We have been experimenting with producing epub format CQ-TV so that is can be read on tablets and smart phones. CQ-TV 235 and 236 had epub files created by Ian Pawson, which involved a lot of re writing. We have now updated the club software and the new version should have produced an epub file without all the re-writing. We have walked into one or two teething problems, but hope to produce a file for CQ-TV 237 and all future issues.
We would be interested in how many people found the file for CQ-TV 235 and 236 helpful.

The BBC truck ('Project Vivat') back from repaint. Soon to move on to the more exciting (and easier!) bits of filling it with gear! more in CQ-TV239.

# Circuit Notebook No 110

*by John Lawrence GW3JGA*

"you would have me teach my Grandmother to suck eggs"

( J. Stevens 1707. Quevedo's Comical Works IV 403.)

You may think that Circuit Notebook No. 110 comes within this category!

**Portable Operation, Reversed Supply Protection and Voltage Drop**

Because of my home location, I usually need to go out and operate portable. I have arranged that all my equipment operates from 12V and I have two large 12V lead-acid batteries which I can just about manage to lift into the car boot.

A strange thing about operating portable is that it reduces a normally methodical radio/TV amateur into a careless and confused one, quite capable of wiring the kit to the battery reversed way round, causing smoke and an expensive smell.

The usual way to prevent this damage is by using one of the circuits shown in Fig.1.

(a) is the conventional series diode where the voltage drop is about 0.5V,

(b) is the fuse and reverse connected shunt diode, simple and adequate and

(c) is a diode feeding a relay of suitable current rating, the preferred method.

As an alternative, I have fitted my batteries with permanent leads ending in a polarised 'Miniature Jones' socket. This can be connected to equipment, with no possibility of accidental reversal.

**Miniature Jones Connectors**

Many years ago I acquired a quantity of Plessey/Painton 'Miniature Jones Connectors' (1950's vintage). They have a very good electrical specification,

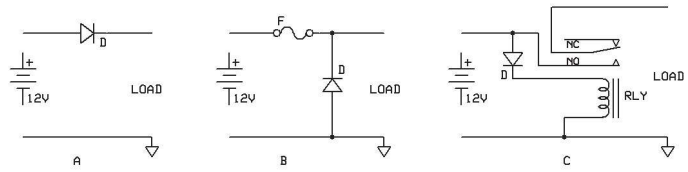



Fig. 1 Polarity protection methods

Fig. 2 Jones connectors

Fig. 3 XLR connectors

1000V wkg. and 10A through each pole. Four of these four pole connectors are shown in Fig.2.

I fitted all my equipment and connecting leads with these connectors so everything is polarised and interchangeable, the supply coming from the socket of course. I also strapped two pins on each half of each connector to increase the current carrying capacity and minimise voltage drop.

One disadvantage of the Miniature Jones Connector is that the chassis mounting version requires a square hole. Also, if the free end is of a 'latching' type then the dimensions of the square hole are critical. Another is that they are increasingly hard to find.

**XLR Connectors**

These are commonly used for audio signals in professional audio equipment and are readily available. They have a good electrical characteristics, are easy to fit and would be my preferred choice if I was starting over again.

Both plugs and sockets are available in free cable end and chassis mounting types, as shown in Fig.3. The most common types, found surplus, are the three pole version. The current rating for each pole is 10 - 15A depending on make. For a history of the XLR connector see:
http://www.soundfirst.com/xlr.html

**Connector Series Resistance**

I have always been careful to keep the number of connectors between the supply and the load to a minimum because of the possible voltage drop they may cause. I thought it would be interesting to make some measurements. I connected various items in series, to a 12V supply as shown in Fig.4. The 21W car bulb ensured a current of 1.5A through the circuit. Then, with the current flowing and using a digital multimeter I measured the millivolt drop across various connectors and parts of the circuit. I also included my Battery Monitor, to see what voltage drop this caused.

The XLR connector showed a high value of 75mV. It was an ITT version and removed from equipment. When I replaced this with a new Newtrix one the voltage drop was much lower at 0.8mV. The Miniature Jones type gave a consistent value of 2.7mV. My Battery Monitor (see Figs. 5 & 6) showed 14.2mV overall. The voltage drop across the moving iron meter was 0.5mV, the remaining drop was due to the connectors and the internal wiring.

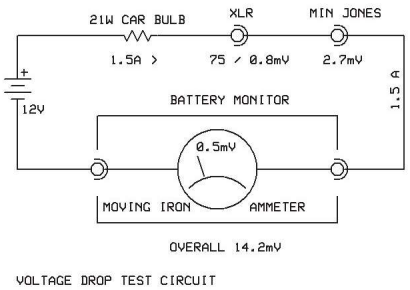


Fig. 4 Test circuit

**Battery Monitor**

The overall voltage drop is 14mV on the meter line and a further 14mV on the return line giving 28mV at 1.5A. This translates to (28mV x 10/1.5) 185mV at 10A. I think I can live with that and leave the Battery Monitor permanently in circuit.


Fig. 5 Battery monitor


Fig. 6 Battery monitor - inside

**Conclusion**

Use good quality connectors, new if possible, within their ratings.

Use substantial cables well within their ratings.

Where possible, avoid loose unmarked cable ends, spades and clips.

Take additional precautions where currents exceed 15-20A.

But you knew this already!

# Bye Bye Sky

*By Mark Bloor*

The Sky's the Limit (or the limit is Sky) I have been a Sky customer for more years than I care to remember. Actually I was a BSB customer forced to migrate from respectable DMAC to a crappy Amstrad composite satellite receiver then to digital and more recently to HD by getting an eBay HD Sky box though only for the free ones. In parallel with this I have a Freesat Freeview HD plasma and an Elgato EyeTV system but more of this later. Recently I had been questioning the sagacity of having Sky reckoning I was watching one or 2 programmes a week that were not available for free and paying around £20/month for the privilege.

Well this week the PSU packed up in the Skybox so I thought again whether I wanted/needed Sky my decision was made for me when I received a letter from Sky informing me my subscription was to be increased by £1.50 a month.

Having made the decision and cancelling my subscription which cost me about 70p on a premium rate number as you can't cancel on line (but of course you can upgrade) I needed to replace the Sky box with something that was equally user friendly. I looked around at various satellite options (receivers) and very nearly bought the Technomate 7102 with triple tuners 2 satellite and 1 Terrestrial all HD capable. I then thought 'what about my Elgato system?'. I was using this on my Mac Mini (3.1) server to record programs and it can stream to iPads allowing them to be used as small TVs as well as allowing access anywhere there is internet on my iPhone/iPod touch. In addition I can remote set recording..so all of the Sky box functionality without the cost and incidentally available for some years prior to these Sky services.

I would also have a power saving as the server is on 24/7 I would save the cost of the Sky box power consumption. (60 watts operational say 12 hours per day = 0.72 Kwh per day or 263Kwh per

year or around £40 per year. BONUS! So I am looking at saving around a little under £300 per year in total.

I moved the MacMini server from the study to the sitting room connected it up to my 50î plasma (it has HDMI out and allows embedding of the Dolby Digital bitstream which is decoded by my AV amp). Additionally the Mac allows for normal HDTV resolutions 1080i/p so everything is compatible. So what about remote control? Well conveniently the mini has infra red remote built in and the Elgato software can use this to navigate through the eye TV menus and to set a recording is as easy as selecting the programme and the record option. The only downside in my arrangement is it uses the apple remote so it ís a tree menu but very well laid out. The only cost I do have with this arrangement is the cost of a tvtv subscription for the internet provided EPG (the elgato can use the transmitted EPG) I find the ability to series link and remote scheduling tvtv gives me to be worth the £14 a year and its cheaper than a weekly paper guide and its free for the first year with Elgato EyeTV software anyway.

So what other hardware is required well Elgato offer a range of tuner options either directly linked to the computer via USB/Firewire in either Terrestrial or Satellite form, though currently there is NO terrestrial HD option. They also support a range of 3rd party tuners including the Digital Sands HD Homerun (though despite the title it does not support the UK HD terrestrial service). I am currently using the Netstream Sat and USB sat free companion. These are basically 2 HD capable satellite receivers that plug into my router and with the free Netstream software on the iPad/iPhone/iPod touch I can watch TV WIRELESSLY on these devices as well as pause live TV (buffer is limited to around 100 MB) and with the Elgato software on the mac can, providing no other devices on the network are using the tuners record 2 channels and playback a previously recorded programme.
I have the ability to archive the material to my library from which it can be accessed from a variety of streaming devices eg Apple TV and with Elgatoís optional DNLA software to any compatible device eg Playstation 3 or the free XBMC. XBMC can with the addition of the free Eye TV parser plug-in access the live TV as well.

One final point regarding XBMC software (did I mention its free) it supports Apple's Airplay technology so you can stream video and audio from your iPad/iPhone/iPod touch and Mac to your XBMC device and display it on your TV.

So how ís it working in practice? OK so far with a couple of caveats:

You will need to play around with the Elgato software to get the best subjective display on your TV;

The up scaling of HD material when viewing a live source is not as good as my Panasonic Plasma TV manages, but interestingly appears better when viewing pre-recorded material.

When EyeTv has finished a recording it immediately prepares it for iPhone access so it can be accessed over the internet this maxes out the dual 2.6 G processors in my mini and can lead to stuttering playback and obviously if one of the tuners is in use by another device you are limited to a single record/view channel. I have asked Elgato support if it ís possible to have multiple network tuners..they say customers do have this arrangement and it appears to work but it is currently unsupported.

This Mac mini also acts as a server for my entire network of Macs (some 3 laptops and 4 Mac desktops a couple of Windows 7 machines and 1 running XP) and centralised Backup and software server (Mac only) and so far even acting in "dual role" does not seem to cause any problems even when the aforementioned iPhone conversion is taking place.



Using Appleís Bluetooth Keyboard (which can also be used with Sony's PS3) and a mouse/touchpad you have a fully functional computer in your sitting room (is that an advantage ?? I leave that to the other half) However it does mean you can have family Skype calls and watching on a large TV is easier than crowding around a small LCD. My TV has this built in but wants over £100 for the camera! Of course you can also use it for YouTube, iPlayer ITV player the list goes on and Netflix and Lovefilm with the advantage of localised download capacity which for those like me with less than 2mbs internet is a distinct advantage.


The mac mini server comes with 2 internal drives and I use the second one exclusively for the Elgato software (remember to pause live TV you need a temporary store). You can change this to RAM only if you prefer or have an SSD drive. I may increase the RAM to 8GB and set the buffer to use some of this as it is configurable in the software. It would be interesting to see how the latest quad core Mini server performs especially given its dramatic increase in processor power.

So what about power consumption ..well I have an 8 TB firewire 800 DAS (Direct Attached Storage) unit plus the 2500GB drives in the mini itself with 4GB of ram and the total consumption for the system as measured at the power socket is around 68 watts, not bad eh! To put that in context I measured the power drawn by an old 3Ghz pentium 4 with 2GB of ram and 1 HDD it drew nearly 150 watts.

Finally I have the server backing EVERYTHING up using Apples Timemachine to a remote homemade NAS box situated in a separate building (also known as the garage) this is based on the Freenas 8 software and the MSI E350 motherboard with 8GB of ram 10-14 TB of disk storage and gigabit Ethernet connection. (See Trevorís article (Timeline) on backup for costings pictures and power consumption)
All of the Server setup and management as well as the Freenas box can be managed from my mac laptop so I can be "fiddling" whilst others are watching, recording TV in the sitting room or on their mobile devices.
As you can see this fulfils all my requirements, it ís not a cheap option but it is very flexible. However if you look at the total yearly savings of around £300 then allowing for purchase of a mac mini and all the hardware payback is around 30 months.

Rather like Sony used to be in broadcast TV where all of their components


fitted together and just worked this is true of the Elgato Mac solution too. I know this may look like an Elgato Apple infomercial but I have a system that does all that the Skybox could do (excluding anytime which I never used) but allows me to centralise all my media (photographs, music video) wirelessly synchronise and manage all my iOS devices and Mac desktops. The server also plays nicely with Windows and Linux machines. One huge advantage is I can archive my "recordings" in a file based format rather than having to burn DVDís which was the case with the Sky box.

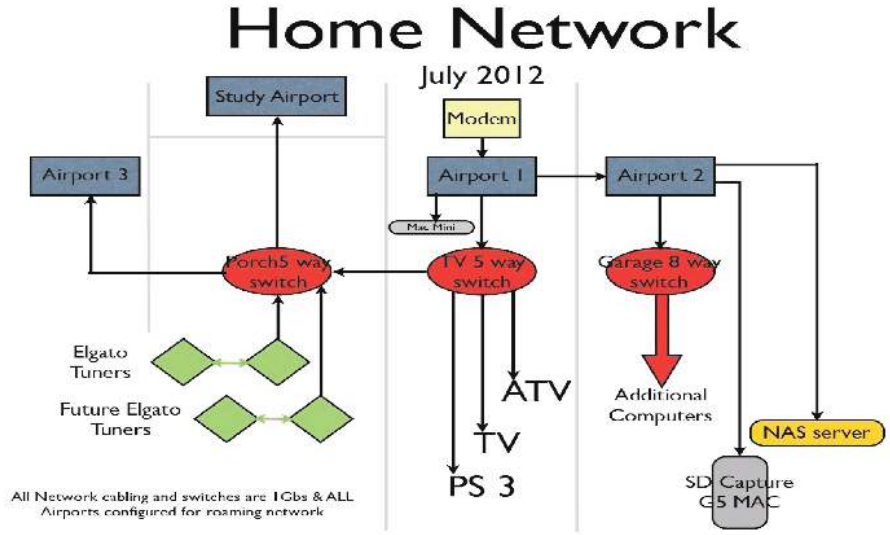
I also have one added benefit using the EyeTV app on my mobile devices (£2.99) I effectively have a "sling box" added into the system.

Other OS options?

Windows media centre and the HD Homerun terrestrial tuners but the only network Satellite tuners I know of are the Elgato's and these are supported through 3rd party software. There is software that allows streaming to iOS and other devices though these appear to be via a web browser type window.

Linux mythTV is well known, a little geeky and requires a front end "viewing box" and a back-end server. Very comprehensive but there are complaints about the streaming quality as this is accomplished by the back-end converting on the fly.

Humax Free sat box allows recording etc and has iPlayer integrated however getting the files off the internal HDD is tricky and requires the use of a Linux formatted drive if the recordings exceed the 4GB fie limit of FAT 32 otherwise its relatively straightforward.





# Funcube Dongle and ATV

SOFTWARE DEFINED RADIO DONGLE HELPS LOCATE WEAK ATV

WB8LGA reports that there is a "super" FunCube radio dongle available that plugs into your computer's USB port to receive radio signals from 64 to 1750 MHz. It is super sensitive and able to resolve signals as weak as 140dBm. The only drawback is its ability to only receive an 88 KHz wide signal. That sounds like a killer for 45MHz wide ATV signal reception but...not so fast!

Although it cannot detect an entire 4 MHz video passband, it CAN see any desired 88 KHz part of it. For example, if it is tuned to 427.25 MHz, you can see the ATCO repeater horizontal sync pulse in the signal just 15,750 Hz away from the centre carrier. You can tune 4.5 MHz higher and see the 4.5 MHz sound subcarrier and its modulation. In short, you can't see the entire signal at once, but you CAN tune through the bandpass to see the subparts. That way you can identify if the signal is upper or lower sideband, double sideband or any other type of modulation. You can even "pick apart" the DATV signal and identify it as digital and see some of the "haystack" components. The time display, detailed below, can identify non repetitive random signals to provide a type of "peak sample and hold" function. The unit at first glance, is a rather pricey cost of £119.95 post paid from the UK in about 23 days. No, the manufacturing cost is nowher near that, but they donate a portion of the profits to the UK AMSAT project group that helped develop it. So, you're helping the European Amateur Radio efforts. The unit software is available as a free download as well as any software improvements and related software programs that run using this dongle. Already there is a companion up-converter module available to extend the lower RF receive range down to less than 1 MHz making the dongle useful as an HF spectrum scope!

The dongle is available from:

www.hamradio.co.uk/sdr-software-defined-radio-amsat-uk/funcube/amsat-uk-funcube-dongle-pd-4094.php

www.proviationshop.co.uk/shop/article_ML-FUNC-/AMSAT-UK-FUNcube-Dongle.html?sessid=wXTXOxJ6U1lH1HwmmiBeDDEjL9SXlxnHCxesQkJGPkqrj31xJFuIavw5xEvvRdTP&shop_param=cid%3D1%26aid%3DML-FUNC-%26

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# Digilite

*from information supplied by G4EWJ with photos by G4KLB article compiled by G8AJN*

The DigiLite has proved to be a very successful project with several hundred boards sold across the World. Apart from being reasonably inexpensive it actually allows for home construction of a digital ATV encoder.

For some time Brian G4EWJ who wrote the original software has been working on an add-on to allow the use of a memory card to store the transport stream file which will allow for the playback of previously recorded material. This can be a carousel of files on the card or just a single file. The advantage of this is that a computer is not required in order to retransmit a recorded file. You will still require a PC on which to make the original recording, but if going portable or needing a test signal it could be very useful.

In order to allow for the extra software the dsPIC33 chip (IC2) will need to be re-programmed with the extended software (v2-50.hex) . If you do not wish to change the software you are using at present you will soon be able to get a programmed IC2 from the BATC Shop with the latest version of the software already programmed. Please specify the v2-50 version when ordering.

The code for the DigiLite itself is unchanged so there is no need to change it unless you plan to use the card option. The 10 pin male header (JP1) is already on the DigiLite pcbs so only a 10 way female plug and ribbon cable will be needed to connect to the card reader interface board. There are a few components on the interface board, but they are simply pull-up resistors and a decoupling capacitor, otherwise it is simply joining the ribbon cable.

Note the unusual numbering sequence of the SD card socket. Resistor values are nominal 33K but can be from 22K to 68K. J95 is the PIC programming connector, if required.

J93 and J94 are joining points on an optional USB cable. Ground is at JP91 pin 7.

Referred to as the DTS1010 there are a number of points to be made about this add-on. (It is essential to read full details in the DT1010 pdf on the DigiLite website before commencing a build).

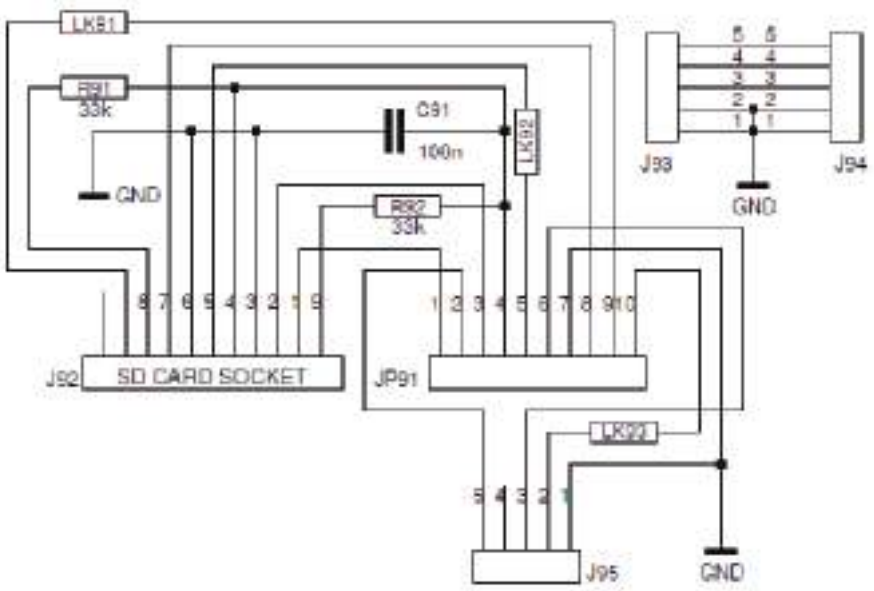
You can cram about 40 minutes of transmission onto a 2GB card. It needs to be a 2GB (no larger) SD card (not SDHC) and with FAT16 format only. Colin G4KLB who made the boards shown in the pictures says that if you purchase the Verbatim 2GB SD card it is already formatted in FAT16. Details of how to format an SD card are in the pdf file.

The file name is critical and must follow a specific format for the software to deal with it. The file must be in the main directory of the card (not inside a folder) and must be named DT_*****.#FX where # is the Symbol Rate (see tables below),F is the FEC setting and X is FEC on/off. ***** can be any valid characters ie:E.g. DT_SHACK.431 = SR4000, FEC 3/4, 1 means the FEC needs to be applied. See details below. Files will be played in alphabetical order, so remember that when naming them.

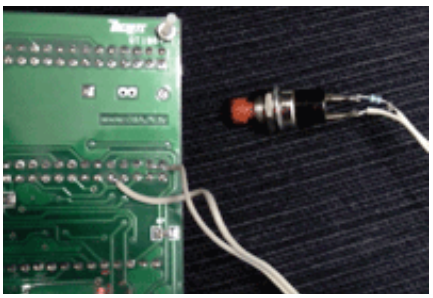
Transport Stream files are generated by the program 'DigiLite TS Generator' which processes the mpg files made by WinTV or GB PVR.

In the photo you can see a small press-button switch. This enables you to step through the files on the SD card. There is a also a 'card inserted' switch built in the card reader socket, so you only need to add one if you donít want to remove the card (if it is inside a box for example) this is best wired to the card reader PCB.

The pcb is about 62mm x 37mm, if preferred it is possible to wire directly from the DigiLite pcb to the SD card holder via the 10 way plug and fit the three components onto the plug itself thus avoiding the need for the pcb.





**Carousel Mode**

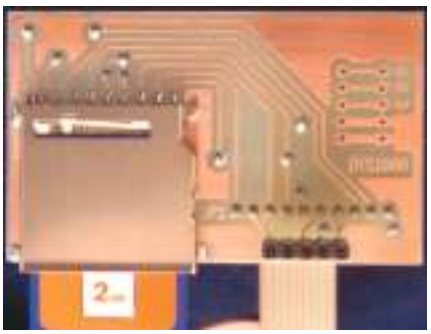
Holding down the button for five seconds selects Carousel Mode, where all valid files are transmitted in sequence in alphabetical order. After the last file in alphabetical order has been transmitted, the first file in alphabetical order will be transmitted again. Carousel Mode may be automatically selected by putting a file named DT_.CAR on the card. This file will be detected when the card is inserted. There will be a short delay before a file is transmitted while the file is being prepared. This is proportional to the size of the file. There will be a glitch in transmission at the end of the each file.

If the button is pressed when Carousel Mode is active, Carousel Mode is de-activated and the next file in alphabetical order is transmitted repeatedly.

If the main part of the file name ends with @ (e.g. DT_F12@.431) it will be skipped in Carousel Mode. If such a file is being transmitted when Carousel Mode is activated manually, the next file in alphabetical order without an @ will be transmitted immediately.

The connections on the SD card PCB marked GWR are not part of the SD card circuit but are provided to connect an optional panel mount USB socket (Farnell 122-9686) You have to cut the USB lead that plugs into the FT module ( GWR stands for Green White Red, which seems to be standard colours for USB wires) If you don't need a panel USB socket this can be ignored.

A suitable SD card socket is Farnell 918-6158 There are several pdf downloads available at the DigiLite website which contain 1:1 and mirror images of the tracking. Final size should be 61.9mm x 37.1mm



The following characters are used to indicate the symbol rate (# in the section above):
1000 1, 1333 B, 1500 C, 1667 D, 2000 2, 2500 H, 3000 3, 4000 4, 4167 T, 5000 5, 6000 6, 6250, Y 8000 8

DigiLite TS files must reside in the root folder (directory) of the SD card. Valid file names are of the form DT_ ABCDE.#FX ABCDE may be any valid Windows characters.

# indicates the symbol rate (SR) at which the file must be transmitted. F indicates the FEC. X = 1 indicates that the FEC needs to be applied. X = 0 indicates that no further processing is needed. This is determined by the FEC setting in DigiLite Config when the file is converted.

**The interface board. Cutaway allows access to presets on main board.**

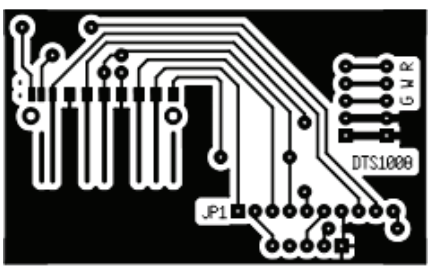
E.g. DT_SHACK.431 = SR4000, FEC 3/4, the FEC needs to be applied.

The stepper button must have a 1k5 resistor in series. As I said earlier, this is only a brief overview of the project, please download and read the full documentation.

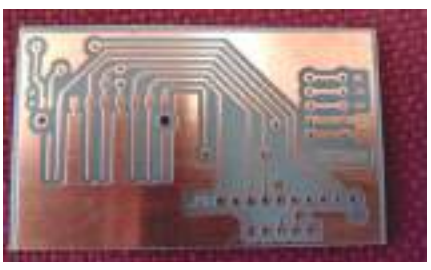
I know that Brian G4EWJ has put a lot of time into getting this software to this high standard and I would like to register my thanks to him for releasing the software and his pcb design information and to Colin G4KLB for supplying me with the photos.

All required software and pdfs can be found at:
http://www.g8ajn.tv/dlhardware3.html

Dave G8AJN




**Track layout**



**PCB etched and ready for populating**

# A (very) low light C mount CCD camera

*by Mark Atherton ZL3JVX*

I recently became intrigued by the extravagant claims about an apparently new class of tiny, low light CMOS camera, packaged to look like a curious bullet-with-wings. The device claims 0.008 lux sensitivity, 520 VTL resolution, less than 70mA consumption at 3.3V, and a price tag of NZ$89 (about 45 quid, for those of you who are bi-lingual).

When the unit arrived, first impressions were very favourable. The supplied tiny lens has something in the order of 90 degree viewing angle, with a claimed aperture of F2.0 (the only spec I have a difficult time believing). The unit had a bit of a difficult time with outdoor levels of illumination, and there were some signs of chromatic aberration and some dark areas around the edge of the image where the lens wasn't fully illuminating the sensor.

So the camera was put in a small cardboard box with a coin as a target and the box was closed. Dark performance was best described as excellent, so the only major failing was the lens.

Most obvious next step was to take-it-apart-to-find-out-how-it-works. The bulk of the product is the silicon sensor which is mounted on a tiny top PCB. Five wires (3V3, GND, CVBS, XTAL1, XTAL2) connect to the lower board.

The lower board appears to hold a tiny crystal, a 3V3 regulator, and a mic pre-amp. The '+' sign next to a via in the picture is where a tiny microphone

was mounted. To give some idea of geometry, the resistors are 0603, and the ICs are SOT23-5s. Build quality isn't the greatest that I have seen, and my soldering (red, black, yellow wires) always look excellent until some idiot puts it under a microscope :)

So how to mount this for use with a sensible lens ?

I have a small pile of C mount lenses, and misc. useful bits that have been stripped off of dead cameras; mainly mechanical stuff. One such item was a chrome-plated-brass 'C' mount lens mount. That, along with a small diecast box (50 x 50 x 32mm) should make a respectable new home for the camera electronics.

The whole CCD imager assembly is of similar order-of-magnitude to the RCA jack. I was planning to use a BNC, but the connector just looked too large for this job.

The image surface of the CCD needs to be mounted about 8mm back for the rear of the lens, and also must be adjustable. A small piece of FR4 was stripped of it's copper, four 2mm clearance holes drilled at each corner, and an 8mm square aperture added to the centre.

The front surface was painted black (using a large marker pen), the front CCD assembly was poked through the aperture and hot-glued in place. The board was then mounted on four compression springs, with M2 bolts and nuts. Spring compression was adjusted until a 'C' mount lens operated over expected focus range.

To finish things off, the 2.1mm DC connector, RCA jack and a small gooseneck were attached to the die-cast box, and the gooseneck inserted into an angle-poise lamp base.

The new unit really was worth all of the effort. All of the optical issues associated with the tiny lens have been resolved, and the camera behaves well

with outdoor lighting by virtue of being able to close down the lens. Low light performance is quite amazing and appears to be able to work at a similar order of sensitivity to my eyes.

Finally, a test was done with a rather larger zoom lens. This is now getting into the realms of being able to spy on the neighbours (perish the thought :)

Since a very early age, Mark has had a strong interest in things-electric. He acquired his first UK callsign age 17 (G8JVX) moments before getting his first Fast Scan TV license (G6ANI/T). Many home brew projects ensued covering 2m through 23cm, including the design and component level construction of a complete analogue ATV chain incorporating a vidicon camera, solid state video mixer and valve TX.

Recent projects include a low cost Digital TV Modulator (Digilite-ZL) and low power AMPS micro-base station. After 30 years living in the UK he moved to San Francisco where he lived and worked for another 15 years (KE6LVK). He then moved on to a much more pleasant life in New Zealand (ZL3JVX) along with American Wife and Fat Spaniel. Latest projects include significant technical involvement with KiwiSAT. He has a Degree in Electrical Engineering and is named inventor on five patents.

**Videotape Pioneer Charles E. Anderson sadly passed away on July 13th 2012**

(from the left) Charles E Anderson, Ray Dolby, Alex Maxey, Shelby Henderson, Charles Ginsburg and Fred Pfost. with the Emmy Award for the development of the VR1000 VTR Anderson was one six engineers who developed the first successful videotape recorder.

Anderson persuaded project supervisor Charles Ginsburg to utilize frequency modulation for recording the video signal onto tape, and designed the first FM modulator for the task.

This method solved a number of issues and became a patented method of recording video on tape. The method is still used in new analog and digital video recorders, more than 57 years later.

Ampex honored Anderson with the very first annual Alexander M.Poniatoff Gold Medal for Technical Excellence (cash and a gold medal) for proposing in late 1954 and creating in January, 1955, the original FM video recording system used in development of the Quad video recorder.

## F.Y.C. security Systems & Wireless Communications Ltd

### COMB LINE \ INTERDIGITAL BAND-PASS FILTERS (CAVITY)

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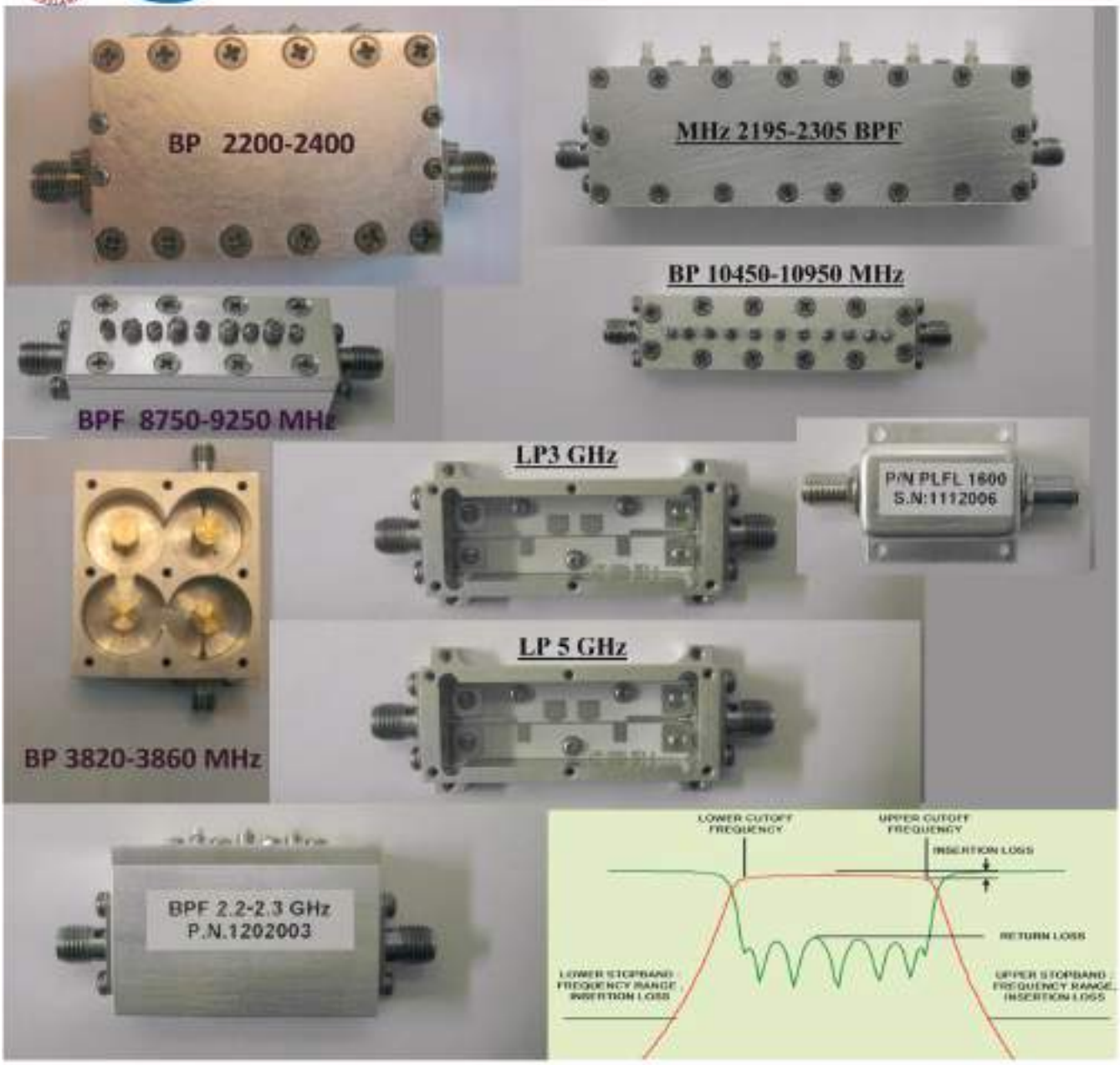



**the table to define the filter specification**
**very date and outline within 2 - 4 working days**
**cal Numbers of Resonators: 3 - 8**
**cal Relative Bandwidth (BW\F0): 3 to 20%**
**cal Frequency Range 1- 18 GHz**
**mum Quantity 3 units per filter type**
**cal Delivery is one month max**
**IRE requested**

**Email: fyctec@gmail.com**

| Symbol | Description | Value | Units |
|---|---|---|---|
| F0 | Center Frequency | | MHz |
| LCF | Lower Cutoff Frequency | | MHz |
| UCF | Upper Cutoff Frequency | | MHz |
| PB IL | Max. Pass Band Insertion Loss | | dB |
| RL | Min. Pass Band Return Loss | | dB |
| LSB | Lower Stop Band Frequency Range | | MHz |
| LSB IL | Lower Stop Band Frequency Insertion Loss | | dB |
| USB | Upper Stop Band Frequency Range | | MHz |
| USB IL | Upper Stop Band Frequency Insertion Loss | | dB |
| Z0 | Input \ Output Impedance | 50 | Ohm |

# Timeline 2

*By Trevor Brown and Mark Bloor*

Having made the jump from linear to non linear editing in the last issue and, I hope, solved some of the hardware problems associated with running the free edit software Light Works, I would like to delve a little deep into the problems and again look at solutions using software that is free on the internet.

The biggest single problem of non linear editing is secure data storage, the material may have originated on memory card or tape, but before you reuse the medium you need to know the data is safe. Just being in a single space on your hard drive is not sufficient, and in the last issue I talked about adding other discs and raid arrays to the computer.

In this issue I would like to talk about NAS (Network Attached Storage). This again will involve additional hardware, unfortunately there is no concept of free hardware, only free software!

So we put another PC together (ouch!) but it does not need to be the fastest machine and can sometimes be done from redundant hardware left over from upgrading the current hardware. Before you splash out on a second operating system for this machine let's review the options: One is to install a Windows operating system and then raid two or more discs together, Bill has double guessed you and not all windows editions will allow this option and is usually reserved for the top of the range version of windows (double ouch); The other problem is conventional raids are not all they are cracked up to be, leaving your data not as secure as you are led to believe, see:

http://www.pcper.com/reviews/Storage/Western-Digital-Red-3TB-SATA-SOHO-NAS-Drive-Full-Review

Let's look at alternatives starting with Zettabyte File System. This is an advanced open source file system originally developed for Solaris. FreeNAS currently uses ZFS version 15 as its recommended file system for devices with 6GB of RAM or more. ZFS includes software RAID called RAID-Z. Regular RAID-Z writes one parity block like RAID-5, while RAID-Z2 writes two parity blocks like RAID-6. Both are available in the FreeNAS Volumes screen when creating a new volume (assuming there are enough disks available). More complex parity arrangements are also possible.

Every ZFS file system is checksummed from top to bottom to confirm data integrity. If inconsistencies are found, parity blocks can be used to repair corrupt data. This scrub is turned on by default in FreeNAS 8 (more later) and can be scheduled or configured from the web interface.

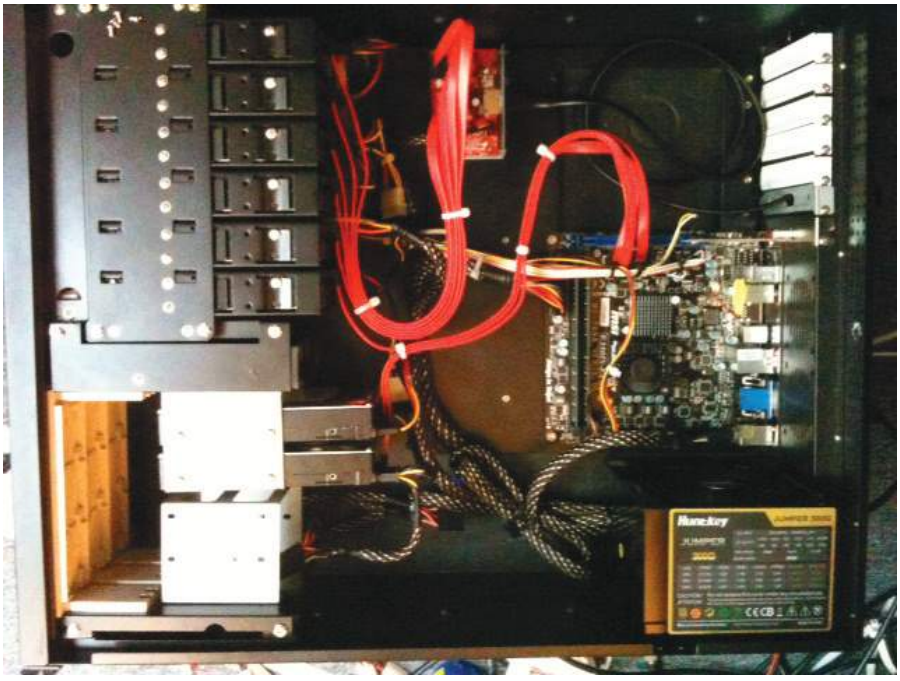
At any time, a snapshot of a ZFS file system can be taken, preserving all files in the system at that time against deletion until the snapshot expires or is deleted. This can be done manually or scheduled regularly. These snapshots act as roll-back points in case of accidental critical data deletion. Snapshots also provide a way to back up a ZFS file system - it is possible to use them to incrementally back up a file system to another one. Replication can be scheduled regularly along with snapshots. I will let you do the reading on this as I want to keep too much computer Geekism out of something that's television; it is safe to say it is a pretty safe concept for data storage.

Enter BSD (Berkley Software Developments), yes the university that brought you UNIX, with Free Nas 8. See:

http://www.freenas.org/free

This is downloadable software that has full ZFS support.

FreeNAS 8. It also has Thin Provisioning, this is another excellent addition to the FreeNAS feature list. Thin Provisioning allows the administrator to allocate users more space than physically exists in the system. When paired with ZFS, it becomes easy to manage your total data pool size, and quickly and effectively grow to meet your users needs as they use more of their allotted space (not an easy concept to get your head around but the filing system can be bigger than the disc space and discs added later as needed with changing the filing system) Backup and Restore.



ZFS Snapshots are more than just local backups - they can be used to create remote backups as well. Sending snapshots of the file system to a remote ZFS file system creates a complete duplicate of it there. Furthermore, additional snapshots of the same file system can be sent incrementally, reducing the size of each backup to the changes that were made between snapshots.

In case of catastrophic damage to a local ZFS file system (such as disk failure in excess of parity protection or irrecoverable log device failure), any backed-up snapshot can be sent to a new ZFS file system, preserving all data up to that backup.

Ok, enough of the Geekism, lets see how we get all this wondrous free software up and running. First the hardware we used.

MSI E350IS-E45 M1 with E350 Processor SATA6 VGA HDMI mITX Motherboard. Kingston 8GB (2x4GB) DDR3 1066Mhz Memory Kit CL7 1.5V Unbuffered Non-ECC. Huntkey Jumper 300W PSU 80Plus Gold Certified. 16 Gb USBHewlett Packard stick (the smallest ASDA had in stock). Xenta LP4 Molex MALE to 2x Serial ATA SATA Power Adapter. 10 x Xenta SATA 3 Cable 6Gbps - 46cm.

Total Cost £175 inc vat and delivery from Ebuyer. Expanded with a silicon Imagee-sata card2 port card I had lying around, a better choice would be the internal card, Lycom PE-103 x2 Port SATAII 3Gbps PCI-E Controller Card with NCQ - PC/MAC/Linux about £14 and the port multiplier breakout 1. Lycom ST-126RM SATA II 3Gbps 1-To-5 Port Multiplier bridge board (for Rack Mount) from scan computers £35 each.

This gave me the potential of the 4 satatype III ports on the motherboard plus a further2 sata to 5 way port multipliers (10 drives) sata II. A grand total of up to 14 drives. With 5 Hitachi 7k2 spin speed drives Total power consumption working 72 watts peak at boot around 135 plus watts. Replacing them with the Samsusng F4 green drives I had the power dropped to around 55 watts working and 30w in idle with powersaving applied inc spin down. As the MB supports 64 bit OS I used the 8.0.4 p3 -x64. Case was an Old 19" rack mount I had surplus to requirements. Total cost (without drives)for a 4 drive NAS would be around £200.

This compares favourably with a 4 bay nasbox HOWEVER if you go more than 4 the prices skyrocket a 6 or 8 bay is around £800 plus drives and a 14 way one would be around £1500 plus drives this unit comes in around £260, not a bad saving.

I then downloaded the free software from the FreeNAS site, there are three options:
32-bit:FreeNAS-8.0.4-RELEASE-p3-x86.iso
64-bit:FreeNAS-8.0.4-RELEASE-p3-x64.iso
Upgrades: FreeNAS 8.0.4 p3

We went for FreeNAS-8.0.4-RELEASE-p3-x64.iso

The ISO image need transferring to a USB stick and the option to boot from USB needs setting up in BIOS. First burn the ISO image to make a bootable CD/DVD. Set the BIOS/UEFI to boot from DVD as primary boot device and while there set the secondary device to your blank USB stick. Save and exit and the CD will boot into a live screen and then give you the option to install to the USB stick, usually referred to as a DA0 (HDD are referred to as AD0, AD1 etc) don't waste your HDD. Once loaded remove the DVD and reboot...
You are then presented with the menu shown below:

The alert button at the top will be flashing red to make you change the admin password which is blank by default. You can then use the tabs to the left to set up users, groups (in addition to the system defaults), Volumes (you don't have to use ZFS) shares and so on. Once you have done all of that, finally switch on the services you want...they are quite comprehensive. I am using a Mac mini server in the house which acts as a time machine for all the home devices as well as a software update server, I then use the NAS box which I have configured to show up as a time machine disk to the server to back up everything from the Mac mini to a separate building (the Garage).

Simple file transfers are around 50-60 MBs across a gigabit Ethernet link going through 3 switches time machine sparse bundles are slower around 30MBs. For comparison my original arrangement using an Airport disk the initial 5.6 TB of data took anything between 5 and 7 days. With my new Free Nas box and the faster Hitachi drives this took 2 days the slower but more power efficient Samsung drives this has increased to 3 days but still twice as fast as my previous arrangement

There are numerous help sites:
http://www.youtube.com/watch?v=MPkAfTcOevQ
http://www.youtube.com/watch?v=-7iqHnKd690
http://www.youtube.com/watch?v=geD3mf_kAaY
http://www.pcper.com/reviews/Storage/Western-Digital-Red-3TB-SATA-SOHO-NAS-Drive-Full-Review

# Contest News

Here are the results of the 2011 Summerfun contest.

| 70cm | | | | | | | |
|---|---|---|---|---|---|---|---|
| Pos | Call | Locator | QSOs | Points | Best DX | QTH | QRB |
| 1 | G3KKD | JO02CF | 1 | 120 | G4CPE | IO91SW | 60 |
| 2= | M0DTS/P | IO94DF | 1 | 102 | G1LPS | IO94EQ | 51 |
| 2= | G1LPS | IO94EQ | 1 | 102 | M0DTS/P | IO94DF | 51 |
| | | | | | | | |
| 23cm | | | | | | | |
| Pos | Call | Locator | QSOs | Points | Best DX | QTH | QRB |
| 1 | M0DTS/P | IO94DF | 4 | 708 | G0EHV/P | IO94ET | 65 |
| 2 | M0DTS/P | IO94MJ | 2 | 608 | G7AVU | IO93OJ | 112 |
| 3 | G1LPS | IO94EQ | 4 | 488 | M0DTS/P | IO94DF | 51 |
| 4 | G0EHV/P | IO94ET | 3 | 436 | M0DTS/P | IO94DF | 65 |
| | | | | | | | |
| 13 cm | | | | | | | |
| Pos | Call | Locator | QSOs | Points | Best DX | QTH | QRB |
| 1 | M0DTS/P | IO94DF | 2 | 835 | G0EHV/P | IO94ET | 65 |
| 2 | G1LPS | IO94EQ | 2 | 650 | M0DTS/P | IO94DF | 51 |
| 3 | G0EHV/P | IO94ET | 3 | 465 | M0DTS/P | IO94DF | 65 |
| | | | | | | | |
| 6 cm | | | | | | | |
| Pos | Call | Locator | QSOs | Points | Best DX | QTH | QRB |
| 1= | M0DTS/P | IO94DF | 1 | 255 | G1LPS | IO94EQ | 51 |
| 1= | G1LPS | IO94EQ | 1 | 255 | M0DTS/P | IO94DF | 51 |
| | | | | | | | |
| 3 cm | | | | | | | |
| Pos | Call | Locator | QSOs | Points | Best DX | QTH | QRB |
| 1 | G1LPS | IO94EQ | 2 | 650 | M0DTS/P | IO94DF | 51 |
| 2 | M0DTS/P | IO94DF | 1 | 510 | G1LPS | IO94EQ | 51 |
| 3 | G0EHV/P | IO94ET | 1 | 140 | G1LPS | IO94EQ | 15 |

And the combined scores:

| Pos | Call | Locator | 70 cm | 23 cm | 13 cm | 6 cm | 3 cm | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | M0DTS/P | IO94DF | 102 | 708 | 835 | 255 | 510 | 2410 |
| 2 | G1LPS | IO94EQ | 102 | 488 | 650 | 255 | 650 | 2145 |
| 3 | G0EHV/P | IO94ET | | 436 | 465 | | 140 | 1041 |
| 4 | M0DTS/P | IO94MJ | | 608 | | | | 608 |
| 5 | G3KKD | JO02CF | 120 | | | | | 120 |

Congratulations to Rob M0DTS on winning and activating 2 locations during the contest. It was good to see contacts on both 6 cm and 70 cm. In addition to the stations who submitted entries, the following stations were also active: G3KJX, G4CPE, G4FVP/P, G7AVU and M0IKB/P. Thanks to all who braved the weather to operate with portable equipment.

Rob has suggested that next year we simply run the contest all day on the Saturday – please e-mail me with your views on this proposal.

Terry, G1LPS, reported: *After last year's contest operating analogue and digital, the stations I worked on air had reverted back to analogue for the contest. It was fun, but hard work to do both, last time.*

*70cm is by far the hardest to work in this area as we have massive interference from the PAVE PAWS system on 70cm with I think 4 megawatt EIRP. Only Rob and myself aired the equipment. I struggled pointing south towards this.*

*Nice to work this year for a first was Rob M0DTS/P on 6cm. We decided that Rob would TX as he has more power and I would setup a RX station. Rob completed a horn feed for his dish and I mounted a patch antenna offset on a sky mini dish I was using for 10GHz about 2 hours before the contest started. Both sides were untested. I found Rob as soon as he switched on a beautiful P5 over the 51km path. I'm hooked, the TX will be on the mast soon. Brian G3KJX who monitored the pictures when I relayed them via GB3KM was also impressed and is looking into equipment.*
*My antenna system was all new for*

*this years contest and I finished the system the day of the contest. In the pictures included can be seen the 23cms antennas being finished. The QTH is on a hill 200m asl. On the elevation cross boom is a dish for 3cm with a 6cm feed offset, equipment mounted behind the dish. On 23cm, 4x 44 element yagis and a 6 element 2 meter talkback with 9 element 70cm mounted on the same*

*boom. The new 23cm antennas I built are certainly a big improvement on the single loop yagi I used previously.*

*Had a really enjoyable time. Thanks to those I worked for making it so.*

What a great report and good pictures from Terry! An equally impressive contest set-up can be seen in the Photo from Eddie, G0EHV.

**IARU Region 1 International ATV Contest 8 and 9 September**

In the last Contest News, I said that the BATC were trying to get an exemption from the Olympic restrictions on the use of 70cm for the International Contest Weekend. I am pleased to report that, thanks to the efforts of Graham G3VZV, there will be no restrictions on the use of 70cm for the contest.

Please take a look at the International results for last year's contest and see where the activity was. You'll notice heavy use of 70cm, so it might be worth dusting off your old gear for this year!

**Contact**

I can be contacted through e-mail (contests@batc.org.uk), or through my BFPO address: Wg Cdr D G Crump, Defence Section, British Embassy Abu Dhabi, BFPO 5413, London.

**Contest Calendar**

1800 UTC 8 September 2012 -1200 UTC 9 September 2012 - International ATV Contest

1200 UTC 8 December 2012 - 1200 UTC 9 December 2012 - BATC Repeater Contest

1200 UTC 23 March 2013 - 1200 UTC 24 March 2013 - BATC Repeater Contest

1200 UTC 8 June 2013 - 1200 UTC 9 June 2013 - BATC Summer Fun Contest – but see above!!

**IARU Region 1 International ATV Contest 2011 Results**

My apologies for the late publication of these results. Please at least give them a quick glance to note how much 70cm activity there is on the continent!

| Results IARU R1 ATV contest 2011 | | |
|---|---|---|
| Total scores | | |
| Section 1 (RX/TX) | | |
| Place | Call | Points |
| 1 | PE1NKT | 18732 |
| 2 | PA1PAS/A | 15007 |
| 3 | PA9DX | 13781 |
| 4 | PA3DZA | 9483 |
| 5 | PA1AS | 6698 |
| 6 | PA0AVN | 6371 |
| 7 | PA1RK | 4830 |
| 8 | PA3CWS | 4657 |
| 9 | PA7HV | 4442 |
| 10 | PE1OMB | 3759 |
| 11 | PE1OFO | 3591 |
| 12 | PE1OLR | 2659 |
| 13 | M0DTS/p | 2224 |
| 14 | S58RU | 1920 |
| 15 | PE1RLF | 1684 |
| 16 | F6IQG | 1640 |
| 17 | PE1JMZ | 1582 |
| 18 | PE1CHY | 1025 |
| 19 | PA3CRX | 980 |
| 20 | PE1GQE | 815 |
| 21 | F6BGR | 659 |
| 22 | PE1IWT | 593 |
| 23 | S52DS | 500 |
| 24 | PE1AXM | 255 |
| 25 | PA3BWE | 212 |
| 26 | G0AZQ | 188 |
| 27 | F6KJX | 148 |
| 28 | G8ADM | 138 |
| 29 | PA1EBM | 120 |
| 30 | F1FKO | 72 |
| 31 | F1BCT | 25 |
| | | |
| Section 2 (Rx only) | | |
| Place | Call | Points |
| 1 | PE2HHN | 69 |

| Scores/band | | | | | | |
|---|---|---|---|---|---|---|
| Section 1 - 435 MHz | | | | | | |
| Place | Call | Locator | QSO's | Points | Odx | QRB |
| 1 | PA1PAS/A | | | 1231 | PA1AS | 121 |
| 2 | F6IQG | JN08BM | 5 | 1018 | F6AQO | 166 |
| 3 | PA0AVN | | | 1012 | PE1NKT | 217 |
| 4 | PA1AS | | | 837 | PE1JMZ | 154 |
| 5 | PE1JMZ | | | 802 | PA1AS | 154 |
| 6 | PA9DX | | | 786 | PA1AS | 124 |
| 7 | PE1NKT | | | 721 | PA0AVN | 216 |
| 8 | PA1RK | | | 589 | PE1NKT | 138 |
| 9 | F6BGR | J0OOSC | 2 | 385 | F9ZG/P | 248 |
| 10 | PE1OLR | | | 321 | PA9DX | 55 |
| 11 | PA7HV | | | 304 | PA1PAS/A | 66 |
| 12 | PE1RLF | | | 252 | PE1IWT | 49 |
| 13 | PA3BWE | | | 212 | PE1JMZ | 88 |
| 14 | PA3DZA | | | 195 | PA0AVN | 70 |
| 15 | F6KJX | JN07QO | 1 | 148 | F6GNJ/P | 148 |

| Place | Call | Locator | QSO's | Points | Odx | QRB |
|---|---|---|---|---|---|---|
| 16 | PE1IWT | | | 147 | PA1PAS/A | 77 |
| 17 | G8ADM | IO91TO | 1 | 138 | G8LES | 69 |
| 18 | PA3CWS | | | 124 | PA9DX | 33 |
| 19 | PE1OMB | | | 115 | PA9DX | 54 |
| 20 | M0DTS/p | IO94LK | 1 | 94 | G1LPS | 47 |
| 21 | PE1AXM | | | 51 | PE1JMZ | 51 |
| 22 | PE1CHY | | | 41 | PA1PAS/A | 41 |
| 23 | F1BCT | JN-18CU | 1 | 25 | F6GNJ/P | 25 |
| | | | | | | |

Section 1 - 1,3 GHz

| Place | Call | Locator | QSO's | Points | Odx | QRB |
|---|---|---|---|---|---|---|
| 1 | PE1NKT | | | 5096 | PA0AVN | 216 |
| 2 | PA1PAS/A | | | 4006 | PE1NKT | 136 |
| 3 | PA9DX | | | 3480 | PE1NKT | 157 |
| 4 | PA3DZA | | | 2818 | PE1NKT | 191 |
| 5 | PA1AS | | | 2116 | PA9DX | 123 |
| 6 | PA0AVN | | | 2024 | PA1NKT | 217 |
| 7 | PA1RK | | | 1496 | PE1NKT | 138 |
| 8 | PA3CWS | | | 1468 | PE1NKT | 127 |
| 9 | PE1OMB | | | 1374 | PA1AS | 72 |
| 10 | PE1OFO | | | 1026 | PE1NKT | 88 |
| 11 | M0DTS/p | IO94LI | 3 | 1012 | G7AVU | 108 |
| 12 | PE1OLR | | | 648 | PA9DX | 55 |
| 13 | F6IQG | JN-08BM | 3 | 622 | F6GNJ/P | 135 |
| 14 | PA7HV | | | 618 | PA9DX | 63 |
| 15 | PE1RLF | | | 582 | PA2RIK | 43 |
| 16 | PE1JMZ | | | 460 | PA9DX | 64 |
| 17 | PE1IWT | | | 446 | PA3DZA | 98 |
| 18 | F6BGR | JO00SC | 6 | 274 | F6GNJ/P | 137 |
| 19 | PE1AXM | | | 204 | PE1JMZ | 51 |
| 20 | G0AZQ | IO94TA | 1 | 188 | G4TNX/p | 47 |
| 21 | M0DTS/p | IO94LK | 1 | 188 | G1LPS | 47 |
| 22 | PE1CHY | | | 164 | PA1PAS/A | 41 |
| 23 | F1FKO | IN99XE | 2 | 72 | F1AAI | 9 |
| 24 | PA1EBM | | | 20 | PA1AS | 5 |
| | | | | | | |

Section 1 - 2,3 GHz

| Place | Call | Locator | QSO's | Points | Odx | QRB |
|---|---|---|---|---|---|---|
| 1 | PE1NKT | | | 10215 | PA3DZA | 191 |
| 2 | PA9DX | | | 9515 | PE1NKT | 157 |
| 3 | PA1PAS/A | | | 8670 | PE1NKT | 136 |
| 4 | PA3DZA | | | 6150 | PE1NKT | 191 |
| 5 | PA1AS | | | 3645 | PA9DX | 123 |
| 6 | PA7HV | | | 3520 | PA1PAS/A | 66 |
| 7 | PA0AVN | | | 3335 | PA1PAS/P | 84 |
| 8 | PE1OFO | | | 2565 | PE1NKT | 88 |
| 9 | PE1OMB | | | 2270 | PA1AS | 72 |
| 10 | PA3CWS | | | 2095 | PE1NKT | 127 |
| 11 | PA1RK | | | 1835 | PE1DWQ | 102 |
| 12 | PE1OLR | | | 1690 | PA9DX | 55 |
| 13 | PE1RLF | | | 850 | PA1PAS/A | 39 |
| 14 | PE1GQE | | | 815 | PA7HV | 59 |
| 15 | M0DTS/p | IO94LI | 1 | 460 | G4TNX/p | 92 |
| 16 | PE1CHY | | | 410 | PA1PAS/A | 41 |
| 17 | PE1JMZ | | | 320 | PA9DX | 64 |
| 18 | M0DTS/p | IO94LK | 1 | 235 | G1LPS | 47 |
| 19 | PA1EBM | | | 50 | PA1AS | 5 |
| | | | | | | |

Section 1 - 5,7 GHz

| Place | Call | Locator | QSO's | Points | Odx | QRB |
|---|---|---|---|---|---|---|
| 1 | PE1NKT | | | 1480 | PE1DWQ | 48 |
| 2 | PA3CRX | | | 980 | PA3CWS | 56 |
| 3 | PA3CWS | | | 970 | PA3CRX | 56 |
| 4 | PA1RK | | | 810 | PE1DWQ | 102 |
| | | | | | | |

Section 1 – 10 GHz

| Place | Call | Locator | QSO's | Points | Odx | QRB |
|---|---|---|---|---|---|---|
| 1 | S58RU | JN75AS | 2 | 1920 | IK4ADE | 284 |
| 2 | PE1NKT | | | 1220 | PE1DWQ | 48 |
| 3 | PA1PAS/A | | | 1100 | PA3DZA | 64 |
| 4 | S52DS | JN66SB | 1 | 500 | S58RU | 4 |
| 5 | PE1CHY | | | 410 | PA1PAS/A | 41 |
| 6 | PA3DZA | | | 320 | PA1PAS/A | 64 |
| 7 | M0DTS/p | IO94LK | 1 | 235 | G1LPS | 47 |
| 8 | PA1AS | | | 100 | PA1EBM | 5 |
| 9 | PA1RK | | | 100 | PA1PAS/A | 10 |
| 10 | PA1EBM | | | 50 | PA1AS | 5 |
| | | | | | | |

Section 2

| Band | Call | Locator | QSO's | Points | Odx | QRB |
|---|---|---|---|---|---|---|
| 70cm | PE2HHN | | | 5 | PE1IWT | 5 |
| 23cm | PE2HHN | | | 64 | PE2TV | 27 |

# !!! Your Club Needs You !!!

If you do something, anything, related to ATV please drop your editor an email so it can appear in CQ-TV, if you can write an article about your latest project even better, you may even get paid !!

**editor@batc.org.uk**

# A Look at Shellwood Productions

*by Mike Cox and Granville Cooper*

Quite near the River Thames, at Thames Ditton, is Shellwood, the home of Mike and Kathy Lorenzini. They run the Billy Mayerl Society from there, and of more interest to us, Mike has a fine working TV studio in his purpose built music room in the house (Fig.1).


Fig. 1

Concerts are regularly held, with mainly piano works on the programme. These are recorded, and then made into DVDs [and maybe now blu-ray discs] that are on sale to members of the Society, and many individual items are available on YouTube. [Look up "inizerol" or click on the link:-
http://youtu.be/nkeAGi2adyU

Mike is a former professional photographer and took to video about 15 years ago. He is an innovator, and constantly looking to the technology available to him to improve the product.

One of the innovations that appealed to me was a computer screen that displayed music for the piano, but even better was the knee-operated paddle to turn pages (Fig.2). The system has a small computer mounted behind the screen, or, if mounted on an upright piano rather than a Grand, fitted behind the piano.


Fig. 2

Cameras are fixed around the studio on remote pan/tilt heads, controllable from the control room. At this point, we should consider the use of the LANC control system, used by Sony and Canon, but sadly not by JVC or Panasonic. This system allows for control of zoom and focus remotely, and together with the pan/tilt control, allows for all cameras to be pointed, framed and correctly exposed from the control room. Four single chip SONY HDR-HCE's are used together with one three chip SONY HVR-V1E as the "flagship" camera. Readers of CQ-TV may remember that it was from Mike that I got the two Sony DCR-TRV355 cameras that feature in my 3D rig. [CQ-TV 228]

Fig. 3

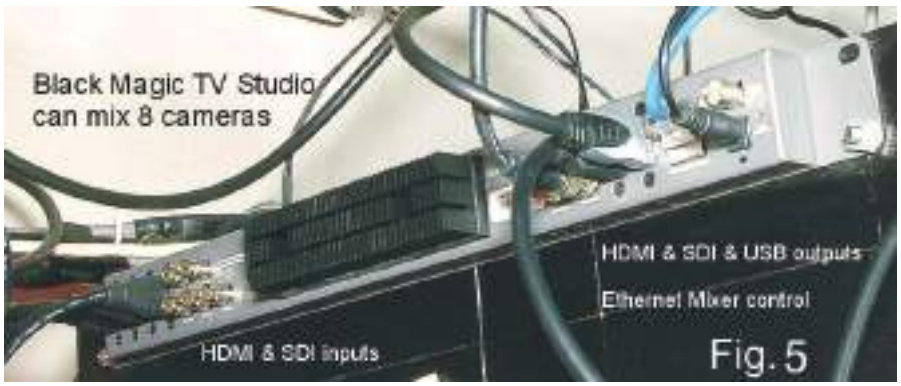
Originally, Mike used an analogue mixer fed with Y/C signals. A Datavideo mixer replaced this, with new Sony High Definition [HD] cameras run at Standard Definition [SD]. and connected via Firewire, which, at a stroke, cleaned up the pictures dramatically. The HD capability of the cameras was taken advantage of last year when a Black Magic Design mixer [ATEM Television Studio] was acquired (Fig.5).

This mixer uses a computer as the control panel, rather than paying a rather large price for a conventional control panel (Fig.6).

In a corner of the music room, there is a minuscule control room for video and audio, and lighting (Fig.7).

The HD output on the cameras is on HDMI connectors and it was initially assumed that long HDMI cables could be used to connect to the HDMI inputs to the mixer. However, experiments showed that the mixer would not work with long HDMI leads even though a perfectly locked picture could be viewed from the camera output on a monitor fed via a 15 meter HDMI cable. Careful perusal of the literature supplied by Blackmagic Design






revealed that the maximum length of HDMI cable their ATEM Television Studio will tolerate is 5 meters! [As an aside, their HyperDeck Shuttle recorder will accept long cable lengths!]

Some cameras in the studio are between 15 and 20 metres from the mixer so a means of extending the range had to be found. Attempting to extend the HDMI path with active cable boosters and equalisers proved problematic and the "solid" solution of converting to HD-SDI and making use of the alternative HDSDI inputs on the mixer would have been expensive. [Conversion cost for 4 cameras would be greater than £1K.] Conversion to make use of 2 Cat6 cables provided a solution at a tenth of the cost of conversion to HDSDI. However, even this solution is incomplete as the Black magic TV Studio does not like the HDMI output from the converts so additional HDMI amplifiers are necessary! (Fig.8).


The mixer has synchronisers on each input, so that camera genlock. is unnecessary. It has an HDMI output for transmission, and one for multiview [All sources displayed on one monitor]; (Fig.9) together with 2 SDI outputs for TX and one for multiview. It also has a USB 2.0 port for H264 output, but there are some snags with this as it outputs 24 frames a second [1920 x 1080 x 24 fps], with some motion problems on fast moving objects and, what appears to be incorrect field sequencing giving rise to jagged edges on diagonals. A HyperDeck Shuttle [Blackmagic Design] was purchased to record the HDMI output from the mixer on to an SSD card, which, it was hoped, could be used to transfer files to computer for editing in Pinnacle Studio. However the .MOV files recorded by the Shuttle proved too much for Pinnacle and, after considerable experimentation with conversion software, this route was abandoned and a Panasonic AG-HMR10 AVCHD Compact Field Recorder is now used connected via HDSDI (Fig.10).

Fig. 10

As this records on SD cards formatted with FAT32, the resultant data stream is split into files of 4GB. It has been discovered that when these files are combined in Pinnacle there is a frame or so glitch. So far careful viewing has failed to detect this problem if the files are played out straight from the recorder!

labyrinth before going into the studio. This is all in the interests of keeping noise injection to a minimum.

However, not only does heat have to be removed, but also because of the grand piano, and the singer's throats [when there is a singer], the humidity has to be kept within limits. In the winter, when the air is drier, a 5-gallon water reservoir has to be filled once a week, in order to stop the piano timbers drying out (Fig.12).

Some video engineers tend to be carried away with the pictures, and forget that sound is the most important part of the story. Because the output of the studio is a DVD or blu-ray disc, editing is needed both for video and audio. Audio is recorded separately, and then put back in as part of the editing process in Pinnacle 15. The output is edited ready with opening pages for the DVD or blu-ray disc. The Audio track is edited in Cool Edit (Fig.13).


Fig. 14

All in all, this is a remarkable effort on the part of Mike [and Kathy], with the technical assistance of Granville Cooper. This effort has been spread over many years to reach the current high standards of picture quality. This has entailed a large amount of trial and error, not to mention sheer ingenuity. Thanks to Mike and Kathy for their hospitality during the assembly of this article.

**Websites:**

www.blackmagic-design.com
www.shellwood.co.uk

www.panasonic.com/business/provideo/AG-HMR10.asp

www.billymayerlsociety.co.uk
http://youtu.be/nkeAGi2adyU

Fig. 11

Lighting in such a studio is critical, some incandescent keylights, and now some RGB LED luminaires [on the rear drape] are in use with the main lighing provided by. dimmable colour corrected fluorescent tubes [8 x 36 W, + 4 x 18W] (Fig.11). The aim is to match the 2700 – 3000° K of the Tungsten spot lights and room lights. Well-chosen varnish was applied to the tubes to get to the required colour temperature. Control of lighting level is also from the control room.

The lighting load of around 3 KW, plus the 40 strong audience [150 W per person] means that there is quite a bit of heat to be got rid of. An air conditioning unit is fitted with the compressor/heat exchanger mounted on an outside wall, and cooled air led through ducts and a

How, you ask, are the audio and video synchronised? A clapperboard is used with a flashgun driven from the clapper arm is used at the beginning of the recording, giving a marker on both video and audio tracks.

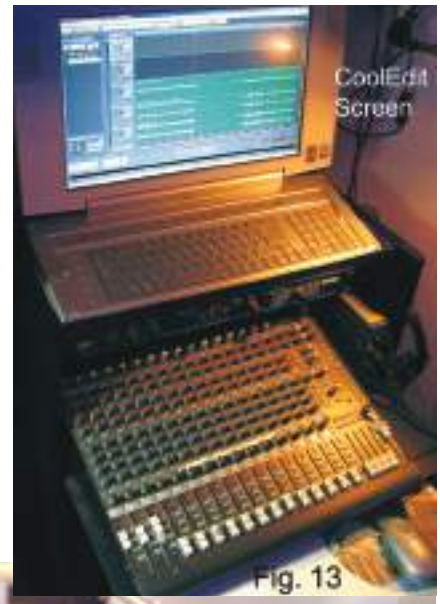


Fig. 13

Fig. 12

# More 23 cm propagation experiences.

*by Ian Waters G3KKD*

Back in November 2008 (CQ-TV 224) I published some observations made on the signal of the GB3PV 23 cm repeater as received, over a fairly unobstructed path of 14 km, at my home station. It was concluded that the signal strength, which was subject to considerable variation, was influenced by two main factors.

1). There is a yearly cycle controlled by air temperature and whether the trees are in leaf or not.

2). A daily cycle, superimposed on the yearly one, controlled by air temperature.

The signal on a cold winter night could be some 8.5 dB lower on a hot summer afternoon. This is believed to be due to the refractive index of air, which varies inversely with temperature, causing part of the signal, which in warm conditions would pass over my aerial, to be refracted downwards.

Later in February 2010 (CQ-TV 229), by which time PV was also transmitting QPSK DATV, I reported on a strange propagation effect. For a period of 3 weeks in August I had no digital reception. While the FM signal remained normal and strong at P5 and the QPSK signal strength also strong, as measured by the green bar on the STB, the box refused to decode with quality zero. Things then returned to normal and have remained so until this year. The conclusion was that, as no interfering signals could be seen on the spectrum analyser, this must be being caused by multipath, to which QPSK is prone. A careful search along the whole path to the repeater failed to show any structure or tree etc. which could be reflecting.

Now in the spring of 2012 yet another strange effect has been observed. During the month of May both the FM and QPSK signal strength fell by some 10 dB superimposed on the normal daily variation. The normally P5 FM fell to about P3. Such a fall would normally have resulted in the STB failing to decode BUT incredibly the reverse happened. With a very weak signal the reliability of decoding actually improved. Whereas I would have normally expected some drop outs decoding is solid with virtually none to be seen.

The only conclusion I can come to is that this is again a multipath effect. Prior to the start of May the received signal was probably the sum of two rays, with very nearly identical path lengths, combining to produce the measured level. Any timing difference was quite invisible on FM and so small as to only produce the occasional drop outs. A tree has probably come into leaf obstructing one ray, hence the drop in signal, but giving a clean signal for the benefit of QPSK.

# Colour Lab

*From TV-AMATEUR 165*

At the "Bergische University" in Wuppertal, Germany, at the Chair of Communications, together with Prof. Franz-Josef In der Smitten (died 2010) Prof. Uwe Kraus, DJ8DW, installed a historical TV lab, with original devices from the PAL colour lab at WDR Cologne in the sixties and HDTV1250 gear from "EUREKA 95".

There are early black-and-white TV cameras with 3-inch Super-Orthicon including amplifier and controller train for outside broadcasts made by "Fernseh GmbH", Darmstadt (1957):

B/W 2-inch tape recorder RCA TR-22 (1965) adapted by minimizing phase errors for the first usable PAL colour TV recordings of the Cologne carnival parade in 1966. These findings were input to the development of the RCA TR-70 colour tape recorder which was used as a workhorse in the regular colour TV service from 1967 on:

The micro-computer controlled setup can store different camera head settings digitally for quick exchange and is multi-standard capable: On four parallel traces the signals Y1, Y2, CR and CB are FM modulated besides three high quality sound channels:

The historical colour TV lab is supported by Wuppertal University and Radio/TV station WDR Cologne, it will open for registered visitor groups after appointing a date by E-Mail to krausue@uni-wuppertal.de

Translations: Klaus, DL4KCK, AGAF e.V. http://www.agaf.de

**We are still paying for quality articles for CQ-TV**
**Contact editor@batc.org.uk for details.**

# PCBs

*By Dave Mann, G8ADM*

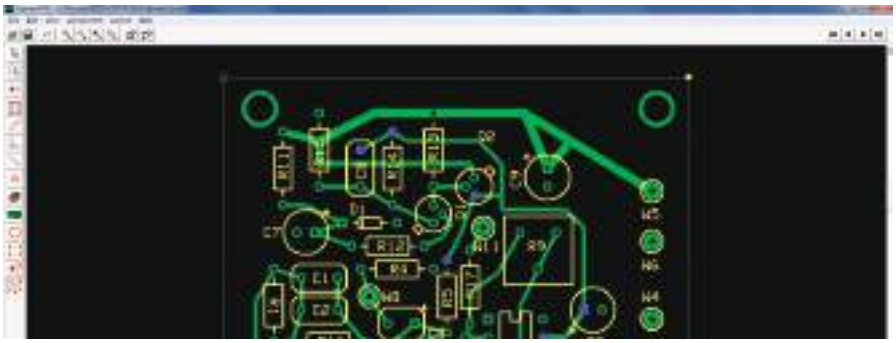
Many people make PCB's at home using home made artwork, copper coated PCB material and pints of acid. I am sure that this is a very dangerous process especially with family members around and I strongly advise you to find an alternative method. (To improve safety, one of our committee members said he leaves the acid bit to the wife!)

I use an on-line service where the supplier provides free PCB layout software and the boards are normally shipped to me within four days. Currently a two sided 60cm square board without the component reference legend or solder-resist costs about £40 to get made. This is for a quantity of two, the price is less for higher quantities and more if you require the component references and solder resist. Sometimes there is also import duty to pay.

The company I use is Express PCB located in California USA. I normally lay out the boards over the weekend and press the buy button and enter my credit card details, on a Sunday night. The boards are usually delivered on the following Thursday. This is a remarkably good service for a company thousands of miles from London.

Their software can be downloaded from: http://www.expresspcb.com/

Other companies also offer this service such as Eagle. Their PCB Software may be downloaded from:
http://www.cadsoftusa.com/



I have no experience of Eagle but I have heard good reports about them.

**So, how does it work!**

There are two programmes in the package, one is for drawing the circuit diagram and the other is the PCB layout software. Having drawn the circuit and saved this drawing to a suitable file this file can then be imported into the PCB layout software that guides you through the layout process.

I am an oldie born 30 years before home computers were invented. Even I found the software very easy to use and so much simpler than the so called professional layout software that I have seen used over the years at my work.

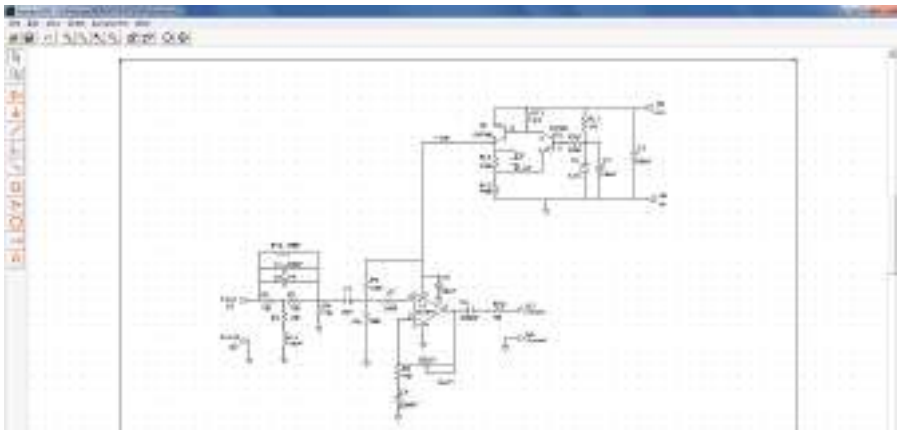
Both programmes have a comprehensive library of components. If you wish to use a component that is not in the library it is possible to create your own library component. So by pulling the various components out of the library, first for the circuit and then for the PCB layout the various components may be moved around to appropriate positions and the pins connected together,

Having imported the circuit to the PCB layout, when you click on a component pin, all the pins that should be connected to that pin are highlighted. See Fig. 2. This makes it very easy to connect the appropriate pins together and the wires may be easily moved to different layers which are colour coded. Pad sizes and wire thickness can easily be changed.

When you are happy with the result one of the menu functions will check the connections and another will allow a trial order to be placed, this is to show you the cost before you actually place the order. If you are happy with the price you can then place the order from another menu function all without leaving the software and without having to send an email.

**Conclusion**

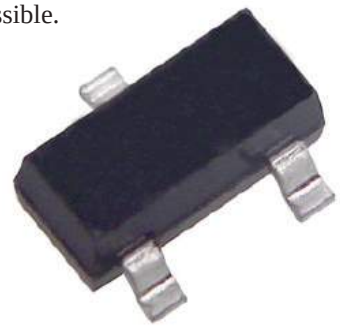
Having discovered this service it has enabled me to do much more home construction. It is very rewarding to look at the professional results that it possible to achieve and I strongly encourage you to try it.



# Circuit Snippets

*by Dave G8AJN*

There have been a lot of video circuits using more older devices in CQTV, these DIL versions are frequently used probably because of their convenient size and the fact that SMD does not allow use of the chunks of Veroboard you have in your 'bits' box. However most products are now surface mount packages and stocks of devices like the quite elderly EL2020 and CD4066 DIL versions will eventually evaporate so it might be wise to start to use or at least plan for the SMD versions wherever possible.



Thankfully there is a much simpler way to create your own pcbs these days with the help of the free CAD software and even for etching your own single-sided boards using Press-N-Peel or by photographic means. The main benefit of using smd chips is the total lack of board drilling.

There are several that I have used extensively in the GB3SQ repeater, particularly the FDV301N , the AD8057 and the MMBTA13 and I present them here knowing that they work reliably and consistently. They are offered as an option to help you when you need a quick and simple circuit to get some extra video or audio drive.

**FDV301N**

From a constructional point of view there are a number of advantages of using discrete switches instead of an IC such as the 4066. Clearly there is less risk of cross-talk but more advantageous is the fact that the switches can be placed at a more convenient and nearer point than having to run wires to and from a single quad chip. This reduces the length of tracks, reduces the likelihood of any cross-talk and rf pick-up and reduces the size of the board overall.

The ON resistance of the CD4066 can be as high as 50 ohms depending on the manufacturer. This is enough to be a problem on a 75 ohm video line. By using a discrete FET switch such as the FDV301N from Fairchild which has an ON resistance of about 4 ohms with an OPEN resistance of many megohms and with capacitance of less then 6pF means that at 75 ohms this is an ideal device. They can be used either in line or even by dumping the signal to ground, but doing this means that there must be a series resistor to drop the signal across and to prevent any loading of the incoming line.

On our repeater I found that the input line could be dumped to ground OK on the IC input but an in-line switch was added as well after each IC to reduce loading and avoid any crosstalk or noise where the two different video IC outputs were joined. The switches can be used as inverters too, not of course linear, but useful for inversion of logic pulses.

They can switch up to 200mA at 20v so can be used for operating small relays or lamps. They are safe to 6v on the input gate pin and are diode protected internally. No bias resistors are required. They can switch on and off at under 8nS and they are very small, SOT23,about 3mm x 2mm.

**Video amplifiers**

There are two main types of opamps used for video signals, voltage-feedback amplifiers (VFA) and current-feedback amplifiers (CFA)

Voltage-feedback amplifier circuit configuration uses a high-gain amplifier whose parameters are determined by external feedback components. The amplifier gain is so high that without these external feedback components, the slightest input signal would saturate the amplifier output.

Stability as used in electronic circuit terminology is often defined as achieving a non-oscillatory state. Stability is a relative term, it is easy to draw the line between a circuit that oscillates and one that does not oscillate, so it is understandable why many people believe that oscillation is a natural boundary between stability and instability.

Feedback circuits exhibit poor phase response, overshoot, and ringing long before oscillation occurs, and these effects are obviously undesirable in video circuit design. Relative stability is defined in terms of performance. By definition, when designers decide what trade-offs are acceptable, they determine what the relative stability of the circuit is. A relative stability measurement is called the damping ratio. The damping ratio is related to phase margin, hence phase margin is another measure of

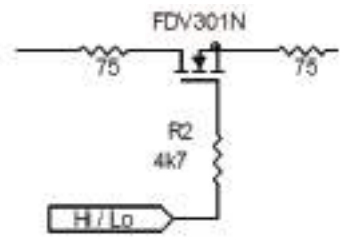



*Fig. 1 Series switch.*

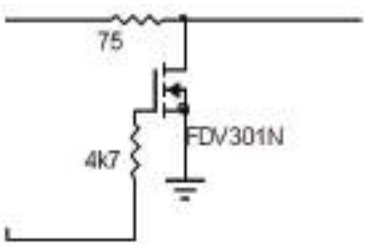



*Fig.2 :Dumping switch*

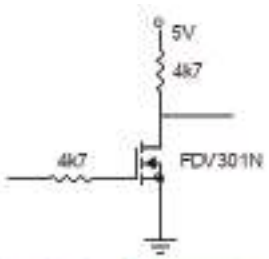



*Fig.3: Logic inverter*

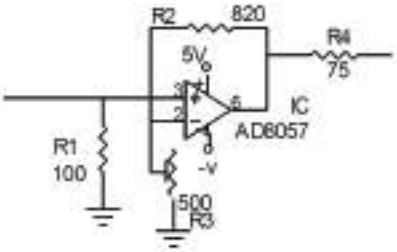
relative stability. As you may imagine, the most stable circuits have the longest response times, lowest bandwidth, highest accuracy, and least overshoot. The least stable circuits have the fastest response times, highest bandwidth, lowest accuracy, and some overshoot. So as with most things it is a case of trading off the various pros and cons.

Current-feedback amplifiers (CFA) do not have the traditional differential amplifier input structure, meaning that they sacrifice the parameter matching of the VFA. The CFA circuit configuration prevents them from obtaining the precision of voltage-feedback amplifiers (VFA), but the circuit configuration that sacrifices precision results in increased bandwidth and improved slew rate.

The higher bandwidth is relatively independent of closed-loop gain, so the constant gain-bandwidth restriction applied to VFAs is removed for CFAs. The slew rate of CFAs is much improved from their counterpart VFAs because their structure enables the output stage to supply slewing current until the output reaches its final value.

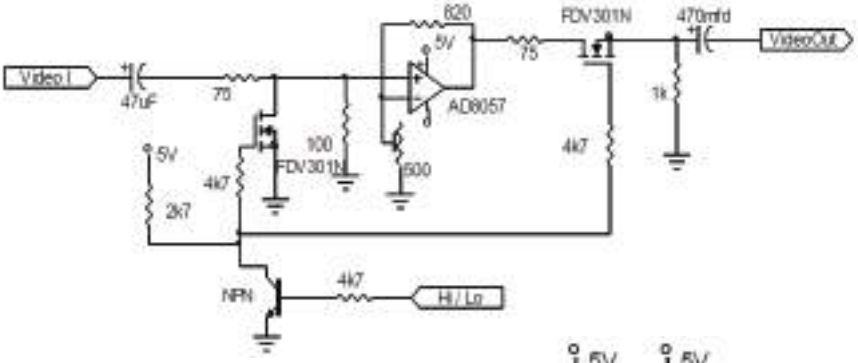
In general, VFAs are used for precision and general purpose video and non-rf applications, while CFAs are used for high frequency applications.(i.e. above 100 MHz). Although CFAs do not have the precision of their VFA counterparts, they are precise enough to be dc-coupled in video applications where dynamic range requirements are not severe. CFAs, unlike previous generation high-frequency amplifiers, have eliminated the ac coupling requirement; they are usually dc-coupled while they operate in the GHz range. CFAs have much faster slew rates than VFAs, so they have faster rise/fall times and less intermodulation distortion.

The AD8057 is a VFA but has managed to combine the best features of a VFA with performance comparable to CFAs. They are stable between 3v and 12v supply range with low noise and distortion figures and a x5 bandwidth of 25Mhz. By keeping the feedback resistor below the 1k ohm of other designs the stability is good with no apparent colour degradation and gain can be set with a pot to ground (R3) on the feedback input pin which retains




the bandwidth whilst changing the gain of the stage. The value of the feedback resistor itself should not be used to alter the stage gain. These are normally run with a dual +5 and -5v supply but at these low currents it is easy to create a dummy ground at half the supply voltage, but that means that the dc output of the IC will be at half supply instead of 0v and the output will need to be AC coupled thus risking losing any dc clamping applied.

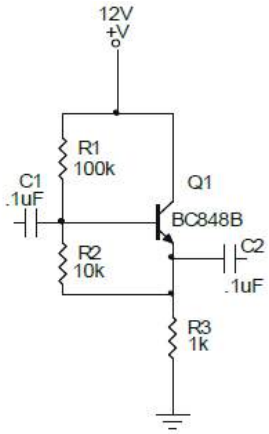
If running into a low impedance load such as 75 ohms a coupling capacitor of at least 470 mfd will be required to cope with the 50Hz field rate, 1000mfd is probably advisable. Bridging the electrolytic with a 0.1uF to preserve hf should not be necessary with modern electrolytics. Provided you have a 75 ohm resistor in series with the output of the IC they are short-circuit proof.



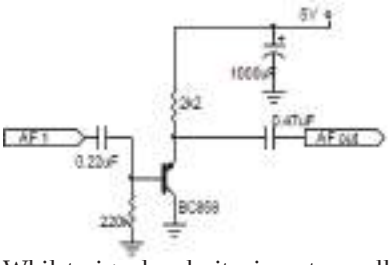

One of the three video channels that join across the 1k ohm in the repeater is drawn here to show how the switches were implemented. The NPN inverter could be directly substituted by a FDV301N if preferred.

**Emitter followers**

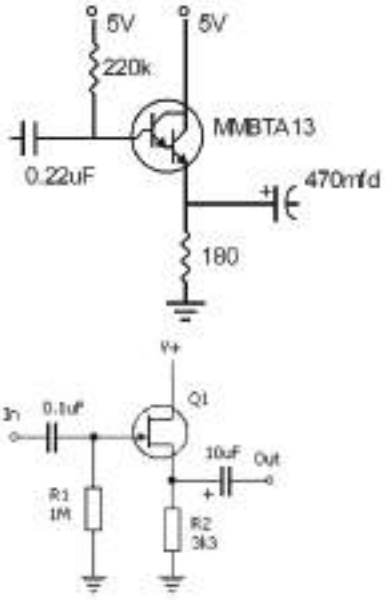
Also called common collector, the wide bandwidth and low impedance output of emitter followers make them useful in audio and video stages to give non-inverting outputs into 75 ohm. Here is a typical emitter follower with an output impedance of about 1k, ideal for audio stages.



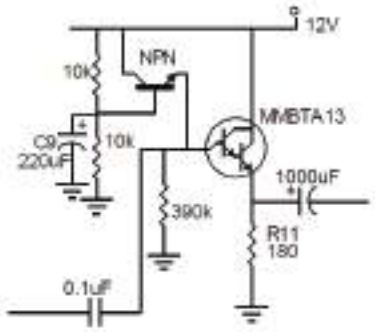

This is using an NPN transistor but a PNP can also be used.




Whilst signal polarity is not usually a consideration for audio, with a video waveform it is essential to retain the correct polarity. To get a good match from a higher impedance source (>10k) into 75 ohms a Darlington device is ideal as the two transistors it contains enable a good bandwidth but

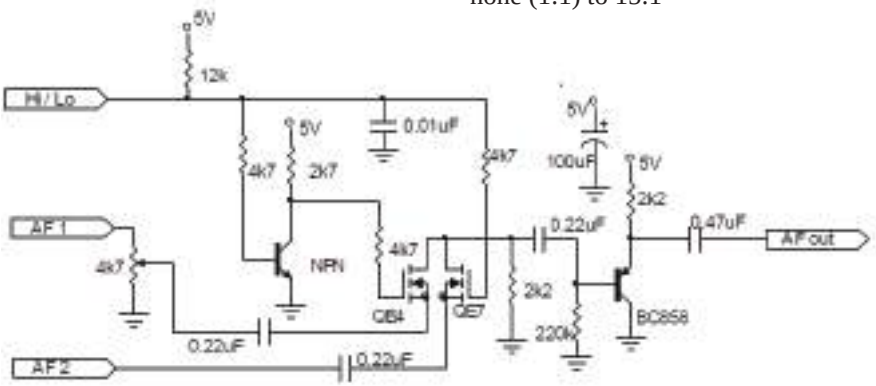


with a high output current that enables a video waveform to run into 180 ohm for matching to a 75 ohm line. Keeping the base current constant gives a better clamping by stopping the bias point being modulated by a large signal. An extra NPN transistor can be added to the circuit to achieve this effect.



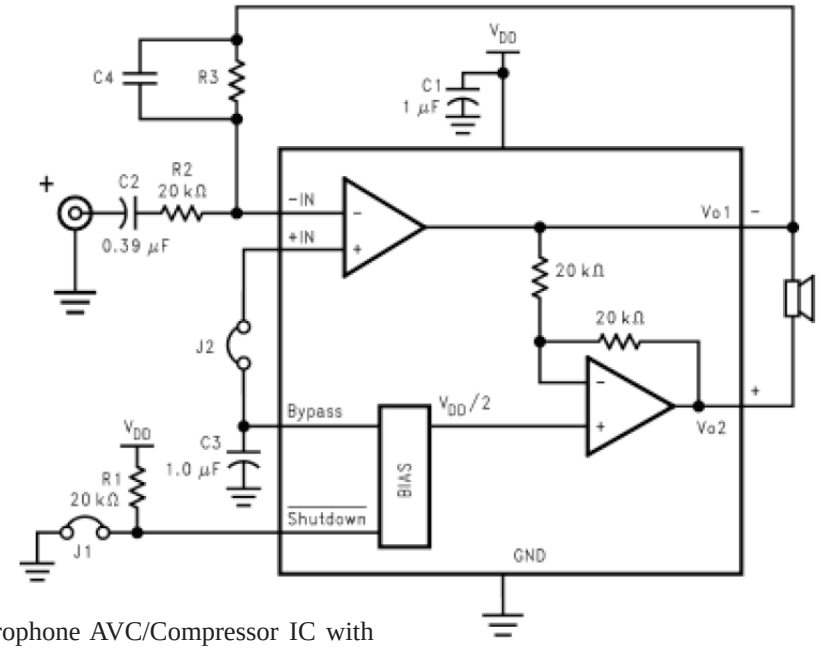

FETs also can be used too but are not called emitter followers, FET versions are called source followers. A much higher input impedance than a bi-polar transistor circuit so they are suitable where higher impedance inputs are involved.

Here is a part of the audio switching in the GB3SQ repeater. AF1 is the audio from the analogue input and the digital feed is on AF2. When the Hi/Lo line goes low it switches to the AF1 feed. It defaults back to high on a digital or when the analogue signal drops out.




**Headphone Amplifier: LM4890M**

This tiny amplifier chip will drive a 8ohm speaker or headphones if required. It is very useful to be able to add a headphone option to mixers etc for the purpose of setting up microphone levels or for distribution or talkback. The maximum output is around 1W. The package is smd SOIC8 which is about 5mm x 6mm. R1 = 18k, C4 is not needed. R2 =18k and the coupling C2 = 0.22uF. R1 =22k and the link J1 (muting) should be o/c.




Microphone AVC/Compressor IC with 60dB range & adjustable noise floor.

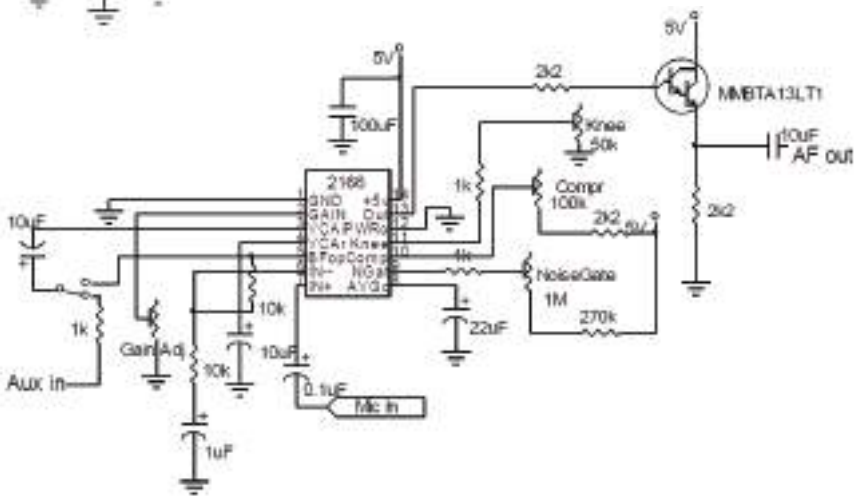
Popularly called VOGAD this chip takes agc options to a new level. With a microphone input you can set compression , attack and noise floor points and get a couple of volts of audio out.

Setting the audio presets :
The maximum gain of the SSM2166 front end amplifier is set by R24 ranging from 0dB to around 20dB.
R23 sets the compression ratio from none (1:1) to 15:1

The Rotation point or the limiting threshold is where the limiting starts to come in and attenuates any transients that might exceed this point.
Noise floor is the point below which the microphone signal is muted, very useful in a noisy environment.
If using a larger audio input signal than a microphone it would be advisable to reduce the value of the 10k feedback resistor between pins 5 and 6 and attenuate the input line accordingly.

A PCB layout and more details are available on my website
http://www.g8ajn.tv/projects.html

I hope you find these circuits of interest and even of some use in your future builds. If you have some useful circuit bits why not jot them down and send them either directly to me or the CQTV magazine and we will publish them for the benefit of others.



# Turning back the pages

*A dip into the archives of CQ-TV, looking at the issue of 49 years ago.*

*by Peter Delaney*

CQ-TV 52

The editor began by commenting that with that edition "BATC enters its fifteenth year - a year which will bring the next Convention of the club". He continued to say that "It must be remembered that no CQ-TV can appear without sufficient articles being submitted to the Editor. In the past most of the published articles have come from a small group of people, this is not because they are of the selected elite, but because they were the only people to submit articles. I would, therefore, like to ask anyone who has a circuit or gadget in use in their rig, to remember that it may be of use to other members, and to let them know about it via CQ-TV".
(That could have been written in 2012, as well as 1964 !)

As commented in the last 'Turning Back the Pages', CQTV was a good 'teaching medium'. This time, however, the 'lesson' was about a 'non-electronic' subject, as Grant Dixon considered 'Lenses and Amateur Television'. At the time, he remarked that 'most people start their amateur television career with the construction of a simple flying spot scanner in which a negative or other transparency is stuck on the face of the cathode ray tube. Soon however, their thoughts turn to slide scanners and cameras, and as these involve the use of lenses, the purpose of this article is to try and throw some light on this subject' (was the pun intended ? !!).

Considering a biconvex lens (Fig I), rays of light from the object ABC form an image PQR - the rays of light that strike the lens squarely are bent to pass through the point F (called the focal point), and rays of light through the centre of the lens, O, pass on without being bent. The distance from O to F is called the 'focal length' (f). The angle of view (a) is given by

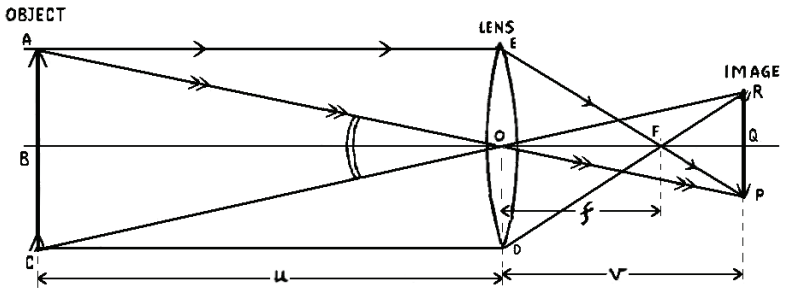



**Fig. I**

$$\tan\left(\frac{a}{2}\right) = \frac{x}{2f}$$

where x is the width of the scanned area of the camera tube.

TABLE OF LENS ANGLES Assuming a width of scanned area of 13mm. and distant objects.

| FOCAL LENGTH mm | FOCAL LENGTH inches | ANGLE |
|---|---|---|
| 15 | 0·6 | 47° |
| 25 | 1·0 | 29° |
| 50 | 2·0 | 15° |
| 75 | 3·0 | 10° |

fig. II

Fig II showed typical values, whilst Fig III and Fig IV showed that a wide angle lens is one with a short focal length. The consequence of this was that if several such lenses were used on a lens turret, each had to be mounted at its own focal length from the camera tube faceplate. Two useful formulae when dealing with lenses are:-
where u is the distance from lens to

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

object, v = distance from lens to image and f is the focal length of the lens.
If an object is brought closer to the
And:

$$\frac{\text{size of image}}{\text{size of object}} = \frac{v}{u}$$

lens, the image moves further away, and it was the normal practice to arrange for the vidicon tube to slide backwards to focus the picture, although some lenses were available that could be adjusted with a rotatable focus ring. Grant also explained that the light gathering power of the lens was measured by its 'f number' - which is the focal length of the lens divided by the diameter of the lens.

Fig V tabulated the effective light gathering power of various 'f numbers'. Special types of lens included telephoto

TABLE OF LENS STOPS

| f number | Relative light gathering power |
|---|---|
| 22 | 1 |
| 16 | 2 |
| 11 | 4 |
| 8 | 8 |
| 5·6 | 16 |
| 3·9 | 32 |
| 2·8 | 64 |
| 1·9 | 128 |
| 1·4 | 256 |
| 0·97 | 512 |

fig. V.

and zoom lenses. A telephoto one has a very long focal length, and hence a narrow angle. The difficulty was to produce a lens of this type which is not too cumbersome - particularly a problem if it was to be mounted on a lens turret, since it the telephoto lens was too long, it would be within the field of view of the wide angle lens on the turret !!

The solution (Fig VI) was to use a combination of a convex and a concave lens. The rays of light which the convex lens would have focussed at M are bent by the concave lens to focus at N. If a single convex lens had been used, it would have had to be placed at SP - the focal length of the lens being PN --- by using the combination of a convex and a concave lens this was reduced to BN.

Zoom lenses contain several lenses inside, two (or more) of which could be moved, so as to produce a variable focal length. "As they require precision engineering facilities, they are beyond

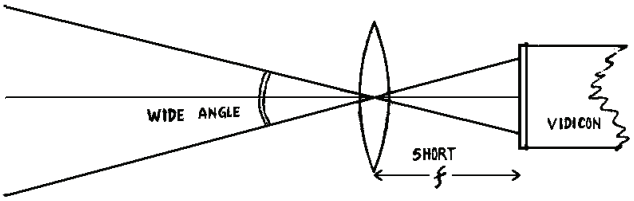



Fig. III

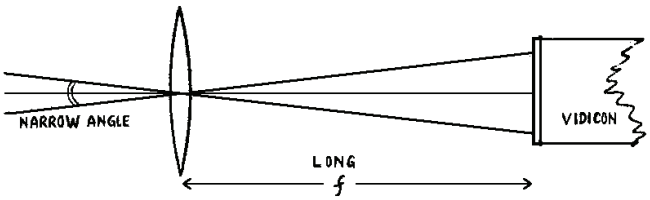



Fig. IV

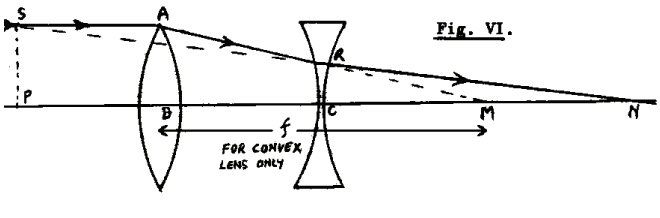



Fig. VI.

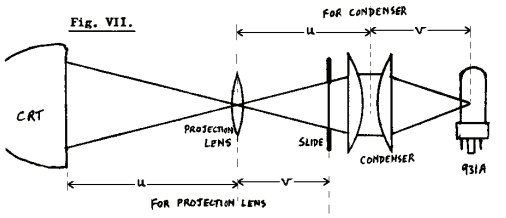
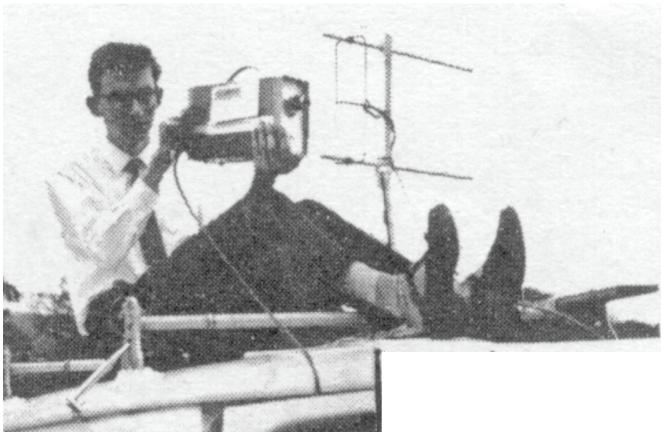



Fig. VII.

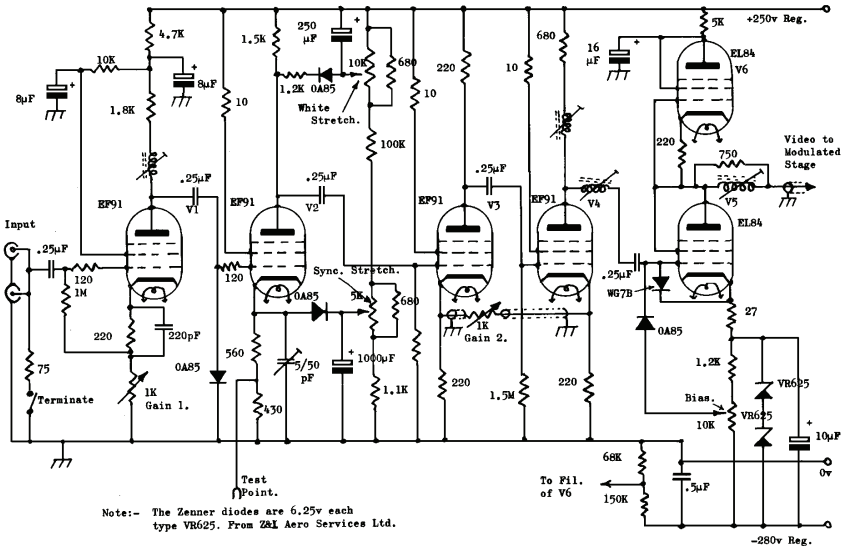



the scope of the average amateur", Grant wrote - now-a-days, of course, most cameras are fitted with a single zoom lens.

For flying spot scanning, the arrangement was basically a slide projector working in reverse - the CRT being where a screen would usually be put, and the photocell in the 'lamp house' - moving the projection lens slightly forward enabled the CRT to be closer than a projection screen would be placed. Fig VII showed the arrangement (and the notes explained how to calculate the distance of the CRT and of the slide from the projection lens).

The magazine included a 5 valve circuit for a modulator, providing an output of up to 150 volts peak negative modulation to drive a QQV06-40A, although it was thought it could also be used to drive a 4X150A. The design was based on one in an earlier CQTV, but modified as here for test transmissions by the Cyprus Broadcasting Corporation.

Other news included a note about the Radio Communications Exhibition, the Club stand being shown on the front cover. The highlight of the exhibition had been live transmissions from G3OUO/T and G3NDT/T (Dave Mann and John Tanner). As Don Reid's work was taking him abroad, Dave Mann wrote the 'What the Other Chap Is Doing' column. The availability of UHF tuners on the 'surplus' market had resulted in much greater activity on 70cm. There were reports from Lancashire, Lincolnshire, Suffolk, Cambridgeshire, the Midlands, the London area, the Bristol area and both South and North Wales, as well as the USA, Australia and Eire. G3OUO/T and G3NDT/T had also been active at the Reading mobile rally the previous August - the photograph shows Dave with his EMI 8 camera on top of G3NDT/T mobile (which looks quite 'modern' compared to 'Matilda' of just a few years earlier!).



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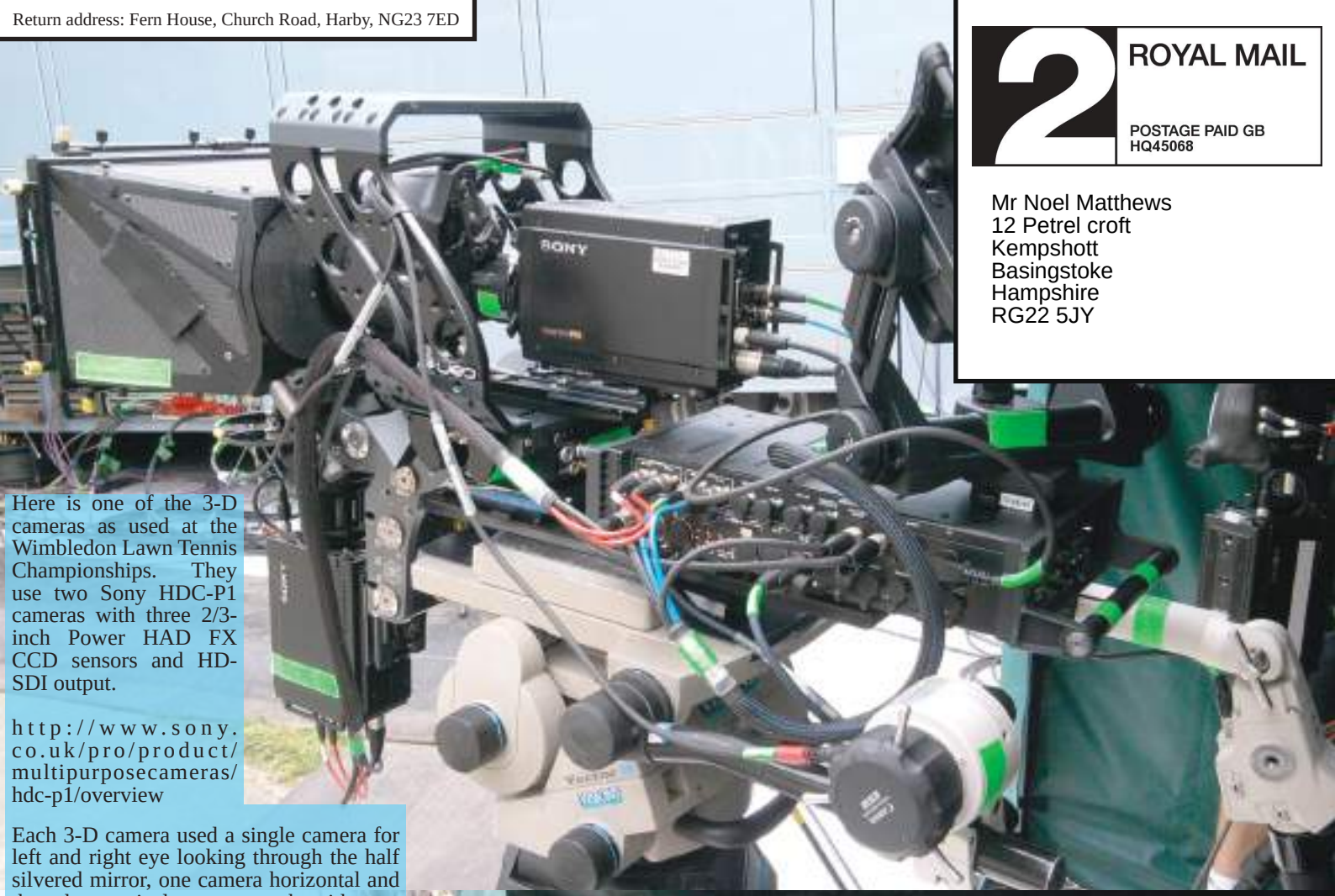


Here is one of the 3-D cameras as used at the Wimbledon Lawn Tennis Championships. They use two Sony HDC-P1 cameras with three 2/3-inch Power HAD FX CCD sensors and HD-SDI output.

http://www.sony.co.uk/pro/product/multipurposecameras/hdc-p1/overview

Each 3-D camera used a single camera for left and right eye looking through the half silvered mirror, one camera horizontal and the other vertical camera can be either up or down mounting. Both cameras have independent lenses and one of the early problems was getting the zoom/focus/iris to track each other accurately, this has now been solved. With all the bracketry, junction boxes, viewfinder and controls it is a rather ungainly assembly. Photo Brian Summers