# CQ-TV 229

February 2010 - Issue 229
ISSN 1466-6790
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## Caption Contest

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

Paul demonstrates the "polish" facility of his new Acme portable pencil sharpener to the assembled crowd - Lee G4TNX

"It was worth moving this in the lounge so you could keep in touch with me" - Richard VK4XRL

'Smile please! The core's jammed and the twiddler's broken off inside' – GW3JGA

The manual states: To achieve optimum performance, adjust L5 for maximum smoke from R21 then back off three turns... here goes! - Colin Howes G6CWL

"If you get a blue screen you can press this reset button to re-boot the micro processor." - Don Hill KE6BXT

...and the winner is Lee G4TNX, congratulations, a caption generator will be on its way shortly.


The caption contest for this issue is not *exactly* ATV related, but it *is* topical - please see the photo on the left; our lovely membership secretary with her new toy! Your thoughts please to:

editor@batc.org.uk

CQ-TV 229

# Contents



**!!! STOP PRESS !!!**
**BATC to stream the RSGB AGM live on 17th April**
**http://www.batc.tv/**


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# Deadlines

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

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

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

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# Editors Preamble

**Welcome to CQ-TV 229**

We have a nice mix of interests this issue, from discussions on depth of field to camera's on the moon, from digital TV to a restoration project to rival all other restoration projects! We've had a couple of repeaters send in some interesting information, as well as the regulars like Peter turning back the pages and John's Circuit Notebook.

Don't forget it's our BGM on Sunday 6th June, at the Helidon Lakes Hotel, directions can be found on their website:

http://www.qhotels.co.uk/

I hope to see you all there!

The streamer is still proving very popular, from the website statistics that I monitor, it is receiving on average 200 unique visitors a day. Keep an eye on the repeater section, more and more ATV repeaters are streaming via batc.tv all the time, and not just UK repeaters.

If anyone has any suggestions for improving the streamer service, please get in touch, I want to get some ideas together to move the site forwards, now it is established and has "proved" itself.

One of the important aspects of the streamer is how it is funded - by donations and sponsorship. If you would like to advertise your company on the streamer and take advantage of those 200 unique visitors a day, please contact me for details.

We also have news of an upcoming live event to be streamed via www.batc.tv which is the FRARS (Flight Refuelling Amateur Radio Society) Science Week open day, which takes place on Saturday 20th March. Streaming should start around 10am and carry on until later that afternoon. Further details about the event and FRARS itself can be found on their website:

http:// http://www.frars.org.uk

My request for an assistant editor fell on deaf ears, not a single offer! There must be someone out there who fancies a challenge? As usual, the quantity of articles submitted for publication is low, it really is a struggle filling the pages each issue, so again please can I ask that you send me whatever information you have, if it relates to ATV then I will seriously consider it for inclusion in CQ-TV - it would be nice to get more from overseas ATV activity/repeaters/projects as well as from the UK.

If you decide to send me an article, please take a look here first:

http://www.g1fef.co.uk/cq-tv

It explains how I prefer to receive the articles, it also has a form for submitting articles to me if you prefer not to email.

I look forward to hearing from you soon! In the meantime, I hope you enjoy CQ-TV 229

Best 73's
Chris - G1FEF


We have produced a DVD containing electronic versions of CQ-TV and the CQ-TV articles index. Also included are electronic versions of our three most recent handbooks, 'Slow Scan Television Explained', 'Amateur Television Handbook' and 'An Introduction to Amateur Television' 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 standard (domestic) DVD player (and on a PC with a DVD player) and the data files will 'auto-run' when the DVD is put into a PC.

The video section was prepared by Brian Kelly and contains videos from Bletchley Park 1999, one from Shuttleworth 2002 and one from 2004. The DVD is available to members for just £5 inc. postage to the UK and EEC.

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

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

# Chairman's Column

In December 2009 Stan Lebar died, Stan was in charge of the Team that built the Apollo 11 TV camera, it's always light heartedly said of Stan's project that all he had to do was design a camera that would weigh about one-fiftieth of what TV studio cameras weighed, survive temperatures ranging from 250 degrees to minus 300 degrees Fahrenheit, and withstand a liftoff pressure of eight times the force of gravity. Oh, and it had to operate without a backup - 240,000 miles from home base. Perhaps the sad thing was that we have never seen fully what this camera was capable of see the full story on page 32

Technology is once again on the move and has resulted in an ATV repeater DB0DLH with a skype input. This is an interesting development and yet another merge in the technology between internet and ATV. There are many who may not be happy with this merging of technologies, but we are a technology based club and we should report on and implement as much of the new technologies as possible, along with exploiting all opportunities to bring ATV before as wide an audience as possible. Just because the technology exists, you don't have to use it, but for some it will be the way forward, and providing a film library of ATV and AMSAT material is proving popular. You can also view the RSGB news live every Sunday or watch a recording later in the day. Nobody else has yet risen to the challenge of putting a video news together for the streamer, the facilities exist and I am sure someone out there is capable of scripting, videoing and down loading a news on a regular basis, see the News Intro, on the News Desk button if you think you could produce an ATV news

Those of you interested in nostalgia of a more terrestrial nature have not been forgotten with Paul Marshall's new Outside Broadcast truck project. This is to be a recreation of a 1950s BBC vehicle of the type built for them by the Marconi Company. The Marconi MkII camera and the associated equipments were the mainstay of the TV coverage of the coronation of HM Queen Elizabeth in 1953. The project will see the rebuild to operational status of one of the actual cameras used on the day along with the rest of the truck fitted out to a mid 1950s status. All of this needs to be operational in time for the 2012 Diamond Jubilee, but failing that in time for the actual anniversary of the coronation in 2013. There's an awful lot to do!

We have also been having an interesting debate within the committee on getting Television pictures to have that nice filmic look for reduced depth of field, as CCD sensor get smaller this problem is only going to get worse. What did come out of the discussion is that the distance from the rear element to the CCD is also part of the equation, the shorter the better. I will leave Giles to tell you the full story on page 13.

Turning to the subject of RF one of our DATV pioneers Dr. Uwe E. Kraus Chair of Communications at University of Wuppertal, is to receive the "IEEE fellow" award. The "Institute of Electrical and Electronics Engineers" will present the award at the International Conference on Consumer Electronics, ICCE, in January 2010 in Las Vegas.

Still on the subject of conferences our own humble event at Helidon Lakes on the 6th of June is gathering momentum. Several bookings for overnight rooms in the 4 star accommodation have already been placed, If you want to attend the Gala dinner please let me know by email, otherwise book your room direct with the hotel at our special discount rates. We have opened a section in the forum to discuss the lecture programme and events in an attempt to get everyone's input. So far we have Noel Matthews stepping up to the plate to deliver an insight into DATV where to start and how to take advantage of the latest developments

The BGM is also where we elect the committee members, and we are considerably under strength at the moment. If you feel that you would like to help steer the club, have ideas for projects or CQ-TV, stream ATV events, please consider joining the team. Our club is international, our committee conducts much of the day to day running by email, so being resident in the UK is not a pre requisite in fact, we would welcome some overseas input to our debates, and having someone who could attend events in other countries could be a positive advantage

Please enjoy CQ-TV 229

Trevor Brown
BATC Chairman

# ATV Newsletter

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

Bryon Foster - N6IFU (Editor & Publisher of the ATV Newsletter)

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# Circuit Notebook 103

*by John Lawrence GW3JGA*

The Maplin Signal Generator MK105 (Order Code VX94C) (Velleman PMK105'1)

This is a really inexpensive bubble packed kit costing £4.99. The signal generator, when built, provides a choice of four audio waveform outputs, square, 'integrator' (between square and triangular), triangular and sine. The output frequency is fixed at a nominal 1 kHz, (my kit provided 970Hz).

Besides bring useful for general testing purposes, it would provide an audio line-up tone for the home station. When operating portable, it could be used to modulate the transmitter to assist in aligning beam aerials etc.

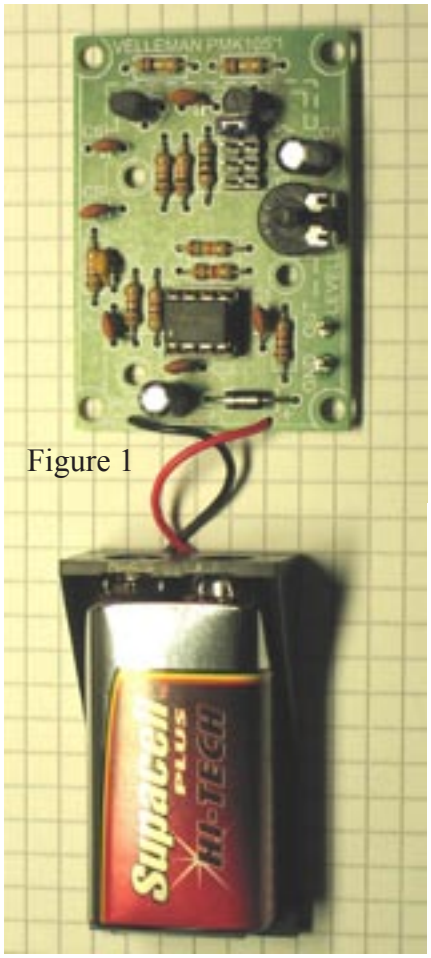

Figure 1

The kit contains a small PCB (40mm x 56mm) with all the components including a 555 timer IC and battery holder (a PP3 battery is not included). It can be built in about an hour and is shown assembled in Fig.1.

There is an output level control and the desired waveform is selected by a moveable link bridging two rows of pins. It would be possible to replace the pins with a 4-way wafer switch. A 9V PP3 battery fits into the battery holder and can be bolted onto the PCB. No switch is provided, so switching on and off is done by fitting or removing the battery.

The circuit only draws about 9mA at 9V so a simple Zener diode regulator could replace the battery and would allow it to be fed from a 12V supply. A suitable diode would be a BZX79C (9.1V) with a 220R feed resistor.

The circuit of the Signal Generator is shown in Fig.2. The 555 timer IC generates a square-wave signal which passes through three simple low pass filters to provide, in addition to the square-wave signal, the 'integrator', triangular and sine waveforms. The final filter circuit employs a transistor connected as a Miller integrator producing a quite respectable sine wave.
The maximum sine-wave output level is about 160mV rms. This could be reduced by the output level control and set to 77.5 mV (-10dBm) for testing/ line-up etc. The maximum square-wave output is 600mV p-p.

The main features are its simplicity and low cost. It's useful little circuit that I wouldn't bother to build on Veroboard.

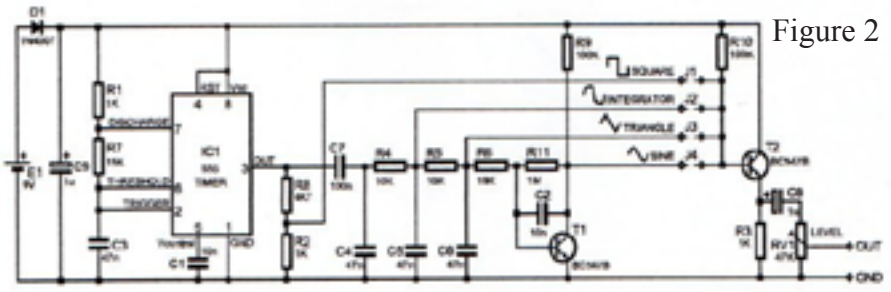

Figure 2

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# Controller For Comtech Transmitter Modules

*by Dave Crump G8GKQ*

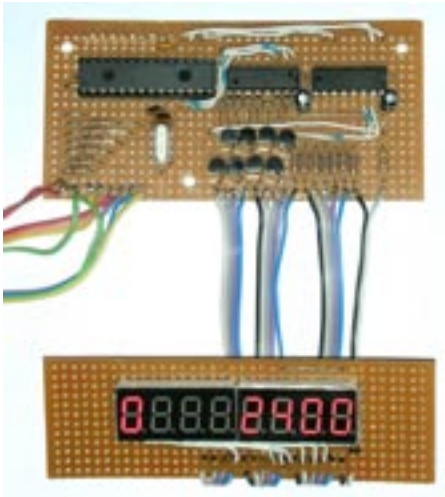
## Part 2

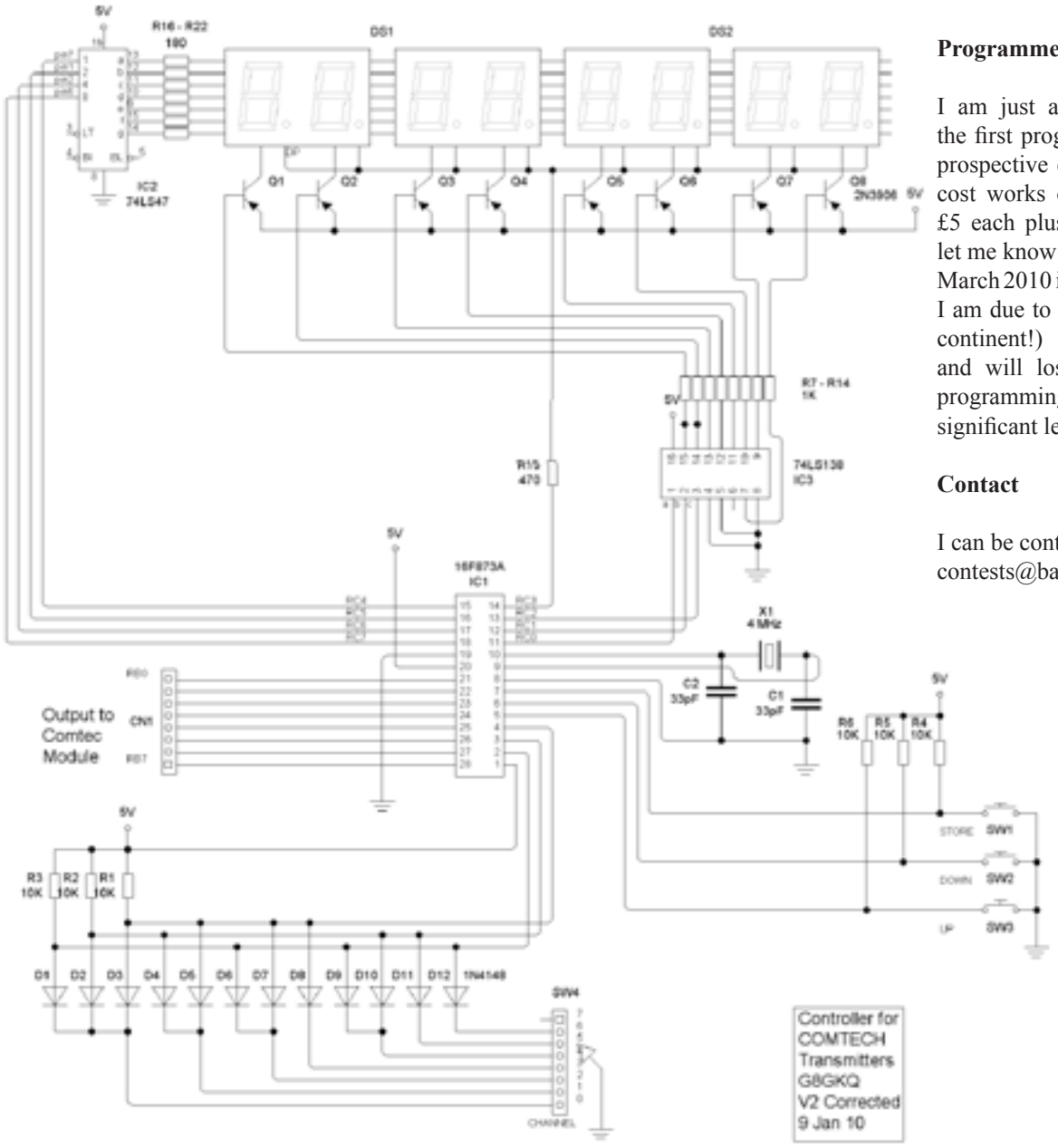
### Corrections

I had hoped to build a production version (rather than just a prototype) of the Comtech transmitter controller before I submitted the article for publication in the CQ-TV 228. Unfortunately, time ran away with me and a few errors went undetected. The corrected circuit is shown below. None of the errors would have fried any components, but they would certainly have caused some head scratching! My apologies.

### Construction

The controller and display can be built on 2 small pieces of Veroboard, linked by ribbon cable. My first production version is shown in the photo on the right. There are wire links both on the top and bottom surfaces of the veroboard and, in particular, the +5v supply to the emitters of the 2N3906s is hand-wired, not soldered to the veroboard.






### Programmed PICs

I am just about to dispatch the first programmed PICs to prospective constructors. The cost works out at just under £5 each plus postage. Please let me know before the end of March 2010 if you want any, as I am due to move house (and continent!) in the Summer and will lose access to my programming equipment for a significant length of time.

### Contact

I can be contacted through: contests@batc.org.uk.

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# 23cm DATV Propogation, a strange story

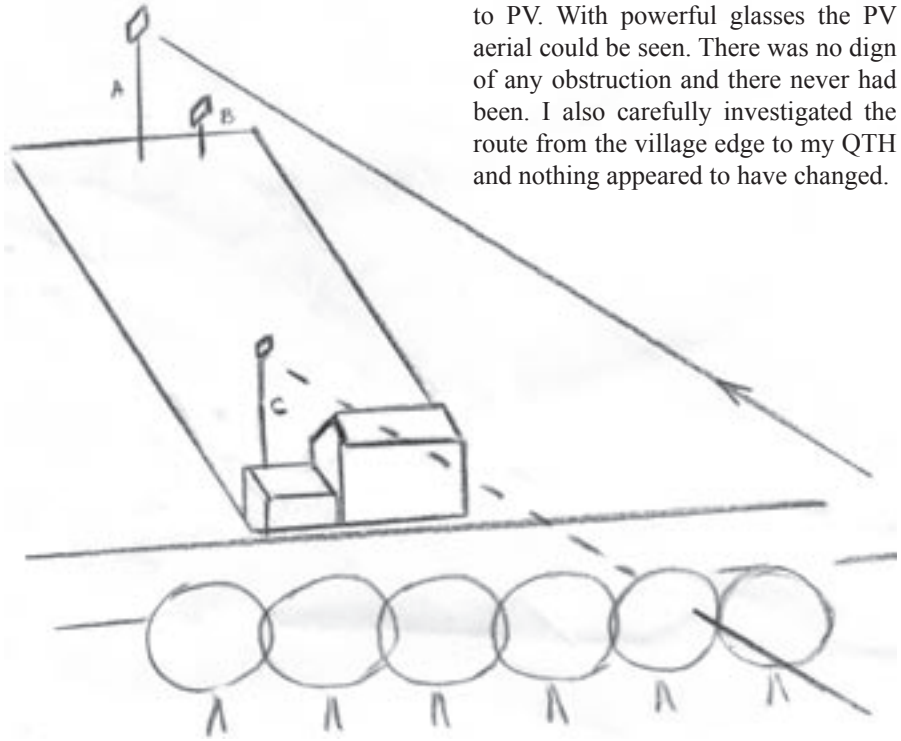
*by Ian Waters G3KKD*

This is a report on reception problems with the digital transmissions from the GB3PV repeater.

PV has been transmitting FM and QPSK alternatively for a year or so and reception at my home GTH has always been good. I have two aerials, the main (A) with 20 dBd gain at 35ft and a lower look thru aerial (B), which gives a weaker signal, but adequate for purpose.

About the beginning of August 09 I noticed that the digital picture via the main aerial was becomming increasingly broken up, while that via the LT aerial, which normally only produced digital pictures when propogation was above normal, improved. Over a period of 7 to 10 days the main signal got progressively worse until it disappeared, followed by that via the LT aerial, which also deteriorated and disappeared.

I suspected an interfering signal that was being received by the higher aerial but not by the lower, but looking on the spectrum analyser showed the digital signal spectrum to be normal and no interfering carriers. Although the signal strength, shown by the green bar on the STB remained above 60%, the box would not decode at all and there was no red quality indication via either aerial.




I tried another STB, but no difference. I tested both STBs with my local QPSK signal and all was normal. All this time the FM picture via either aerial remained normal and good. I contacted G6HFS, the repeater keeper and he reported all normal at his station.

I conjectured that a building was being erected somewhere along the 11 mile path and that the signals deteriorated as it rose higher. Alternatively it was possible that a tree had been growing taller or wider, but this is unlikely to happen in August. Another possibility was that some building or tree, that had been obstructing an interfering ray, had been removed. In this case the two rays were now combining to give multipath interference, that the QPSK decoder could not cope with. If it was a tree it would have to come down quickly although a building could have been demolished over a period of days.

From the village edge the land drops off to the valley of the Cam and then rises to PV. With powerful glasses the PV aerial could be seen. There was no dign of any obstruction and there never had been. I also carefully investigated the route from the village edge to my QTH and nothing appeared to have changed.

In desperation I took my STB and monitor to the village edge in the direction of PV. Using a small portable aerial, although the signal strength was low the qaulity was steady at 70%.

Thinking that the combination of multipath signals, if this was the cause, might be different at another location, I tried a 12 dBd panel aerial on top of my main mast (C). This provided only a very weak and fluctuating FM picture and certainly no digital. I then realised that I was again facing the problem of trees, which years ago when first working via PV, had caused me to erect my 23 cm aerials at the top of the garden, where they could get an unobstructed line to PV. Then as now there was only a very weak signal on my main mast, which fluctuated as the wind disturbed the branches.

So for a period of about three weeks I had no digital reception.

The miraculously in the first days of September digital pictures returned although still with some disturbances. Obviously what had happened had unhappened, if that is English, and I have no certainty that it will not happen again. What it was I do not know, but my best guess is that some structure, that I was unable to see, had been erected and then removed. Probably a building site crane. If anyone has a better explanation I am sure the editor would like to hear it.

*(I consulted my 5yr old daughter on this one and she suggested it might be the multipath fairies ...ed)*

I think all this illustrates just how vulnerable the DVB-S QPSK modulation scheme can be to multipath, even with strong signals and why COFDM was chosen for terrestrial use. We are presently stuck with QPSK, but if some day we can get COFDM equipment at an amateur price suitable for single channel use we may do better. Does anyone know anything?

# RF ATV + IPTV and Malta/Corfu Contact

*by Sven DG3HT*

The idea to have a real time IPTV input to an ATV repeater has been tested some years ago by Torsten, DG1HT, and Sven, DG3HT in Hamburg. It did not succeed because of poor video quality, bandwidth and an access-system to lock out unauthorized guests. Now six years later we are using www.skype.com (company located in Luxembourg), who provide a complete package for all our needs. Since early 2009 when DG3HT wrote a control program in Visual Basic, skype is the IPTV input at DB0DLH.


Browse to www.d-atv.net or www.db0amk.de and look at IPTV live streams from DB0DLH (Hamburg), DB0EUF (Lenzen/Elbe), DB0HEX (Brocken/Harz), DB0TVH (Hannover) and HB9ZF (Switzerland). Skype inputs are available at DB0DLH and HB9ZF

At https://developer.skype.com there are extensive papers, SDKs and examples for communication on skype.

The skype course-control has taken over several functions:

1) an incoming call addresses over the parallel port and relay board made by Peter, DB9XC, which connects skype-video and -audio via cross-bar matrix to the ATV repeater,

2) The call sign is read out by a TTS engine or by wav-files (audio),

3) The call sign is read out by a logomat via serial port (caption),

4) Control of online/offline state to show a free or a busy input.

Abuse of the system by non-licensed guests is excluded by skype privacy policies, so only manually registered users have access to the ATV repeater.

To access DB0DLH you have to search in skype for the skype name “db0dlh” under “contacts” > “new contact”, for the second DB0DLH input search for “db0dlh_hq” and verify it with the button “add contact”. Now you can input text for your introduction including your call sign. Also as an additional safeguard you have to send in a copy of your amateur radio license document to “skype@db0dlh.de” After verification your skype name is activated, and participation in ATV operations via DB0DLH can begin. There are around 350 hams from 4S, 7X, A6, K, F, HB9, HZ, I, LU, OE, PA, PY, RA, SM, SP, SU, VK, and DL (of course).with access to DB0DLH

**New FM-ATV record on 23 cm (Mike Zwingl, OE3MZC)**

When I was on holiday on the Greek island Corfu (SV8) in July last year OM Erwin, OE5ERN, pointed me to a special propagation condition on 70 cm. Two weeks in a row the FM repeater 9H1BBS from Malta was readable on 433.175 MHz The location is near the capital Valetta on the island between Algeria and Sicily, a distance of 650 km to Corfu. In November 2008 I met Dominic, 9H1M, from Malta at the IARU region 1 conference in Croatia, I suggested we should try an FM-ATV link on 1270 MHz between Malta (9H) and Corfu (SV). Dominic agreed as he and his team (9H1VW, 9H1LO) had already established the existing ATV record to Sardinia.

In July 2009 the day arrived, I contacted 9H1M by e-mail to confirm our arrangement and coordinate the equipment. Then everything was packed into the car and in the end shipped by a ferryboat from Venice to Corfu. My XYL Barbara, OE3YCB, had rented an apartment high above the Mediterranean Sea on a cliff 150 m ASL. The antenna was a 35 elements Tonna yagi on the patio, the homemade ATV TX with PLL and PA had 35 Watt RF power. OE5ERN, OE3DDW and his XYL OE3YTB were also on Corfu and visited me in Afionas to give a helping hand.

During the following week weather was calm, but on Saturday evening another storm inflamed the lower Adriatic sea. We didn’t even succeed in a contact via 2 m SSB

Finally on Friday August 1 the weather was good and a distinct duct lay on the calm sea surface. I activated my ATV TX at 16.10 h and heard on the calling frequency 144.390 MHz in SSB from Malta “We see your picture, we receive you!” Signals were strong both ways and easy to find on the spectral analyzer, quality was P5 sometimes and only occasionally disturbed by radar pulses. Screams of joy were easily heard over

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650 km distance, and we started to take pictures and video documentary. Now we were even able to show each other on ATV our equipment, location and team to have an overview on the situation. The Malta team were suffering in the sun in spite of a parasol, while we on Corfu had air-conditioning in our apartment. Barbara, OE3YCB, held the 2 m contact while I was busy operating the ATV camera and TX.

*Reproduced from TV-Amateur 155 with permission. Translations by Klaus, DL4KCK*

***Did you know?***

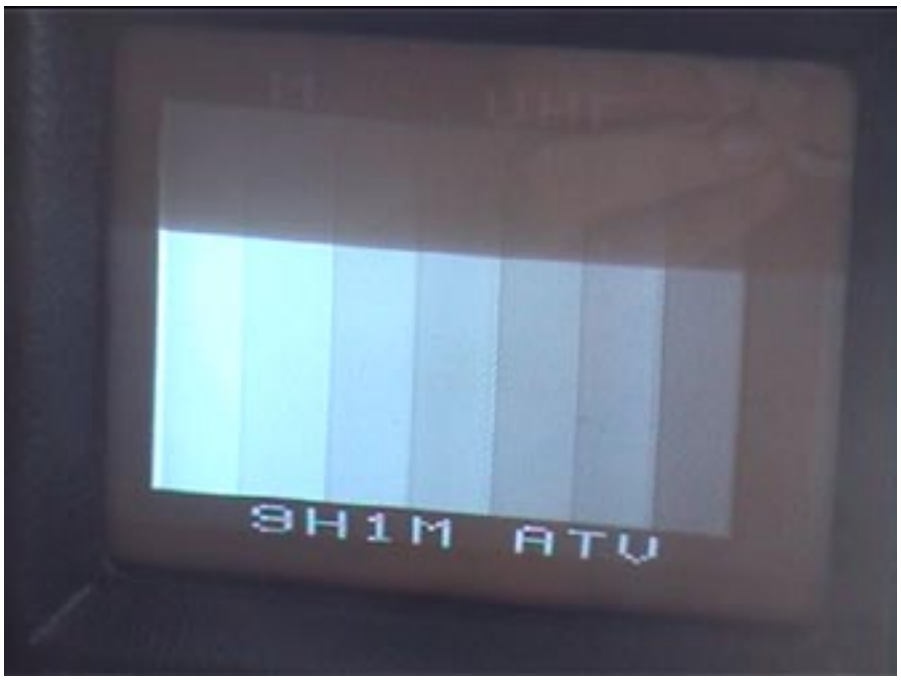
*That the world's first ATV QSO was performed between G3BLV/T and G5ZT/T in May 1952?*

***Did you know?***

*That the first colour ATV QSO was performed over 12 miles from Great Baddow to Dunmow (GB) in December 1956?*

*That a TV QSO over 200 miles was performed between G3ILD and G3NOX/T end of 1963?*

*That G3AST in Yeovil/GB received an SSTV transmission from WA2BCW in New York on November 22 1959?*





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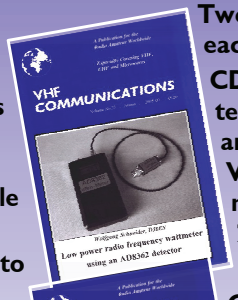

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We have now merged the old cq-tv.com website with the clubs primary website: **http://www.batc.org.uk**
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# To focus or not to focus? That is the question

*by Giles Read G1MFG*

A recent Comment article by Andy Grant in TV Bay magazine caused Trevor Brown to pontificate to the Committee about how he hates pictures with lots of depth of field (DOF), ie everything in focus and background objects growing out of people's heads. The film people manage it so much better than TV, he said. Why is this? He pointed out that the cinema people usually use some variation on 35mm (or larger) film, whereas today's compact TV cameras use much smaller image sensors. The modern pro TV camera 'fix' is to use a good lens focussed on a rotating ground glass 'screen' and then have the actual camera focus on that using relatively simple optics. Rotating the screen makes it seem to disappear, so you get the optical benefits of the big external lens with an otherwise incompatible small image sensor. A quick eBay or Google search for DOF Adapter will show the sort of thing.

Unfortunately, we don't have permission to reproduce Grant's article here, but it described how the use of film is now being replaced by HD video for TV and HDTV applications but that there were some things you could do with film that were difficult with video methods. He explained how the 3ccd system works and how this means that the distance between the (typically 2/3") sensors and the back of the lens was necessarily quite large, due to the prisms etc. An increasing number of high-quality cameras are turning to single, larger sensors with Bayer filters – essentially a souped-up version of the domestic camcorder. This optical arrangement means that the distance between the lens and sensor can be much shorter, which is good news if, like Trevor, you're interested in shallow depths of field. You can't just use a short-path lens in a long-path system, so that's where the depth of field adapter comes in.

This triggered a flurry of emails about the differences between small and large sensors, Bayer vs 3ccd and Foveon X3 sensors, which the Committee thought might make the basis of an interesting article. So, here goes...

Depth of field – particularly a shallow depth of field – is what gives photos and films that sense of intimacy. Only the thing you're interested in is in focus; everything else is a creamy, non-distracting blur (technically known as 'bokeh' - look it up). When the plot requires you to concentrate on the way she gazes into his eyes at the restaurant, you don't really want to be able to count the peas on a plate four tables away.

Photographers and many moving-image makers will know that aperture is what defines your depth of field. But more fundamentally than that, the size of the image sensor and the distance between it and the lens are the really crucial factors. And, film or digital, still or video, those parameters are fixed by decisions the equipment manufacturer made.

The basic rules are simple to grasp. It matters not if it's film or digital, so here I'm going to concentrate on electronic sensors. The larger your image sensor, and the closer it is to the back of the lens, within reason, the better (shallower) your depth of field will be. But there are other considerations, too, such as image sharpness, that need to be taken into consideration.

Conventional wisdom is that the 3ccd (or 3 tube) system gives better images than single sensor solutions. And if you compare even a cheap 3ccd camera to a typical domestic camcorder, it certainly does seem to be true. But why is this?

In the 3ccd solution, shown in Photo 1, an arrangement of prisms is used to split the light from the lens into its red, green and blue components. The lens and prism dimensions are arranged so that perfectly focused, single-colour images are focused onto three individual, monochrome CCDs, carefully aligned pixel-perfect together. It's high precision

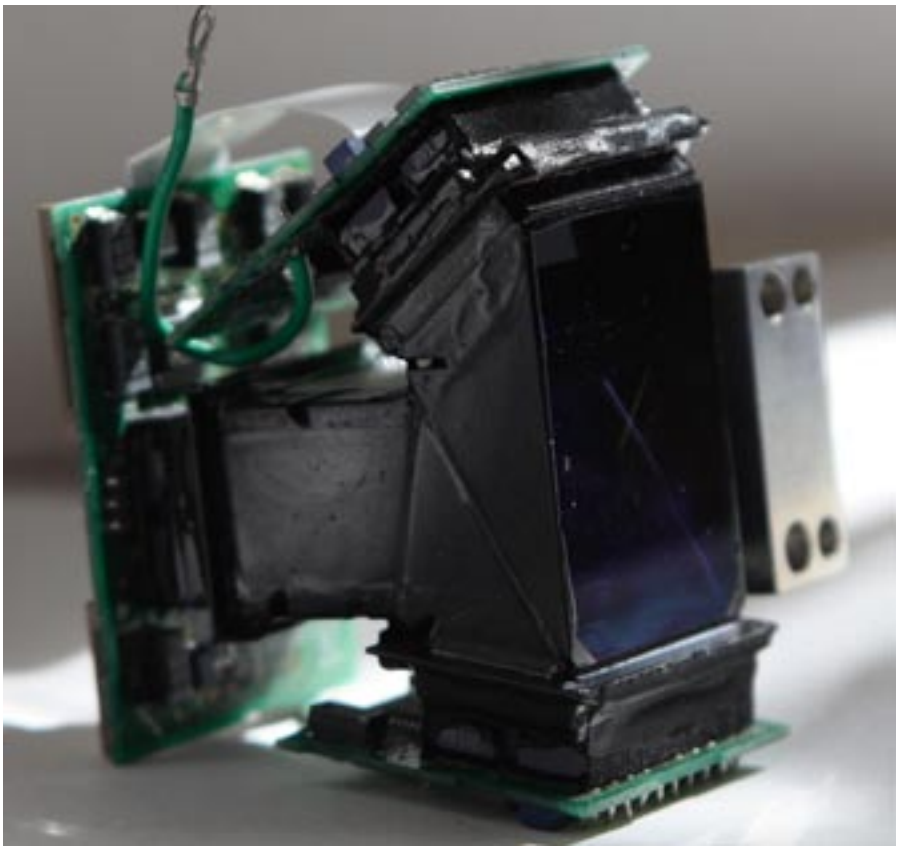


Photo 1 – Three 2/3" CCDs attached to a colour-splitting prism, as used in a broadcast-quality camera. Photo: GFDL

stuff, which is one reason 3ccd cameras are more expensive. But that precision has an important effect: when you have an edge in sharp focus, it falls in exactly the same position on the red, green and blue sensors. We'll see why this is important in a moment. If you want to know more about 3ccd sensors, take a look at:
http://en.wikipedia.org/wiki/3CCD

Bayer sensors, named after the man who described the technique in his 1976 patent, use a pattern of red, green and blue filters (shown in Figure 1) placed over a single array of sensors. In practice, they may be precision printed on top of the silicon sensor. But the Bayer sensor intrinsically cannot produce such a sharp result as the 3ccd array because of the way it produces its image.

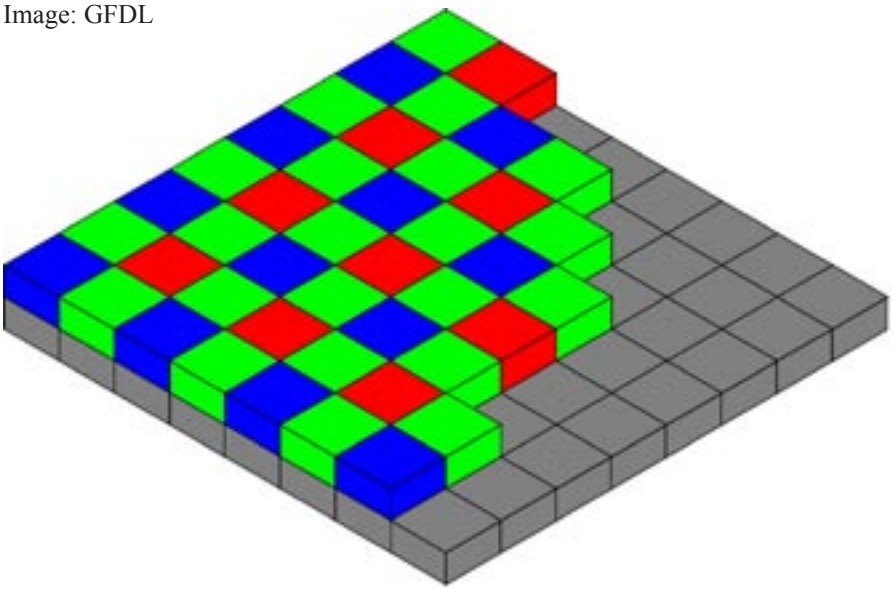
Knowing that the human eye was most sensitive to green, Bayer decided to arrange his colour filters as quads – two green, one red, one blue. The Bayer "GRGB" arrangement is usually
BGBGBG
GRGRGR
BGBGBG
GRGRGR

and it requires processing ('de-mosaicing') to produce an image. You will see that at least a block of four image sensors
BG
GR

is required to produce an RGB 'answer', or one pixel. Rather cleverly though, blocks are re-used, so the larger array shown above would result in 15 pixels of information from the 24 sensors. However, the way I look at things, this only contains the spatial information from 6 truly separate pixels. This is one reason why domestic Bayer-equipped camcorders look so soft compared to even the cheapest 3-chip camera. (I've simplified a little here; you could legitimately drag slightly more resolution out and, in any practical-size imaging array the number of 'effective' (here 15) pixels rapidly approaches the number of 'actual' (24) sensors).

The problem is that our nice, sharply focused edge that we had earlier is now seen by two output pixels, because the area it falls on is, by default, used in two pixels. In fact, it's actually worse than that, because elements of a single sharply focused point will appear in four pixels – a 2 x 2 block, caused by the re-use of individual sensor pairs.

Figure 1 – General arrangement of Bayer colour filters, as applied to the surface of a photodiode array. Each coloured square corresponds to one photodiode.
Image: GFDL



Purists will doubtless point out that I have hugely oversimplified this, but I only wanted to convey the basics. If you want to know more on the subject I recommend you try Wikipedia:
http://en.wikipedia.org/wiki/Bayer_filter

There is a Third Way. It's called the Foveon X3 sensor, and it combines the perfect pixel alignment of the 3ccd approach in a single sensor. It does this because one day someone noticed that silicon attenuates different frequencies (colours) of light at different rates, as shown in Figure 2. Realising that it would be possible to build photodiodes on top of photodiodes, a three-layer stack was developed, with the properties fine-tuned to enable blue, green and red signals to be extracted. Making a mosaic for an area image sensor was the relatively logical next step. Apart from the fact that, like the 3ccd sensor, all three colour sensing elements are perfectly aligned, there are other benefits in terms of sensitivity. A Foveon X3 is, therefore, essentially a 3-chip solution in a single sensor that doesn't require complex prismatic beamsplitting. Much more information on this sensor is at:
http://en.wikipedia.org/wiki/Foveon_X3_sensor

Sensor size has another important role to play: noise reduction. The larger an individual photosensor, the more photons it can intercept and thus the bigger signal it's able to output. A full-frame ('FX' to Nikon buffs) sensor is about 860 square millimetres, whereas a large-ish point-and-shoot sensor might be 2/3", which equates to roughly 58 square millimetres [1]. For sensors of the same number of megapixels, that means

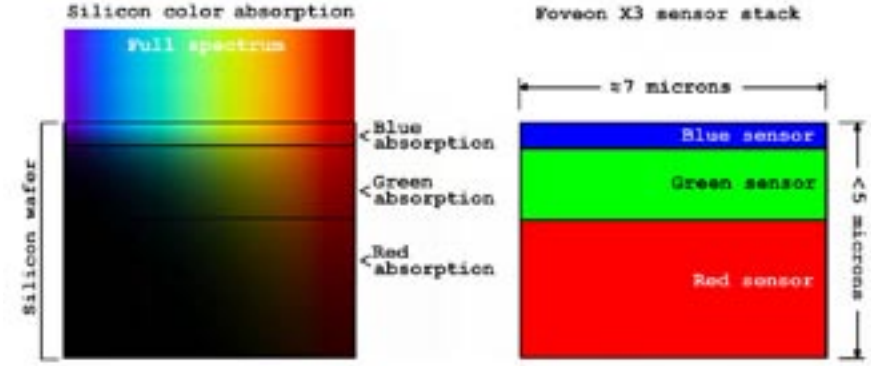



Figure 2 – Operating principle of the Foveon X3 sensor, showing how different colours are absorbed in silicon and the consequent vertical stack of photosensors.
Image: GFDL

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the big sensor has photoreceptors about 15 times larger than its smaller cousin. That's one reason you can get a Nikon FX-equipped camera with a useable ISO rating of over 100,000, whereas smaller-sensor cameras struggle to give decent images at a fraction of this. My small-sensor camera is far noisier at ISO 800 than a good Nikon at ISO 6400 – that's quite a few dB up, and can make the difference between getting the shot, or not. Very large aperture lenses are available for the Nikon, too – up to f/1.2. And that's important for paper-thin depths of field as well as low light capability.

But the main thing that a large sensor gives you is a key to the narrow depths of field beloved of photographers and film-makers. The best digital SLR (DSLR) cameras use extremely expensive full-35mm-film-size image sensors. They give the same field of view and depth of field as a 35mm film camera for any given lens. The best commonly available digital SLRs have, as I've said, sensors the equivalent of a 35mm film. Most digital SLRs are rather smaller than this, about 66% of the size. The smaller sensor means several things: when used with a standard 35mm lens you don't get the same field of view: everything looks bigger, because their megapixels are intercepting a smaller proportion of the light focused by the lens. Non-SLR cameras use much smaller sensors, see:

http://en.wikipedia.org/wiki/Image_sensor_format

As a result it's almost impossible to get any meaningful bokeh. (As an aside, the smaller the target area the lens has to work with, the easier it is to design, and the cheaper it is to make).

The 66%-of-35mm ratio is known as the 'crop factor' and the practical upshot is that most digital SLR users get more magnification out of their lenses – a 100mm lens gives the same magnification that a 160mm one would on a full frame camera. See:

www.kenrockwell.com/tech/crop-factor.htm

for more information on this. Ken also rather nicely explains on that page why, when you use smaller sensors, you increase your depth of field. The salient point is that as the sensor size goes down you need to use a shorter true focal length to maintain the same field of view, but this dramatically increases the depth of field at the same time (in a square relationship). While you're there, have a nose round his site: it's well written and fascinating. There's more on image sensor formats at:

http://en.wikipedia.org/wiki/Image_sensor_format

It is interesting to make some comparisons between sensors of different sizes, so I decided to test two digital cameras side by side. One is a high-end digital SLR with a full-size 35mm sensor, the other a high-end 'bridge' (really a highly glorified 'point


Photo 2 – Same shot, two different cameras. Left: S100FS, 50mm f/3.2.
Middle: D700, 50mm f/3.2. Right: D700, 50mm, f/1.4. The book was about 25cm behind the radio.
Image: G1MFG

and shoot') camera with a half-decent lens and a "smaller sensor, but quite large for its class. I set up a tripod and a small technical still life scene, and shot both cameras from the same tripod. I didn't realise until I'd packed everything away that the lens on the bridge camera was mounted in a different position to the DSLR, which is why the camera angles are slightly different. But by that time it was too late to try and do it all again.

Photo 2 shows the results, taken in deliberately dim light. All the shots were focused on the word "Icom". The image on the left is from the bridge camera – a Fuji FinePix S100FS with its 58 sq mm sensor, set to ISO 1600 with a 1/8 second exposure. The lens was set at 50mm, f/3.2 (as wide as it goes at that focal length). The centre image is from a Nikon D700 full frame (860 sq mm sensor) DSLR, set at ISO 6400 with a 1/80 second exposure, with a 50mm prime lens set at f/3.2. Notice how much blurrier the book is in the SLR image, and how little of the tape is in focus. The bridge camera was struggling with noise due to the low light and relatively high ISO (although it's rated to ISO 3200, and even ISO 12,800 at reduced resolution). The D700 was perfectly happy at ISO 6400!

The third shot shows why a large sensor and wide aperture lens are so great. This was shot on the D700 with the same 50mm lens but opened up to f/1.4. Look how little of the tape measure is in focus, and how the cover of the book, about 25cm behind the radio, is blurred beyond recognition. Compare that to the best bokeh I could get with the around-£400 S100FS. But that's less than the D700's lens cost...

So, is it all about the lens? Trevor Brown mentioned that he had used a 3ccd HDTV camera recently which had had a £30,000 lens. But the cost of a lens responds to economies of scale as well as its precision. The cost of designing, say, a f/3 20-200mm 10:1 zoom lens is pretty much the same whether you're going to make 100 as a niche broadcast product or 100,000 for your latest digital stills camera. But if you're making 100 then it's probably cheaper to use ultra-precision hand-ground aspherical elements than the 99.99%-as-good precision moulded equivalents found in the high volume lens. The difference is whether each lens element costs $1000 to fabricate individually or an initial investment of $10,000 for the mould and then 50 cents each thereafter. I venture to suggest that the difference in quality between these two approaches is so small for most practical lenses that the effects are swamped by other things, such as diffraction at the smaller apertures.

So, if we were designing a new TV camera for Trevor , it would seem that the logical choice would be some sort of variant on the Foveon X3, as big as possible! However, there are other limiting factors, primarily economic. Each semiconductor wafer is of a finite size. So, obviously, if you increase the size of a semiconductor you reduce the number that you can fit on a wafer. I think you can get about 25 or 30 full-size 35mm sensors on an 8" wafer – or about 500 of the 2/3" size that's good enough for broadcast quality. Semiconductor manufacturing is also prone to defects, which happen randomly across a wafer. A dozen minor defects on a wafer might wipe out twelve of those 500 smaller sensors – about a 2% defect rate. But if the same defects existed on a wafer of 25 full size sensors, half of them would be scrap. So not only are you using 40 times the basic material, you're only getting a fraction of the yield. That's why large sensors are so cripplingly expensive. I suspect that the large number of processing steps necessary to make the Foveon X3 might also make it more prone to defects, but that is pure speculation on my part: please don't sue me, Foveon!

The odd thing is that some of the best video images around come from a camera known as the Red One, see:

http://en.wikipedia.org/wiki/Red_One

It uses a resolution of 4096 x 2304 lines – more than double the resolution of HDTV – and, by all accounts, produces stunning pictures. Yet it uses a Bayer sensor. And the big sensor on that Nikon D700? Yes, Bayer again. As far as I know, no-one produces a high resolution digital camera equivalent of the 3ccd, or a video-specific version of the Foveon X3. But, clearly, a good, well-designed Bayer sensor, with a few enhancements like Nikon's microlenses, can produce stunning images. But whatever the technology employed at the sensor, for nice blurry backgrounds it's still a case of bigger is mostly better – well, big sensors, wide apertures, anyway, but remember to keep the distance 'twixt lens and sensor as short as you can. Oh, and lens sets for Red One? It can be built for film lenses – Arri PL mount – or the far more common and ubiquitous Nikon F mount: the same as used on just about every Nikon 35mm film camera lens since about 1976. But for top quality I think my money will be on the Foveon X3 sensor, or its successor.

[1] In the limited time I had available to write this article I was unable to obtain a definitive sensor size for the Fujifilm S100FS, but most references on the internet talked about it as 58 square mm so that's the figure I've used here. I apologise if I got it wrong.

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# Bluff Titler DX9

*by Brian Kelly. GW6BWX*

If you ever wondered how some of those impressive TV graphics and program titles were made, I'm going to reveal one of the methods here. It isn't a complex and expensive box of graphics rendering electronics, it's an easy to use piece of software developed by "Outerspace Software", a company from The Netherlands and it's called "Bluff Titler".

The program isn't a video editor but it can produce files ready to drop into an editing program. It isn't a 3D modelling program either but it can utilize structures and shapes from many other modelling programs. It's usefulness lies somewhere between the two, the 'glue' that combines text and graphics into a video animation. This doesn't mean it can only be used in conjunction with other software, it works perfectly well as a stand-alone application and has enough built-in features to produce some highly sophisticated program material.

I've used the program for several years and made quite a few title sequences, rolling credits and animated logos with it. You have probably seen some of them without realizing they originated on a humble home PC. As well as standard TV video it can produce HD, DVD and even web page format files. The latest version, 8.0, was released on January 14th this year and has some very nice new features including the ability to output to SDI which will be attractive to professional editors although you do have to pay for the 'iTV' version for this and the supported SDI hardware is somewhat limited.

There are actually three versions of the program, the 'Easy' level as you might expect is the least capable version but still more than adequate to produce very nice title and video effects. The 'Pro' level adds more control to the attributes of the objects. For example, it allows fuller control over light sources and shadows. It also increases the number of adjustments you can make to lens flare and adds more particle properties. More on that later. The 'iTV' or Interactive TV version has the same feature set as the Pro version but adds SDI output and control facilities. All versions come with a rich set of pre-set effects which can be edited and saved along with creations of your own.

**Using Bluff Titler DX9**

Bluff Titler works on the principle of objects, effects, layers and a time line. It is simpler than it sounds so don't go away just yet. Objects are the 'topic' of the production, they could be shapes, characters or text. They are the thing you want the viewer to keep their eyes on. Effects are changes to the objects. The change could be as simple as the position or size on the screen or could be a dynamic transformation of shape or colour. Layers are just that, they allow items to look as though they are on top of each other. The topmost layer has priority over the one below it and so on all the way to the background which is the lowest layer. The time line is a bar which indicates the length of the production, the left end is the start time, the right end is the finish time. You can set the duration of the production to anything reasonable you want and you can lengthen, shorten or stretch it later if needs be. Allied with the time line are 'keys' which are markers along the time line to set the exact point at which objects and effects have certain attributes.

An example will make things clearer. A new 4 second long project is started, the name 'BATC' is entered as a text layer and it is aligned to the bottom left corner of the screen. Now the time line marker is set half way along and the 'BATC' text is moved (with the mouse or X/Y sliders) to top centre position. A key is created and sits on the time line.

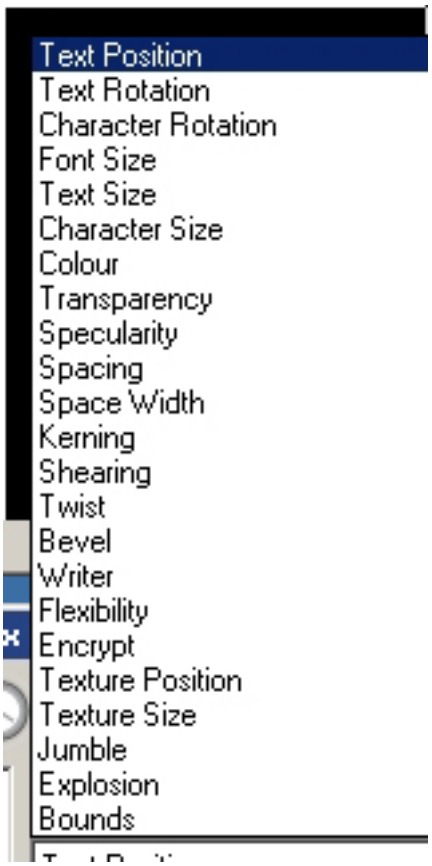


Finally, the time marker is moved to the end of the line and the text to the bottom right corner.


Thats's it! The production is finished! All you need to do is preview it and save it as a video file. If 'Play' is pressed, the screen will show 'BATC' gliding smoothly in an upside down 'V' path over 4 seconds. It's a bit difficult to explain in writing but the line in the photo shows the path the text follows.


What the program is doing is finding out how many frames there are between the keys in the time line then apportioning the movement across those frames.

That example only demonstrates the simplest motion possible and with only three key points. The program is capable of handling hundreds of key points and far more than just moving between X and Y screen coordinates.




The screenshot above shows the full list of available text attributes, each of these has its own control settings and each time line key can have a complete collection of settings tied to it. This means that you could set the text rotation (in virtual 3D), and colour differently at each key and the rendered video would smoothly rotate and the text colour would gradually change between them.

That's just the start! Remember the program also supports layers and each layer also has its own set of attributes. You can have a picture layer as a background, with effects applied to it, and have a text layer with it's own set of effects on top of it. Each layer has it's own time line so the effects do not have to be synchronized with other layers but a facility to 'lock' the keys across layers is available if needed. All the time lines are the same length of course, that being the duration of the production. The picture layer does not have to be a still photograph image, it can be 'live' input from a video source, a webcam or even a feed from the Internet. For instance, it is easy to create a waving flag with a live camera picture on it. By changing the settings of each layers distance from the camera their priority over each other can be rearranged. One of the cleverer tricks I've used is to rotate an object so it appears to have depth then move its layer position between time line keys so it passes through the background. It produces the 'walk through a wall' effect, and as it disappears into one side of the background, the camera can be swung around to the back of the scene where the object is seen to emerge again. For final tweaks and adjustments, the keys can be moved along the time line to adjust the effect speed and duration.

**Plasma and particles.**

One of Bluff Titler's unusual features is being able to attach plasma effects and a variety of particle shapes to objects and layers. An explanation is in order, both are similar entities but particles have a distinct bounding edges while plasma has no, or at least very soft fuzzy edges. Think in terms of a flying aircraft as being a particle and the clouds it flies past as being plasma. When applied as a layer, plasma makes a useful background to other objects. 19 different plasma types are included in the package, the "White Noise" type looks just like the background of a weak TV signal. Particle layers are similar to plasma but a myriad of individual objects are produced. For example, most people will have experienced an effect similar to Bluff Titler's "Star Field" as one of the Microsoft Windows screen savers which gives the impression of passing through a star cluster. In Bluff Titler, it is possible to adjust the star colours, emission rate, point of origin and even the amount of gravity pulling the stars off course. All these parameters are tied to keys on the time line so the properties are adjustable throughout the production. The photo below shows a string of text wrapped around into a circular path with flame particles attached.

As well as using plasma and particles as layers, they can be attached to objects on layers. When used this way, the effect originates from the body of the object. It is difficult to explain in writing so look at the next photo which shows the same word three times. The top 'BATC' is just plain text, the middle has 'flames' particles and the bottom one 'Dripping Blood' particles attached. Remember you are looking here at screen image captures, the real thing is fully animated of course.


Again all the parameters are adjustable in value and duration. Similarly to attaching particles which appear to be emitted from the object, attaching plasma produces an effect within the object. The photo below shows the same as above but this time the middle word has 'white noise' plasma and the bottom one has 'blobs' attached.


**Other effects.**

Bluff Titler has many built-in effects to enhance text, for example you can shatter words into pieces with the "Explode" function and rotate or displace individual letters or words with "Rotate" or "Jumble", the combinations of effects are endless and can be saved for use in the future. When an Internet connection is available, live RSS feeds can be inserted directly into the video so you can have a 'ticker tape' banner with live news in it if you want. There are also numerous mask layers to shape the object or picture outlines and ways to contort the picture geometry. Some 300 short demo clips, all with their production settings are supplied with the program. The screenshot on the next page is a photograph picture layer with extruded text at the top and my

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callsign 'Jumbled' at the bottom with hair attached to it!

**Add Ons.**

Bluff Titler doesn't have ad-ons to add new features, in fact it's difficult to think of features it doesn't already have. It does have a number of template packs and a large number of downloadable effects files though. I would stress that they are not necessary at all to use the program and you can create your own if you want to. As a way of getting excellent results very quickly, they can save an enormous amount of time though. The template packs are called "DPack Templates" examples of their outputs are shown in the two photos on the rear cover.

**Try and Buy.**

Bluff Titler is available from the web site:

http://www.outerspace-software.com

all the program features are available in the free demonstration but the ability to save work is restricted until a fee is paid. The same program works as 'Easy', 'Pro' or 'iTV' but different 'unlocking' keys have to be purchased to enable the different levels of functionality. The prices at time of writing (mid January 2010) are 29.95 for Easy, 49.95 for Pro and 249.95 for iTV, all prices are in Euros. The keys to unlock the program are emailed within a few minutes of payment. I use the Pro version, as I do not have any SDI equipment here to use.

Bluff Titler requires DirectX version 9 or above which sadly restricts it's use to the Windows operating system and works best with modern graphics cards. At the moment only the Blackmagic Design DeckLink card is supported for SDI but no doubt others will be added later. Full details are available at the web site.

Among Outerspace Software's other programs are some which can integrate with Bluff Titler, Bixelangelo which is for producing animated handwritten text and Alphabix for making and converting our own fonts. "Bix" is the friendly alien logo used by Outerspace Software.


# Wanted

I normally advertise for a complete vintage camera of one sort or another, but today here is an advert for viewfinders, for some reason they are often missing?? So here is a list of missing viewfinders for my camera museum:

LDK 15 and mounting arm.

Thomson TTV1602 "Micro Cam"

Bosch Fernseh KCR40
(small viewfinder).

Sony BVP1 and BVP7 portables
(2 needed) cameras.

Sony BVP350p studio camera.

Ikegami 79E portable (2 needed).

JVC KY320

Pye Mk5 Image Orthicon camera 7" tube & scan coils needed.

EMI 201 studio vidicon 7" tube and scan coils needed.

The photo below is the 7 inch tube assembly for the Pye Mk5 and the EMI one is much the same except scan coils are different.

So have a rummage in your junk box and see what is there! If you discover a camera attached to the viewfinder, that's a bonus.

Brian Summers G8GQS
T: 01276677879 M: 07740291191
E: BS486@summershome.co.uk
http://www.tvcameramuseum.org

# An Alternative LDF4-50 ‘N’ Type Connection

*by Brian V Davies GW4KAZ*

Recently I needed to terminate a length of Andrew LDF4-50 coax feeder cable in an ‘N’ connector. Unfortunately I didn’t have a suitable ‘Andrew’ connector in my junk box, but did have some N type connectors suitable for RG213 (UR67) coax. A method of jointing a ‘tail’ of RG213 to LDF4-50 was required, so that an ordinary N type connector could be used.

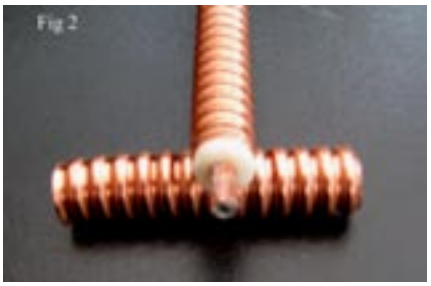

Refering to Fig 1 about 6 cms of LDF4-50 cable is required to make this joint. Start by cutting this length of LDF4-50. Carefully remove the outer plastic insulation and place the piece of bare copper coax in a vice. Using a junior hacksaw, cut one slot the whole length of the outer sheath.

Prise the outer sheath apart along the cut so that it can be removed from the inner insulation. Keep this copper sheath to one side, as it will be required later to cover the joint.

From the remaining piece, remove a 1.5cms length of inner insulation from the centre conductor in a similar way to the outer sheath, but by using a knife to split the insulation. Keep this piece of insulation to one side.

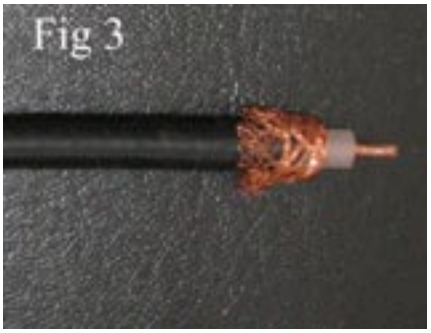
Cut a small strip of the outer copper sheath, about 5mm in width and 1.5 cms long and drill a 3mm hole in the centre. This is required later to form the joint between the two inner conductors.

Now prepare the end of the LDF4-50 cable that is to be joined, as follows.



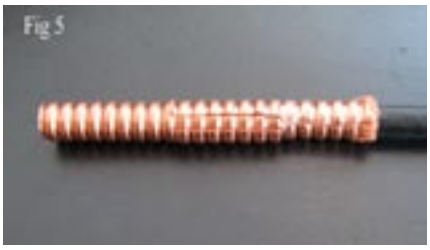

Refering to Fig 2 Remove the outer plastic insulation, 4cms. Remove the outer copper sheath, 1.5cms. Remove the inner insulation to expose the inner conductor 1cms.

Now the tricky part, drill a 2.5 mm hole in the inner conductor to a depth of about 0.5cms. The inner conductor is aluminium with a copper skin. Clean the conductor, taking care not to damage the copper skin, as this has to be soldered later.




Now prepare the RG213 coax ‘tail’ by refering to Fig 3 - This ‘tail’ will be joined to the LDF4-50 at one end and have an ‘N’ connector fitted to the other. Strip back the outer sheath, 1.5 cms, without damaging to the inner braiding. Push back the braiding so that it lies over the outer insulation, this exposes the inner insulation and conductor. Remove 0.5 cms of inner insulation to expose the inner conductor and with a pair of pliers twist tight the wires of the inner conductor.


Refering to Fig 4 the parts are now ready for making the joint. First tin separately, the copper strip and the inner conductors of both the LDF4-50 and the RG213. You will note that the twisted inner conductor of the RG213 will fit into the hole of the LDF4-50 inner conductor, but before they are married together, fit the small copper strip over the RG213 inner conductor. Fit the two inner conductors together and bend the copper strip over the LDF4-50 centre conductor. Apply heat to the inner conductors, and solder the joint. A large soldering iron is required for this job. Make sure solder flows along the copper strip onto both inner conductors. The centre conductors are now jointed. Fit the small piece of inner insulation over the jointed inner conductors. With care, this should stay in place during the next operation.




Refering to Fig 5 take the 6cms length of the outer sheath of LDF4-50 and fit it over the joint, this will form the connection between the outer braiding of the RG213 and the outer sheath of the LDF4-50. With a pair of pliers squeeze this outer sheath together so that the edges of the centre cut will meet over the RG213 and will get very close to meeting over LDF4-50. Once this is done, solder both ends, plus the seam along the cut.

To waterproof the joint, either use self-amalgamating tape to wrap around the joint, or use heat shrink sleeving, as shown.

The joint is now complete. Good luck.

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# GB3TM adds Digital Transmit

*by John Lawrence GW3JGA*

GB3TM came on air in July 1994 and has remained in continuous operation on 23cms FM (1249MHz in, 1316MHz out) for a period of over 15 years. There have been a couple of small failures during that time, a capacitor and a fan.

Members of the Arfon Repeater Group decided early in 2009 to add a digital ATV transmit function to the existing analogue transmitter at GB3TM. As it is reasonable for TV amateurs to purchase a relatively inexpensive DVB-S receiver (e.g. Maplin A94FJ Comag SL25/12 or SL30/12) but not an expensive DATV transmitter, it was decided to just add a digital transmitter at this stage, whilst retaining the existing analogue repeater unchanged.

**Independent DVB-S Transmitter**

Therefore, the intention was to install an independent digital transmitter alongside the existing analogue one and feed the same incoming video and audio to both transmitters. Because of licensing regulations, both transmitters would have to be on the same frequency. Changeover from one transmitter to the other would be controlled remotely by a DTMF tone on the incoming audio channel.

Analogue transmission would be the fallback condition, This would allow suitable captions to be displayed while in analogue beacon mode. The switch-over to digital by a DTMF tone would give 15 minutes of digital transmission after which the transmission would return to analogue. Change to digital or return to analogue could be made at any time by a suitable DTMF tone.

In the final arrangement the two transmitters would be switched by relay to a common transmit aerial. For the initial testing and operation, (February 2010) the digital transmitter would be connected to an independent Alford slot aerial.


Fig.1. GB3TM DATV DVB-S Transmitter

**Technical description**

The GB3TM DATV DVB-S transmitter, shown in Fig.1, is a self-contained Digital Television Transmitter operating on 1316 MHz and based on the DVB-S specification. The continuous output power is 10 W into a load of 50 ohms. The transmitter is powered from the 230V mains supply and consumes 115 W. It consists of two 19 inch rack, 3U high, units housed in a 19 inch cabinet.

**Encoder & Modulator**

The Encoder and Modulator are built on two Eurocard size (100mm x 60mm) PC Boards. The two boards are designed and built by the AGAF organization in Wuppertal in Germany. The boards were originally built into a metal enclosure for portable use. Shown below in Fig.2. Also see CQ-TV221 February 2008, page 9.

Figure 2

The encoder accepts a PAL video signal and stereo audio signals. These are digitally encoded and then applied to the modulator.

The encoder 'jumper' settings follow the guidance given in the AGAF instructions.

JP5
7 CVBS
8 PAL
5 3.0 Mbit/s Data rate

JP9
4 3.375 Mbit/s Transport stream

JP7
2 QPSK
3
4 No jumpers ½ FEC
5

The output from the modulator is a QPSK modulated signal on 437.25 MHz. This signal is fed to the up-converter. The enclosure is built into a 19 inch, 3U high, rack frame, shown below. This is fitted in the upper part of the rack cabinet.

**Up-converter**

The up-converter, shown in Fig.4, is also designed and built by the AGAF organization in Wuppertal in Germany. The input frequency is 437.25 MHz and the output frequency is 1316MHz. The output signal from the up-converter is at +3dBm (2mW) level and is fed to the Driver Amplifier.

**Main Power Amplifier Unit (Lower Enclosure)**

The main power amplifier unit is built into a 19 inch, 3U high rack enclosure which is housed in the base of the main cabinet. It contains both the driver amplifier and the output amplifier, also the power supply for both sections. The Main Power Amplifier is connected to the Up-converter by an SMA - SMA cable

The main power amplifier unit is fitted with a panel meter and range switch. As shown in below. Circuit is shown in Fig.11.

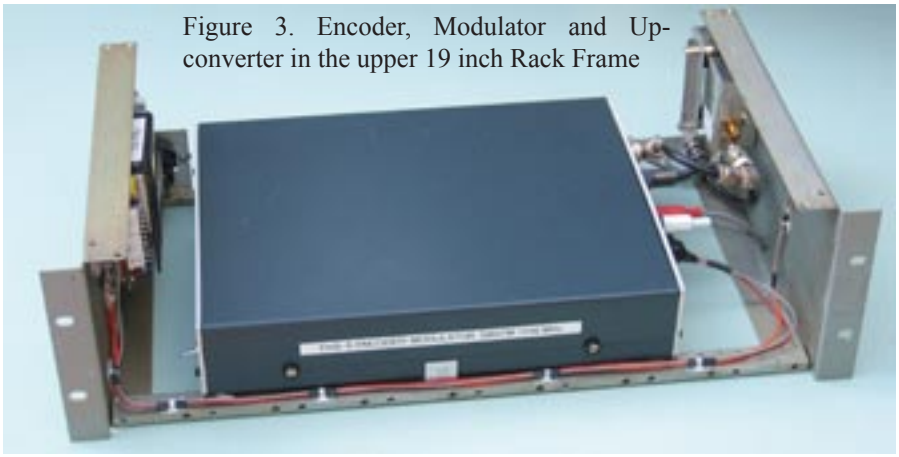

Figure 3. Encoder, Modulator and Up-converter in the upper 19 inch Rack Frame

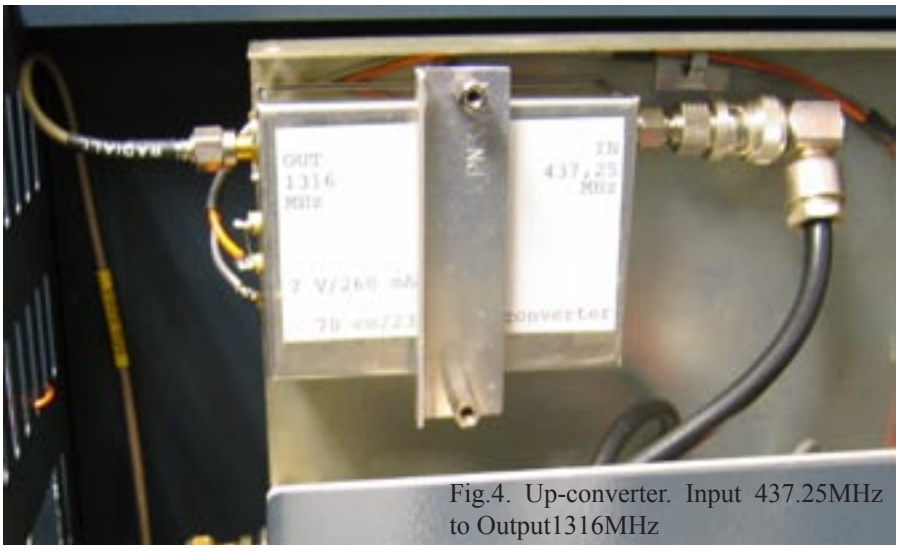

Fig.4. Up-converter. Input 437.25MHz to Output1316MHz

Fig.5. Front Panel of Main Power Amplifier

**Driver Amplifier**

The driver amplifier consists of a Mitsubishi RF Power Module type M68719.

The module has a gain of 27dB. An input of +3dBm provides an output of +30dBm (1W) at 1316MHz. The Power Module is run at this level to minimise gain drift with temperature. The RF Power Module is housed in a small die-cast box fitted with a heat-sink, shown in Fig.7. This is located inside the main amplifier rack frame.

**Power Amplifier**

The Power Amplifier consists of a Mitsubishi RF Power Module type RA18H1213G (from G.H. Engineering). The module has a gain of about 23dB but the input signal is attenuated (on the PC board) so as to provide an output of +40dBm (10W)

The module is capable of at least 16 W output and is under-run to provide good amplitude linearity. It is fitted to a custom PC board mounted on the inside of the large heat-sink at the back of the amplifier rack frame, shown in Fig.7.

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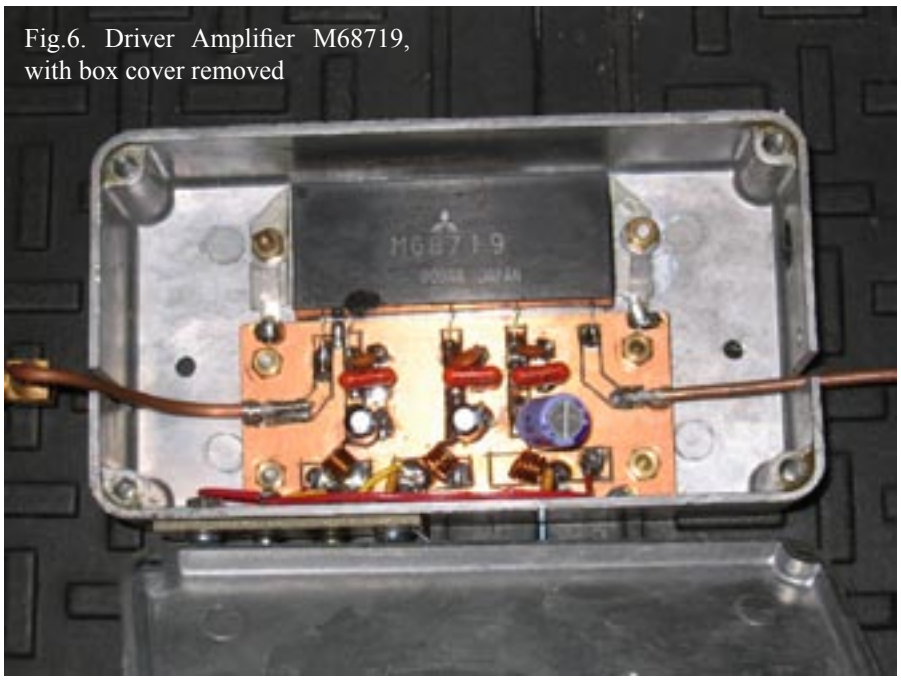


Fig.6. Driver Amplifier M68719, with box cover removed

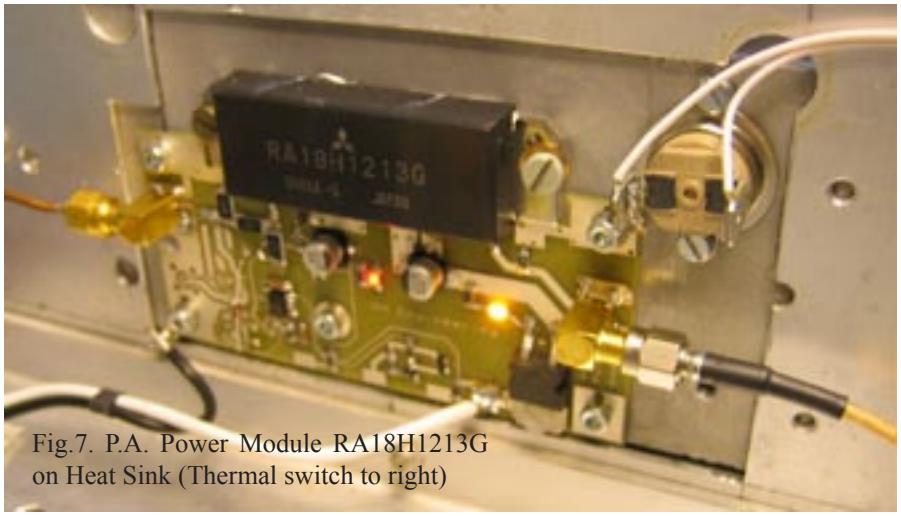


Fig.7. P.A. Power Module RA18H1213G on Heat Sink (Thermal switch to right)

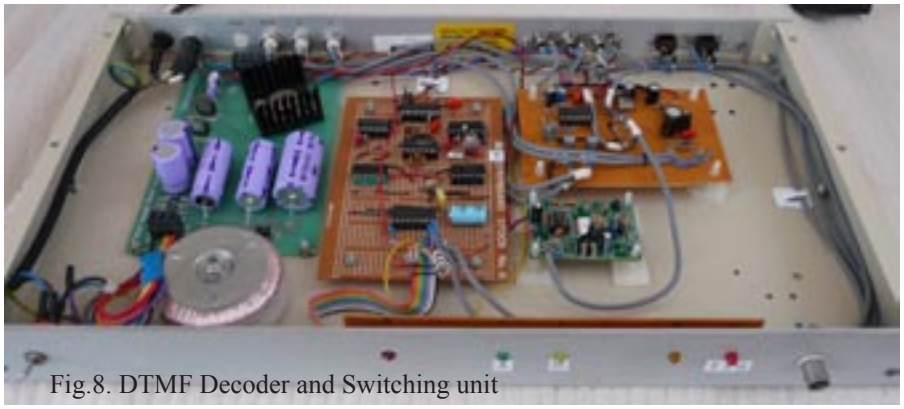

Fig.8. DTMF Decoder and Switching unit

**Power Supply**

The power supply is a modular unit capable of providing 12V at a maximum of 12A. It is built into the main amplifier rack frame. The supplies to the driver and main amplifier are individually fused at 5A and 10A respectively. The supply to the output amplifier is fed through a 'transmit' relay which allows the output stage to be controlled remotely.

**Cooling**

The transmitter has two cooling fans. A 90mm 12V axial fan mounted in the top of the cabinet. Shown in Fig.1. This is powered from the Driver Unit power supply and is operational when the Driver Unit is switched on.

A 60mm 12V axial fan is mounted on the main Power Amplifier heat-sink at the rear of the amplifier. This is powered from the 12V supply to the Power Amplifier output stage and functions only when the output stage is operational.

For adequate cooling, when the transmitter is operating, both fans must be working. A thermal switch is fitted to the Power Amplifier output stage heat-sink (to the right of the Power Module shown in Fig.8) and this is connected in series with the transmit relay circuit. This switch opens if the heat-sink temperature exceeds 40deg-c and turns off the output stage. The switch closes again when the heat sink temperature has fallen to about 35deg-c.

**DTMF Decoder and Switching**

The DTMF decoder, timer, test-tone generator, video and audio distribution amplifiers etc are housed in a 19" 1u unit, shown in Fig.9.

The Decoder uses the usual MT8870D decoder IC and high-speed CMOS is used in the timers and logic control. The test tone generator is described in Circuit Notebook No.103 and the distribution amplifiers use conventional video and audio op-amps. The video switching allows for an external test card or caption (and test tone) to be switched by DTMF and transmitted for test purposes. The system falls back to

Fig.9. Equipment Rack at GB3TM

normal through-video and sound after 1 minute

A general view of the equipment at GB3TM is shown in Fig. 9.

Acknowledgements:

Figs. 1 to 7, 10 &11 by GW3JGA
Figs. 8, 9 by GW8PBX

Fig.10. Off-air picture from GB3TM Transmitter under test.


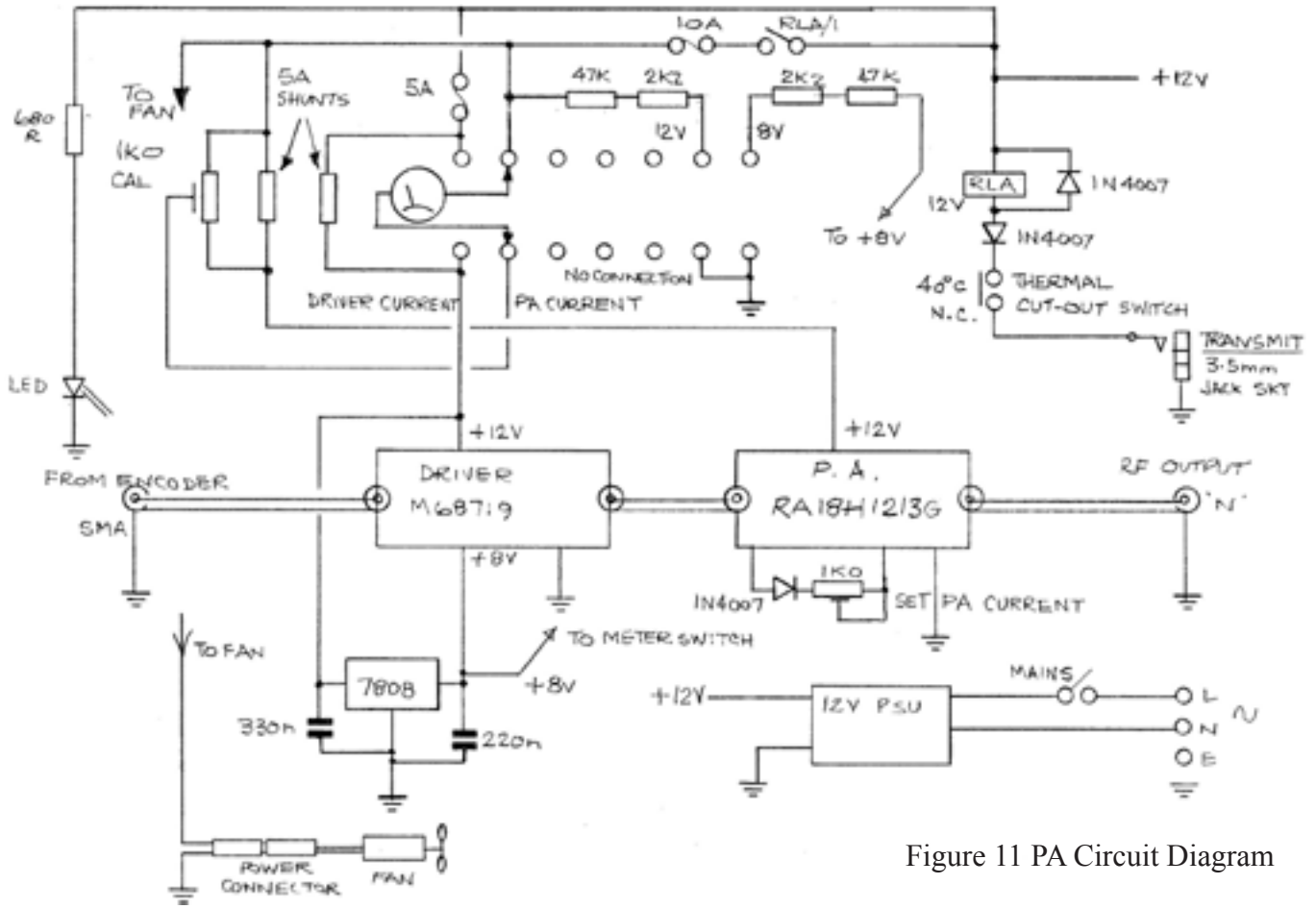


Figure 11 PA Circuit Diagram

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# Project Vivat! Recreating television history

*By Paul Marshall*

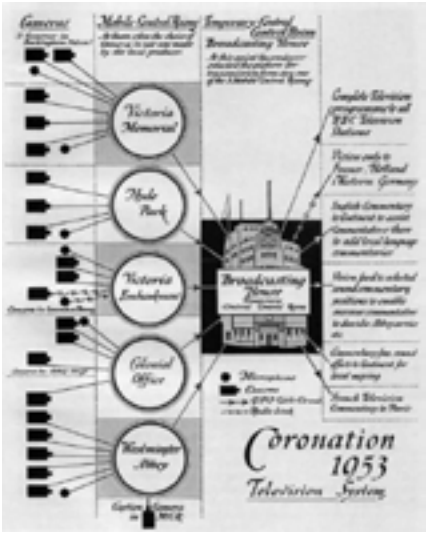
**A special pre-launch description and resumé of planning (so far)**

In just over two years time we should all be enjoying several bank holidays thanks to an anniversary – the Diamond Jubilee of HM Queen Elizabeth II. And anybody who knows anything about British television history knows that later on June 2nd 1953 something important happened, something that fast-forwarded the take-up of television in British homes. That event was, of course, the Queen's coronation, viewed by at least 20 million people in Britain and another 200 million people across the planet, (via live relays and tele-recordings). These days, that 220 million figure doesn't seem too large in light of 'Live Aid' and the Beijing Olympics (to name but two), but back in 1953 there were no satellites and only the beginnings of Eurovision. For North American audiences, the Coronation broadcast was seen via tele-recordings delivered by the RAF using three flights of Canberra jet bombers. The result was that the broadcast was seen in Canada and the USA only hours after the event. Photo below shows a sample off-screen picture that was seen around the world.

Initially, any planning to be carried out for coronation television coverage was not high on the list of official priorities, in fact there was active opposition in some establishment quarters. This, despite a precedent (of sorts) having been established in 1937 when the fledgling BBC television service, using three standard Emitrons, broadcast the Coronation of George VI with the cameras shooting the procession, grouped at Apsley Gate near Hyde Park Corner. Back in 1937, no television cameras were allowed actually inside Westminster Abbey. Pre-war Emitron cameras just didn't have the kind of sensitivity to manage anything except very brightly lit indoor scenes or good daylight images. Even the later Super Emitron and the Pye Photicon (both Image Iconoscopes) didn't have the sensitivity or indeed the stability to sustain a long and important broadcast.

However, for the 1953 coronation television broadcast, (particularly scenes from within Westminster Abbey itself), positive encouragement came, so it is said, from the Duke of Edinburgh, keen to see the monarchy adopt 'modern' ways and, of course, much newspaper pressure to 'let the people see' etc. A political decision was one thing, but could television actually pull this off? At the time, two progressive manufacturers (Marconi and Pye) had in production, cameras using the modern 3 inch Image Orthicon pick-up tube (or the 'American tube' as many in the BBC disparagingly called it). Despite being snooty, the BBC had actually purchased outside broadcast vehicles (or 'scanners' in BBC parlance) using such cameras and so gave every confidence that they could mount what turned out to be the longest and largest television outside broadcast in the world. Using the 3 inch Image Orthicon tube, the Pye Mk3 and the Marconi MkII camera (or MkIB according to some in the Marconi Company) were quite well proven models by 1953 and thus the BBC were certain that they had the tools to do the job. The photo below shows a Marconi MkII televising the coronation procession.


Twenty-one cameras were used (one a caption camera - so actually only 20) to cover the Coronation, 16 Marconi MkIIs and 5 Pye Mk3s, operating in groups from several outside broadcast units linked together with pictures fed up to the transmitter in Alexandra Palace, (and beyond to Birmingham and Scotland). Today, very little now exists of the hardware used that day to stage what was the (then) largest outside broadcast ever. What remains includes part of the Alexandra Palace Marconi television transmitter, (held by the Science Museum) and in private hands two of the Marconi MkII cameras (Dicky Howett and myself). These cameras were rescued as wrecks from a Chelmsford scrap metal yard and both are now restored to cosmetic condition. This seems to be it, nothing more having come to light. It's possible that there are a few items still undiscovered, but at the time of writing (January 2010) nothing, beyond reasonable doubt, can be proven to have been part of the Coronation broadcast system. Even the two surviving cameras have a small doubt associated, but their known history (and in particular the lenses, which were bought from BBC Redundant Plant in the 1960s and are dated early 1950s) assumes that because of their age, they were in BBC outside broadcast use. As extra confirmation, dates on the electrolytic capacitors are typically 1951 or 1952. In 1953 for the Coronation broadcast, the BBC mustered 'everything' suitable, so the likelihood of these two cameras being used is very high. The photo below illustrates the huge (for the time) extent



of the coronation broadcast. A small public memory of the dominance of the Marconi MkII camera in BBC outside broadcasts exists in the BBC Sports Personality of the Year Award – it's a MkII camera that's on the trophy.

With such a major royal anniversary approaching, can anything be done to celebrate this famous broadcast beyond replays of the tele-recordings and a couple of cosmetically restored cameras? The answer is 'yes' but it will need a lot of work (and money). The target date is 2012, but if it spills over into the anniversary of the actual coronation it will not be a disaster.

**A project (seems to be) born**

Almost by accident, I 'acquired' a few years ago a rather sad looking ex-BBC 'Scanner' built by Pye in 1963. It's the sister vehicle to Brian Summers' 'blue' unit that used to grace BATC events many years ago. My acquisition has not seen much care and attention in the last few years so it isn't very pretty to look at, but fortunately it's rather better than it looks! Originally, it had been fitted out with the now virtually extinct Pye Mk6 Image Orthicon cameras. By the time it arrived here it was to all intents and purposes completely empty – just a very tatty shell. The story between its construction and my acquisition of it would take too long to tell here and it's not that important for the purpose of this project. It certainly isn't an early 1950s unit but it does look like one, having followed through on the basic transverse layout favoured by the BBC and the Marconi Company. The vehicle is based on a Commer MK III Forward Control and is the longest wheelbase variant (162", 13' 6") having a 7 ton weight capacity. It has a 4.7 Litre petrol straight six engine and in the jargon of 'Commer' this all makes it a C762


Top: A sister vehicle in the truck series outside Television Centre 'as new'

Middle: MCR 23 in action for the BBC late in its career

Bottom: MCR 23 photographed in 2008 – before the recent steam cleaning

Left: Outside broadcast trucks outside Marconi's New Street works in the mid 1950s. A BBC truck is second from right

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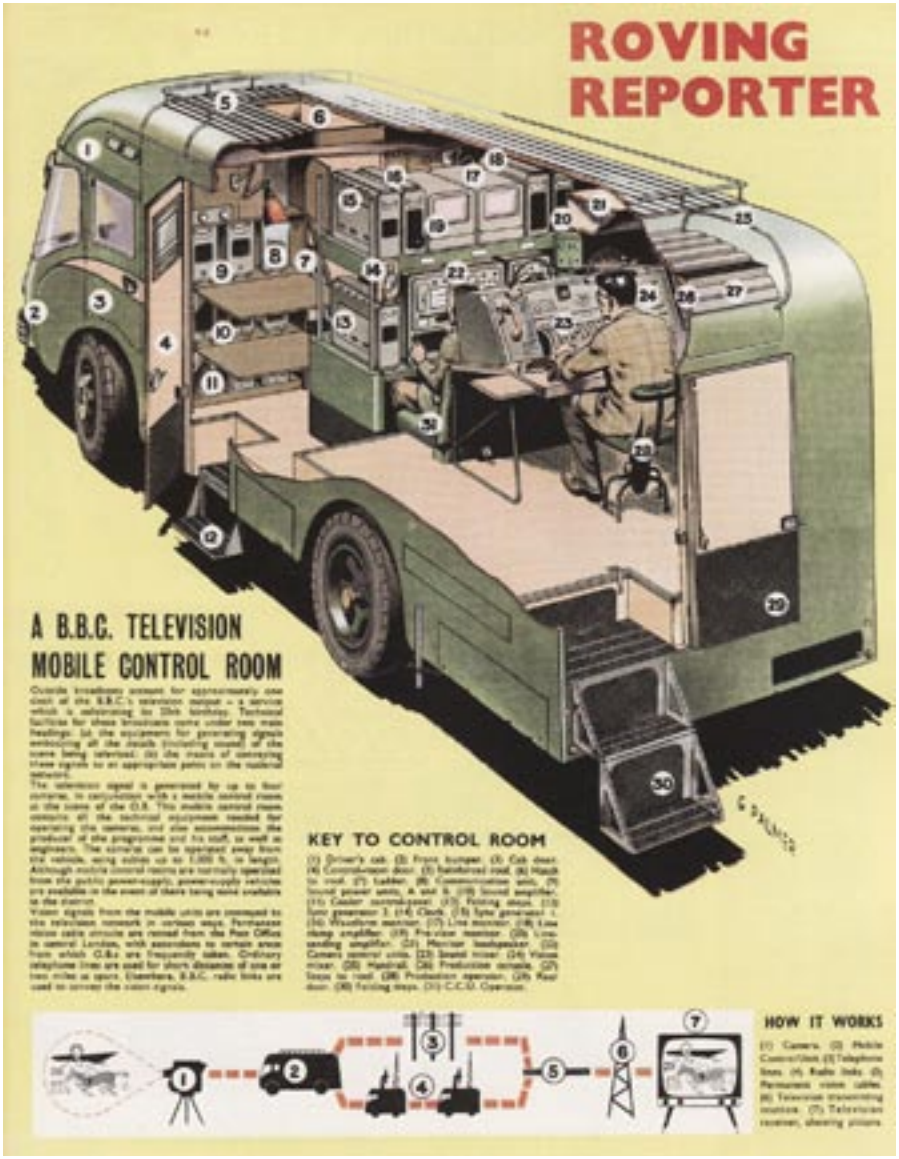
7 for 7 ton and 62 (+1) for 162" wheelbase. It appears that the basic vehicle is a bit of a hybrid sharing some of the features of earlier versions so even vehicle experts remain a little puzzled. The registration number is 390 EXH and this makes it BBC MCR (Mobile Control Room) No.23.

In comparison, the Marconi built units of the early 50s were based on Bedford trucks and this one is a Commer, but to today's non-specialist it looks very similar. Compare the photo bottom left, a selection of Marconi built early 1950s outside broadcast units, including a BBC variant with the four photos on the left showing Pye built MCRs of 1963. A Marconi vehicle of the right type does still exist in the care of the Science Museum, but it's an empty shell and not available. We have the Pye built unit and it will have to suffice. The figure top right shows a typical internal view of a Marconi outside broadcast truck of the mid 1950s and the figure to the right shows the inside of such a vehicle as illustrated in the 'Eagle' in 1961. The top two photos on the left show two views of the 1963 Pye series of outside broadcast truck when in service with the BBC.

A hazy idea of building a 'replacement' early 50s BBC 'Scanner' based on this vehicle, using my accumulated Marconi MkII and MkIII series equipment has been around for a while now but with little in the way of progress other than relieving the vehicle of a former internal conversion to a music room. In the last few years there have been so many other activities on the preservation front to take my time as to render any thoughts along these lines nothing more than a day dream, but now – with the critical date coming closer - thoughts have become more concentrated and look feasible. As I write this at the start of 2010, the whole hazy/crazy idea looks like it just might just fly . . .

Some work has recently been done on the basic Commer truck. It's been steam cleaned, has new tyres, a refurbished starter motor, a new battery, fully serviced brakes and has had a survey done of its structure. The result is a driveable shell that seems to be sound, both mechanically and in terms of its basic coach-built structure. Equipment has continued to 'arrive' in various states




of completion and quality. There is now sufficient confidence in the vehicle and in the quantity and quality of the amassed equipment to contemplate a full rebuild of something like a representative BBC scanner from circa 1952 based on Marconi equipment.

This probably sounds like sacrilege to ex-Pye people, but it has to be appreciated that there's less Pye equipment remaining than Marconi and in any case, two complete 1950s Pye vehicles do survive – one in Hungary and one in Australia.

Somewhere along the line this whole idea of a rebuild has been accepted as the 'next big project' and many people are now involved in an informal manner in the programme. The real challenge now is not technical but organisational. How could (or should) this project be configured? How can it be financed? How should it be run? What will the principal aims be? The questions are almost endless, but in advance of these issues being resolved work has to proceed if the deadlines are to be met. The National Lottery is a possible source of finance and positive sounding informal approaches have been made, but this route reduces flexibility and is likely to constrain the project along goal centred 'tramlines'. Given that this project has to be fitted around a number of other plans (including work), a good measure of flexibility is a highly desirable characteristic. In the short term it can continue to be privately funded, but if external organisations want specific things then a more formal funding scheme will have to be considered.

The previous two outside broadcast truck projects that have been tackled here will be familiar to many readers of CQ-TV – the 'Yorkshire Tyne-Tees' and 'Southern' vehicles. Both trucks were essentially empty as acquired and in the case of 'Yorkshire Tyne-Tees', a virtual derelict. Before and after pictures of these two units are shown to the right. This illustrates that there is the know-how and resources to carry out this new project and take it to a satisfactory conclusion.

Whilst the organisational aspects are vital, they are not the most exciting! The 'fun' part is undoubtedly putting technical plans together, both for the vehicle resurrection and the equipment fitting and commissioning. So where are we right now?

**Technical planning**

**Vehicle**

From the picture reproduced on page 26 it's obvious that the vehicle has a long way to go to be in concourse condition! There's good and there's bad to report. Structurally the vehicle is still sound and is currently under cover – the 'clock'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has stopped. The body is primarily made of aluminium and the timber/steel frame is in relatively good condition so it will not be necessary to de-skin and rebuild it. There are numerous pieces of coach trim missing from the toe hold recesses for roof access to door locks. The lockers are in poor condition, although the actual doors and hinges are sound. Access apertures such as the termination panel are very rusty and will need remaking. The roof fan aperture is in poor condition and the 12 inch fans are both missing. On the plus side the vehicle remains watertight and doesn't leak – quite amazing really.

The six cylinder petrol engine is in excellent order and sounds very smooth. It pulls well, doesn't leak fluids, starts easily and appears to be in good overall order. The brake pipes have been replaced and the actual brakes rebuilt such that the braking system would (just about) pass basic tests. The steering is in good order but much of the cab instrumentation requires replacement or repair following malicious damage. The exhaust is pretty much missing and needs renewing. The vehicle electrical system is just about serviceable but many of the external light fittings need to be replaced or repaired. The next move is shot blasting of the chassis and painting of same. This has to be done before any other work as considerable dust is created during this process.

The grand plan (which is still really just a hazy scheme at this time) calls for the vehicle side of things to be completed by April 2011. This is the projected date when I will be free from my long-term academic studies and able to devote more time to the project. In order to meet this soft deadline, steady progress will have to be made throughout 2010 as funds and time allow. Alongside of this there is the on-going task of sourcing and collecting together the required spare parts, materials, information and for some tasks, know-how. Whilst the vehicle is actually MOT and/or Plating exempt being 'Engineering Plant', it has to be of 'roadworthy standard' and safe to drive. This might involve voluntarily submitting it for an official test of some kind but previous experiences with 'Authority' suggests that re-classing it will actually be difficult – they don't seem to want it tested! The alternative is the method that I have used with my other restored trucks of submission to a competent and recognised authority for pre-test testing. It's not as simple as a car MOT, but fortunately being an old-fashioned vehicle many rules don't apply and there's nothing fancy such as electronically controlled brakes to muddy the water!

For the vehicle proper, the shopping list is as follows:

1. New exhaust system – this will have to be fabricated from standard parts – Halfords don't seem to have Commer exhaust systems on their website . . .
2. New dash instruments – these suffered malicious damage. They might be repairable but 'new old stock' would be better.
3. Provision of driver's seat cushioning – it's not very comfortable right now!
4. Front and rear bumpers – again, these will have to be fabricated.
5. Front visor – this is needed to be true to the 1963 vehicle, but possibly not for a 1952 'version'.
6. Many new coach building items – locks, toe points, body trim, locker catches etc. All still available 'off the shelf', just very expensive for what they are.
7. New front indicator assembly – the original is damaged beyond repair.
8. New headlamps – they currently work but look evil.
9. Refurbishment of all lockers, fan apertures, termination panels, AVR and air con mountings – this is by far the most demanding item.
10. New front number plate – old style silver on black (still legal on this vintage vehicle).
11. New Perspex side windscreens – available but expensive.
12. Wheel trims.
13. A spray paint with twin-pack paint in BBC green – really expensive.
14. BBC logos (including coat of arms) – BBC Heritage has given permission for this but it needs to be confirmed in writing!

I'm sure that there's more that I've forgotten and more that we will find, but that's quite enough to be going on with.

Associated with the vehicle, but perhaps not strictly vehicle items, there's also the following to source:

1. AVR (Automatic Voltage Regulators). Three, or possibly just two, depending on type. Claude-Lyons or Berco servo motor controlled variac type preferred. The Claude Lyons examples are still available as new items and would look fine – it's just the cost at about £2K each . . .
2. Air conditioning unit. This sits under the vehicle at the back and only needs to be a fairly basic through the wall type. Doesn't need to be 'old' and probably better to not be! Not too expensive and readily available.
3. Two 12 inch hooded Ventaxia style heavy duty axial extractor fans for the roof. These are also still available new but cost £650 each . . .
4. Battery charger (12 Volt). This needs to be a period correct unit, something like a Davenset or a Heayberd.
5. Peg board – much of the interior walls of the vehicle are covered in this – hardboard with neat holes punched through in a grid pattern. Most of it survives but some is missing or damaged. It's 'special' peg board being a laminate with Formica. This can be reproduced, but it will take time . . .
6. Tubular foot heaters – all missing but still available as new items.
7. Wall mounted fan/air con/light switch/heater controls – these are all missing. New types can look similar.

All of this sounds like a lot, but it isn't really – especially if money can be thrown at sourcing some of the items. The much more difficult things to source are the missing technical equipment items, with little choice except to find the original types.

**Technical equipment**

This vehicle will be a real Heinz 57 hybrid – not just as a vehicle representing BBC outside broadcast trucks of the 1950s through to the early 1960s, but with regards to the technical equipment to be fitted. As I've already described, the equipment will be largely of Marconi origin but even this will span two eras – the early 1950s as represented by the Marconi MkII series of camera and equipment, plus the mid to late 1950s MkIII camera and series of equipment.

It is fortunate that the MkII and MkIII cameras essentially share common power supplies and Camera Control Units (CCUs). A great deal of this series of equipment is already ear-marked and ready for this project including a complete operational MkIII camera, two operational production monitors, a monoscope camera, audio mixer and some test equipment, including a master waveform monitor. Beyond that there are a number of other MkIII camera channels 'in stock' awaiting restoration plus the real 'jewel in the crown', the MkII camera from the actual coronation broadcast. In addition there's a complete and very rare master engineering monitor, genuine anti vibration mobile mounts, three console CCU units and a genuine Marconi outside broadcast truck power distribution panel. There's enough basic equipment with two major exceptions – a viable vision mixer and a 'cues and comms' sub-system with appropriate control panels. The sound mixer currently available is a little on the small side but it is an actual 1952 unit in excellent working order. There's also many hundred yards of MkII/III camera cable in stock.

Beyond the core equipment there are three system level issues to consider:

1. TV standard – 625 or 405?
2. Mains connectors – do we stay with the EP4 series (now considered 'dangerous') and if so, Marconi or BBC wiring pattern?
3. Cable types – try to source genuine cable (much of it rubber), or go with modern types?

Issue 1 may seem obvious – go with the 'correct' 405, but that leads to compatibility issues with modern kit. This can be alleviated in the 625 to 405 direction with miniature 'Aurora' converters but for 405 to 625 something will have to be designed and built or procured. 405 is the current choice.

Issue 2, the use of EP4s, is something that has not been a problem on either 'Yorks Tyne-Tees' or on 'Southern' and that should be enough to be convincing that they are 'safe'. There isn't a major problem, especially if the bodies are earthed, but there are over-cautious people who say otherwise. These connectors will have to be wired Marconi pattern to match the other trucks as having two standards within the preserved 'empire' is a non-starter. Old hands will know the problems that this causes from hum bars to tripping, given that mains Neutral and Earth become connected together if the two formats are mixed up.

Issue 3 is easy to decide due to lack of cables! It will be modern types but of appropriate colour – black! Fortunately the camera cables (including the vehicle tails) are in good order and there's also now an actual camera cable tester in the inventory of equipment.

The 'wanted' list is probably now the most pressing item on the technical agenda and the principal items are described below:

1. Marconi vision mixer, type BD841N. The only known one of these is in the National Media Museum in Bradford. It's a very compact, 7 input mix/cut/fade and pre-view unit. The only other one known to have existed up until at least 1980 belonged to the Marconi Apprentice Association in Chelmsford. The unit does not contain a processing amplifier and requires a Line Clamp Amplifier to process the video output (see below); the video mixing system will not operate without it. It's the sloping front unit on the extreme left of the top photo on page 27.
2. Marconi Line Clamp Amplifier (LCA), type BD813 is the best choice, being a mobile version. The second choice would be a BD651, a rack-mounted studio version. The last one of these seen was also at the Marconi Apprentice Association in Chelmsford, but there must be more as they had uses beyond that of a vision mixer processing amplifier.
3. Marconi Production Console, type BD647. A desk mounted unit designed to work with the BD649 Mobile Communication Unit (see below). It's known that custom variants of this type existed so anything that looks vaguely like this will probably be fine!
4. Marconi Mobile Communication Unit, type BD649. A mass of relays, transformers and sockets all mounted up in a 'standard' Marconi mobile case. The studio, rack mounted version, type BD671, would do if nothing else becomes available.

There are many other 'would be good to have' items but at this stage they do not represent a problem to the project. Items such as the Marconi BD527 Portable Loudspeaker Monitor and a suitable period clock come to mind, but those can wait.

**Putting it all together**

As of January 2010 this project looks like it will need a great deal of the following:

a) Money – how to pay for it and sources of funds. How to form some sort of consortium will also figure here.

# !!! 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!

*If you fancy being an assistant editor, please let me know.*

**editor@batc.org.uk**

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b) Luck and dedication in finding the missing items – especially the 'top four' technical items described above.
c) Team work. This project will need many skills and the efforts of many people.
d) Long-term commitment and perseverance – this will not happen overnight.
e) Careful liaison and co-operation with/from organisations such as BBC Heritage and other potentially interested parties – maybe even the Palace?
f) Planning. A project of this size needs to be planned, even if it's not to industrial standards and practices.
g) Further historical research – there's a lot that we still don't know and BBC Archives, the Marconi Archive at the Bodleian Library and other sources will be very important.

Having done two previous vehicles the amount of work that's likely to be needed is pretty much known, but this time there will need to be more attention to quality, both in terms of wiring, the restoration of equipment, vehicle appearance (inside and out) and the presentation to the public via written materials, etc. In some respects it is an easier prospect than the previous two – it's purely black and white rather than colour or a mixture, as in the case of Yorks Tyne-Tees. This reduces the complexity and quantity of the wiring considerably but on the other hand the equipment is that much older. Fortunately Marconi kit of that era seems to have been designed to survive a nuclear holocaust so there are few problems with items such as transformers and other wound components. Valves are not an issue; there's plenty of 'old new stock' to go round and also 3 and 4.5 inch Image Orthicon tubes, whilst not plentiful, still exist in sufficient numbers and quality.
So far so good, but who is currently 'in' the project? At the time of writing, the other BATC members actively involved include Dave Hill, Richard Harris, Dicky Howett and Paul Hundy. There are others from outside the club and the most vital is undoubtedly Sam Booth, HGV mechanic and driver. There are decisions to be made about how the project is organised and managed, plus the inevitable issue of how to co-ordinate people, given the geographic separation of interested parties.

2010 will be a year of planning, vehicle preparation, acquisitions (hopefully!) and liaison with interested parties. This pre-launch article is the first public intimation and we would love to hear from people with anything along the lines of skills, time, money, enthusiasm, contacts, equipment, tools or knowledge. The clock is ticking . . .

**One last thing – why is it to be called Vivat!?**

The answer may well be obvious to anyone familiar with the process of coronation, or indeed anyone with even a passing knowledge of Latin. Vivat! is the traditional cry of the Scholars of Westminster School at a coronation, usually in the form Vivat Rex/Regina and in this case, Vivat Elizabtha! Literally it simply means 'Long live the King/Queen' and 'Long live Elizabeth!'. Vivat, meaning 'life' or 'live' seems to be an appropriate project title as it remembers the television event of the 1950s and also suggests that the truck will live (again!).

**http://www.projectvivat.co.uk**

# Marconi on view

Margaret Howett inspects a pristine example of a Marconi Mk VII colour camera, displayed at Chelmsford's town centre museum.

Things are looking up these days in Chelmsford "Birthplace of Radio" (sic). A impressive new wing of the local museum now houses exhibits from 'Chelmsford's Industrial Pioneers'. These include Crompton, EEV, RHP Bearings and of course Marconi. Not before time, in fact rather a long time. Still, we mustn't snipe. On display is a Marconi Mk VII four-tube colour camera plus I.O. tubes and other bits. Also radar and transmitters. Running as part of the display is a short but fascinating amateur b/w film shot in 1934 by George Jessel-Broome of the Marconi works (now boarded up) in New Street.

Dicky Howett Jan. 2010

# Stan Lebar

*by Trevor Brown G8CJS*

Stan Lebar, whose team of Westinghouse engineers developed the camera that allowed us see the Moon landings of the Apollo 11 mission in 1969; sadly passed away in December 2009 Stan was 84. The camera Stan's team at Westinghouse developed and built ran at 10 fps using 320 lines. Rather a non standard TV signal, but at the time nobody knew if live pictures from the moon would be possible, so the transmission path was via the telemetry channel and was shared with voice and biomedical data. The bandwidth available for a television signal was only 500 KHz, Stan's team had to engineer from scratch the camera which had also to withstand Lunar temperatures of -184 C to 101 C so this was rather a special camera The tube was supplied by military and no pictures of the tube were permitted.

The Apollo 11 mission was tracked at three locations Goldstone, Honeysuckle Creek, and Parkes, the telemetry was recorded onto 1" tape by M22 recorders. NASA hired RCA to build a standards converter to process the images in to a 525 line TV signal. The tracking stations converted the signals and transmitted them by microwave links, Intelsat communications satellites, and AT&T analog land lines to Mission Control in Houston. By the time the images appeared on television, they were substantially degraded. Stan was delighted to see his camera working, but was always disappointed with the quality; he knew it was capable of much better results. The problem was not the camera but the standards converter and transmission path. "No one was unhappy," he said. "We were all in seventh heaven". America had pulled off the impossible. The Nation had landed a man on the moon and showed the world, via live television, that it could be done.

The live pictures were viewed at tracking centres on monitors that worked on the 10 fps 320 line standard and reports confirm that these pictures were considerably better quality than what the rest of the world saw.

The original high quality was preserved via the M22 telemetry recordings. The engineers boxed the one-inch telemetry tapes wound onto 14-inch canister reels-which served no other purpose than to provide backup if the live relay failed-and shipped them to the Goddard Space Flight Center. From there, the tapes were sent to the Washington National Records Center in Suitland, Md.

In 1997 a phone call from a British author, to Sarkissian who had been part of the Parkes team raised the issue of the location of the M22 tapes only one had ever surfaced in Australia which was a copy of one of the tapes sent to Goddard. Everyone assumed that NASA had the originals stored away safely. This did however start a search in the states by Stan Lebar, Bill Wood and Richard Nafzger, for the original M22 recordings with a view to unlocking the true quality of the Apollo 11 camera and showing the world some improved quality recordings of this historic mission. This has been a long and exhausting search and in what one of the American papers headlined as "One Giant Blunder for Mankind" it would seem the Apollo 11 telemetry recording no longer exist and are presumed wiped.

In 2004 a machine was located and the Australian tape was replayed and contained chatter and simulation data only, no pictures

What the search did reveal that NASA had hired the Applied Physics Laboratory (APL) near Baltimore to modify two Ampex VR-660C 2" helical VTR's to record the 320 line pictures. This machine only recorded the pictures received at Parkes.

Sarkissian, found a letter and a photo showing two Ampex VR-660C recorders and a man who may have operated them. The letter, written by the former Parkes director, suggested the operator worked for APL. They uncovered the identity of the man who had indeed modified the two Ampex VR-660C's. Now also in his 80s, the former APL employee confirmed he had modified the recorders and recorded the original moonwalk pictures, he packed the tapes and personally delivered them to APL. Nafzger found five two-inch videotapes only, but when a machine was located these tapes two turned out to be blank.

So it may seem the rest of us will never get to see the true quality pictures produced by the Apollo 11 mission. Stan Lebars camera did prove that pictures were possible from the moon and although it was sent as a back up on the Apollo 12 and 13 missions it was never used again, Stan had proved what could be done and a higher definition colour camera was used on the following missions so presumably a greater bandwidth had been allocated.

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*In addition to Apollo 11's lunar camera, Lebar also managed the Apollo color TV, Skylab series and Apollo-Soyuz Test Project camera programs. On behalf of his Westinghouse team, Stan Lebar accepted the Emmy Award in 1970 from the Academy of Television Arts and Sciences, for "Outstanding Achievement in Coverage of a Special Event." He retired in 1986 after a 33 year career with Westinghouse.*

http://www.youtube.com/watch?v=OVcQ4CvGelI&feature=player_embedded

http://www.hometownannapolis.com/news/top/2009/12/26-17/Stan-Lebar-engineer-synagogue-founder-dies.html

http://history.nasa.gov/alsj/a11/A11TapeSearchReport.pdf

# Severnside TV Group donates

The Severnside Television Group's Christmas Social Meeting took place at the GB3ZZ TV Repeater site in Filton, Bristol.

The meeting was very well attended with members and their partners coming from far and wide. It was great to see so many familiar faces.

Viv, G1IXE and Ivor, G1IXF had spent all day decorating the hall, fitting the Christmas lights and putting out all the tables and chairs for the event then preparing the excellent buffet and bar.

Each year the STVG Committee makes a donation to local Amateur Radio groups and this year the lucky recipients chosen were the Bristol Repeater Group and the Frys Hill Repeater Group.

Following the presentation of the donations, the raffle was held and some very lucky people won some top notch prizes!

After the excellent buffet an auction of surplus equipment was held and there were bargains galore as many varied items were snapped up by STVG members.

Mel, the girls and I were made very welcome at the meeting. The girls made up balloon animals while wearing their flashing Christmas hats and we all had plenty to eat from the buffet and drinks bar. Ellen and Catherine even had a winning raffle ticket!

The donation to the Frys Hill Group is very gratefully received and will go towards supporting the existing repeater network operated by the group on two sites, one near Cheddar in Somerset and another on Dundry near Bristol.

Each site contains two repeaters, one 50MHz and one 430MHz.Currently the two 50MHz repeaters (GB3FH and GB3ZY) are linked via the internet and provide excellent 6m mobile coverage from Exeter to beyond Gloucester in a North/South direction and from Bridgend in Wales to Swindon in an East/West direction.

Plans are in hand to link the two 430MHz repeaters GB3FI and GB3ZB.

More information about the Frys Hill Repeater Group can be found at:
http://www.gb3fh.org.uk

The repeaters are linked using the internet and an Asterisk based application called app_rpt. More information on this Internet linking technology can be found at www.allstarlink.org

More info about the Severnside Television Group can be found on their web site: www.stvg.co.uk The group operates 2 TV repeaters, one on 23cm from Filton and the other on 3cm from Dundry.

The West of England Radio Rally, organised by the STVG, takes place in June each year at Frome in Somerset. For more info about the rally, see the dedicated rally web site at:
http://www.westrally.org.uk/

I would like to extend my personal thanks to Viv, Ivor and the STVG team for all that they do for the hobby in this area. It takes dedication and commitment to do what they do and spend the time and effort in putting on events like the West Rally and the Christmas Social evening in addition to running the TV repeaters from the sites in Filton and on Dundry.

Matt, G4RKY, Ross, G4YQY
and Brian, G4UTM.

# Contest News

**International IARU Contest**

I have received the full results for the 2009 International IARU Contest from the UBA – the Belgian Amateur Radio Society.

## Section 1

| | Call | 70 cm | 23 cm | 13 cm | 3 cm | Total |
|---|---|---|---|---|---|---|
| 1 | PA2RIK | 1230 | 3562 | 9565 | 985 | 15342 |
| 2 | PA1DYK | 1807 | 3574 | 6470 | 1630 | 13481 |
| 3 | PA9DX | 1505 | 3872 | 6845 | | 12222 |
| 4 | F6ANO | 3579 | 6584 | 1695 | 280 | 12138 |
| 5 | PE2TV | 1601 | 3034 | 4705 | 1660 | 11000 |
| 6 | PE1EZU | 1295 | 3066 | 5500 | 300 | 10161 |
| 7 | PE1RXK | 293 | 2968 | 4550 | 1455 | 9266 |
| 8 | F3YX | 3444 | 4860 | 560 | 280 | 9144 |
| 9 | F1DUJ | 3119 | 4220 | 70 | | 7409 |
| 10 | F6IQG | 3676 | 3712 | | | 7388 |
| 11 | PE1EBX | 150 | 1860 | 3980 | 1160 | 7150 |
| 12 | PE1OFO | 880 | 1520 | 3035 | 1410 | 6845 |
| 13 | PA3DZA | 360 | 2304 | 3580 | 330 | 6574 |
| 14 | PE1PFM | | 1664 | 1885 | 2775 | 6324 |
| 15 | PA1RK | 691 | 1540 | 3255 | 100 | 5586 |
| 16 | PA3DLJ | 751 | 3418 | 240 | 485 | 4894 |
| 17 | F6ESU | 2960 | 1720 | | | 4680 |
| 18 | PA1AS | 461 | 1482 | 2060 | 100 | 4103 |
| 19 | M0DTS/P | | 2832 | 650 | | 3482 |
| 20 | PE1RLF | 522 | 1324 | 1510 | | 3356 |
| 21 | G4PYD/P | 30 | 1494 | 1600 | | 3124 |
| 22 | PA0AVN | 84 | 668 | 2090 | | 2842 |
| 23 | PA3CWS | | 1012 | 1750 | | 2762 |
| 24 | PE1OMB | | 1350 | 1400 | | 2750 |
| 25 | PE1JMZ | 1022 | 820 | 530 | | 2372 |
| 26 | F6BGR | 1688 | 260 | | | 1948 |
| 27 | PE1CHY | 154 | 514 | 600 | 600 | 1868 |
| 28 | PD2HJE | 420 | 568 | 390 | 385 | 1763 |
| 29 | PE1HIS | | 526 | 1050 | | 1576 |
| 30 | PE1IWT | 511 | 576 | 145 | 315 | 1547 |
| 31 | F8DYG | 451 | 706 | | | 1157 |
| 32 | PA0ZR | 1119 | | | | 1119 |
| 33 | DK7UP | | 412 | 680 | | 1092 |
| 34 | PE1OLR | 211 | 820 | 25 | | 1056 |
| 35 | S5/IV3WSJ | | 1004 | | | 1004 |
| 36 | F1IIG | 138 | 204 | 510 | | 852 |
| 37 | G6GVI/P | | 696 | | | 696 |
| 38 | PE1MPZ | 49 | 316 | 300 | | 665 |
| 39 | PE1GQE | | | 480 | | 480 |
| 40 | PA3CRX | | 136 | 340 | | 476 |
| 41 | G3PYB/P | | 208 | | 260 | 468 |
| = | GB80RBP | | 208 | | 260 | 468 |
| 43 | PA1EBM | 5 | 88 | 220 | 100 | 413 |
| 44 | PD0AV | 276 | 28 | | | 304 |
| 45 | PA1JT | 222 | | | | 222 |
| 46 | PA2RVP | 193 | | | | 193 |
| 47 | PD1DER | 108 | | | | 108 |
| 48 | EB5YF | | 56 | | | 56 |
| 49 | EA5FDW | | 48 | | | 48 |
| 50 | PD0WHE | 46 | | | | 46 |
| 51 | PD5RST | 25 | | | | 25 |

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## Section 2

| | Call | 70 cm | 23 cm | 13 cm | 3 cm | Total |
|---|---|---|---|---|---|---|
| 1 | PE2HHN | 539 | 498 | | 285 | 1322 |
| 2 | F0DYQ/P | | 992 | | | 992 |

It's good to see lots of activity on 70, 23 13 and 3 cm. It certainly shows that it is worth dusting off the high power 70 cm gear and looking South and East for DX contacts this coming September.

## December Repeater Contest

Band conditions appeared promising for the December Repeater contest, but activity was a bit disappointing. I only received 4 entries, even though 12 stations were active: G8ADM, G4CPE, GW3JGA, GW4KAZ, MW0AQZ, G3PYB, M1BAI, G8BYI, G3YWG, G1III and G8ACT. I also participated through www.batc.tv.

## BATC Repeater Contest 12/13 December 2009

| Place | Call | Points | Locator | QSO | Repeaters | |
|---|---|---|---|---|---|---|
| 1 | GW4KAZ | 772 | IO73VE | 7 | GB3TM | |
| 2 | MW0AQZ | 348 | IO73QH | 3 | GB3TM | GB3IV |
| 3 | G8ADM | 85 | IO91TO | 2 | GB3BH | GB3TZ |
| 4 | G8GKQ | 69 | FM16XW | 2 | GB3BH | GB3KM |

Congratulations to Brian on his well-deserved win from two 2-way contacts and 5 internet-based contacts. Notably, Dave G8ADM used the repeater link between GB3BH and GB3TZ for one of his contacts.

**What Are You Building?**

The cold winter months are the perfect time to develop your contest station for next Summer. Remember, you can use the June Contest as a fun rehearsal for the September Region 1 event.

**To Enter or Not To Enter?**

The only way that I can encourage contest activity is to show prospective entrants that there is enough activity to make their efforts worthwhile. To do that I need everyone who operates during the contests to put in an entry. For the repeater contests, I am quite happy for you simply to e-mail me with details of who you worked through which repeaters – I'll do the rest. So please make an effort to operate in the March Repeater Contest and tell me about it!

**Conclusion**

I can be contacted through e-mail (contests@batc.org.uk), or through my BFPO address:
Wg Cdr D G Crump, Mailbox Number ACT, BFPO 63, London.

## Contest Calendar

1200 UTC 20 March 2010 - 1200 UTC 21 March 2010 - BATC Repeater Contest

1200 UTC 12 June 2010 - 1200 UTC 13 June 2010 - BATC Summer Fun Contest

1800 UTC 11 September 2010 - 1200 UTC 12 September 2010 - International ATV Contest

1200 UTC 11 December 2010 - 1200 UTC 12 December 2010 - BATC Repeater Contest

# BATC Publications and Members Services

| Publications | Each | Qty | Total |
|---|---|---|---|
| **An Introduction To Amateur Television (225gm)**<br>The latest handbook full of detailed information on how to set up your ATV station, plus lots of new video and RF construction projects.<br>The BATC handbook featuring construction articles on video units, 24cm and 3cm ATV, a Digital Frame Store, and much more. | £2.50 | ..... | ..... |
| **The Best of CQ-TV (150gm)**<br>A compilation of the best construction articles from CQ-TV's 133 to 146 | £3.50 | ..... | ..... |
| **CQ-TV Back Issues:**<br>The following issues are still available. Please circle those required: 185,186,187, 188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206, 207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225 | £1.50 | ..... | ..... |
| **Special Offer: Any four of the above issues** | £5.00 | ..... | ..... |
| 226,227,228,229 | £3.75 | ..... | ..... |
| **The BATC DVD** | £5.00 | ..... | ..... |

**All publications can be ordered, with a credit card, via our online shop - www.batc.org.uk**
**Or by sending a cheque made out to 'BATC'**

***All items appearing in Members Services from previous editions, can still be ordered (subject to availability). Please see page four for contact details. Several items are still on sale, so please check for the latest pricing before sending a cheque.***


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# Turning back the pages

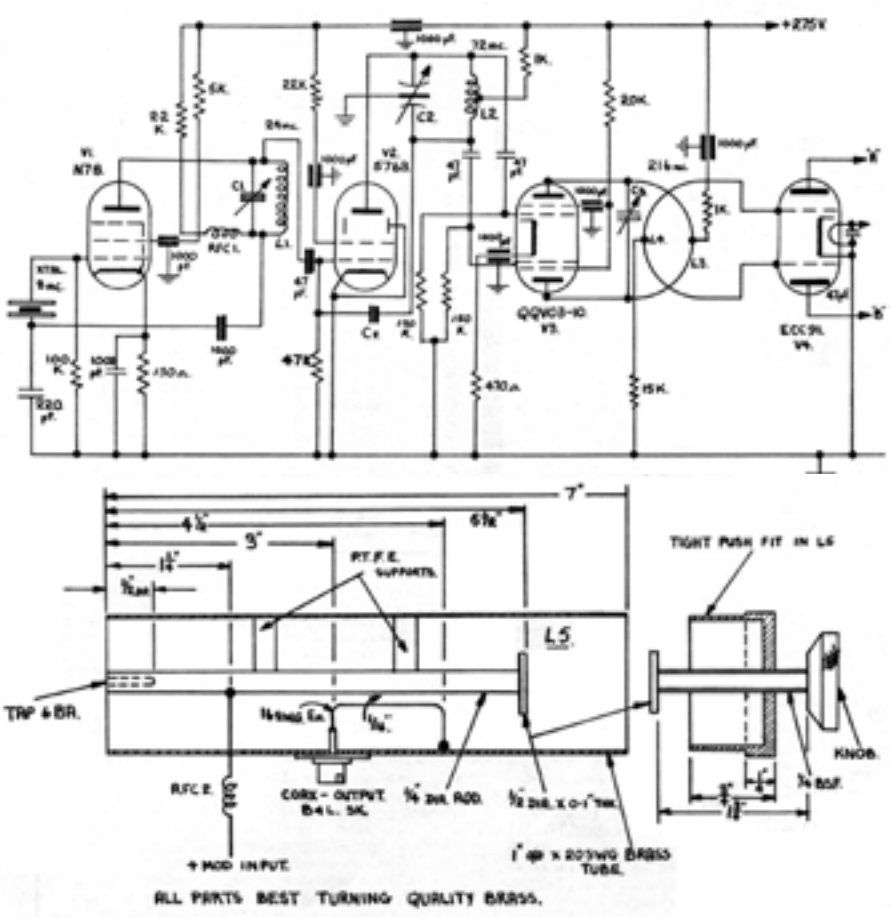
A dip into the archives of CQ-TV, looking at the issue of 50 years ago.

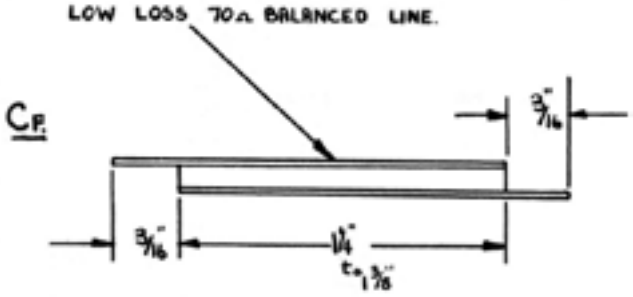
*by Peter Delaney*

CQ-TV 43

Although this issue of CQTV was undated, it included notice of a forthcoming event in April 1960.

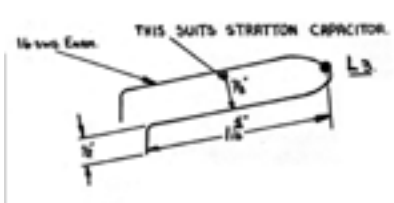
The articles contained a mixture of 'news', circuit ideas', and 'education'. The main circuit idea was for a 70cm transmitter, designed by J Plowman, G3AST. He had designed it to fit within the small space available (1¾in high) in the existing rack . The chassis was of aluminium, and so to improve reliability at the frequencies involved, the entire rear of the chassis was covered in 30 gauge bright copper sheet. The transmitter was intended get signals to G3CGQ, just 3 miles distant, so the use of expensive high power valves was avoided - it being estimated that 2W peak white output could be obtained. He had hoped to make the entire transmitter using 'everyday' components, but in the event he had to construct a coaxial cavity to obtain the best efficiency from the output stages. The 'secret of successful multiplier circuits is plenty of drive' he wrote, and so the 8MHz crystal oscillator and tripler was an output pentode valve, producing a 'very considerable indeed' output at 24MHz across L1. V2 was a second tripler stage, with feedback via a low loss 70 ohm line. The 72MHz output from this stage was said to be 'more than adequate to light a 6.3V dial lamp', and was then fed to the grids of the QQV03-10 stage. The 'hairpin loop' L3 between the anodes of this valve resonated at 216MHz - the power output being a little lower than the preceding stages. The L3 and L4 (as detailed in the diagrams) were adjusted by squeezing the sides together with polystyrene rods until the maximum drive was obtained

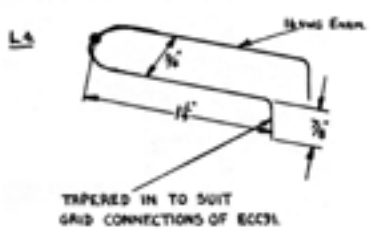


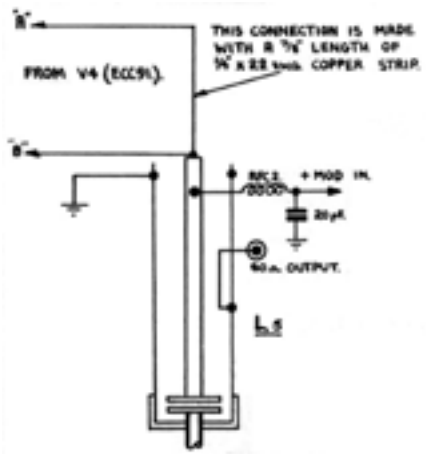




for the following stage. This - the output valve - had its two anodes strapped together and joined to the coaxial cavity by a short copper strap. The coaxial cavity, and its connections, as detailed in the diagrams, had been turned using a small model maker's lathe.

Although testing had shown that over 10 hours into a dummy load it appeared to be successful, with no overheating, on air tests had at that time not been done as there were no other 'active' amateurs in the area.



A ‘useful circuit’ was also included for a transistor video amplifier stage - the notes on the diagram detailing the performance.

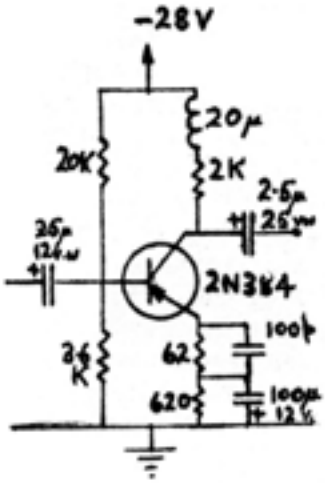
The ‘education’ topic was on coaxial lines - explaining why co-ax rather than ordinary flexible wires is used for video or RF signals (less distortion and a maximum power transfer are benefits of using co-ax). Some mathematics were included of necessity; the most important being the characteristic impedance Zo, which is approximately $\sqrt{L/C}$ - where L is the series inductance in µH and C is the shunt capacitance in µF per foot of the line (ignoring the series resistance and shunt leakage of the line). Typical video co-ax is 75Ω and C was about 20pF per foot, L is about 0.1 µH per foot.

As both L and C are proportional to length, the characteristic impedance is a constant for a particular type of co-ax, regardless of its length. The article went on to explain the reasons why 50Ω cable was used for transmission feeds - a compromise between the maximum voltage the cable will stand between the inner and outer, and the least temperature rise in the inner conductor. Calculating the time delay of a signal passing through the cable was given as $T=\sqrt{LC}$, where T is in µsec per foot. The practice of ‘looping through’ the video signal, and the importance of correctly terminating the cable (with a resistor of a value equivalent to the characteristic impedance) were also explained.

The ‘news’ in this issue included a suggestion that a service might be provided whereby 5PF7 cathode ray tubes (available on the ‘surplus’ market at 12/6d (62½p from Messrs Proops) could be opened up and new phosphors put in - either white for use as a viewfinder or a very short blue persistence phosphor for use in flying spot scanners.

Two cameras made by members were pictured - a CPS Emitron type made by Phil Groves of Hemel Hempstead was still under construction. The large circular hole on the front would have been for a lens turret - the scan coils for the camera tube are in the bottom of the case, whilst between the two vertical chassis panels can just be seen

**USEFUL CIRCUIT**




An RCA advertisement gives this interesting transistor video amplifier circuit. Using a 2N384 drift transistor (£5 or so) it has a bandwidth of 20c/s to 10Mc/s, a rise time of 0.035 microsecs, and 26dbs of gain. It will operate from -65°C to + 55°C; maximum output is 20V p-p. Figures are for a load capacity of 16pF.

a 5FP7 crt, facing to the rear for use as a viewfinder. The much smaller camera of Gordon Sharpley, G3LEE, was being shown to members of the Stockport Radio Society. The vidicon camera had been left in a shed all winter, and this had had the effect of improving the signal to noise ratio by some 10dB !! Gordon was not only working in ‘fast scan’, but, the magazine reported, appeared to be the first member in Great Britain who could record slow scan pictures (the only other known example being Cop Macdonald, WA2BCW in America).

Other news from members included mention of Arthur Critchley, who was serving in the RAF. He had hoped to be posted to High Wycombe as a “scientist” (Arthur’s inverted commas), but ‘true to tradition’, had been posted to Yorkshire instead. In High Wycombe there was a group of tv amateurs, and Rex Lakeman reported that their mk 2 vidicon camera was producing pictures, although the video response needed to be improved. Otherwise “it only remained to clear away the lethal birds-nest of components and wiring round the camera.” Rex was “amazed that none of the members had electrocuted himself”. The editor added - “ take care lads, we can’t afford to lose your ten bob!” (ie membership subscription). Down in Bournemouth, Jim Russell was trying to find other amateurs interested in atv in the area, but without success. In East Anglia, Mike Bryett was active on 434.63 MHz, exchanging good signals with Ian G3KKD/T at Ely (12 miles away) and G3NOX/T - at a distance of 25 miles).

In Cambridge, the old G8PY equipment was being rebuilt by Mike Soames and Pete Bendall. In Dover, Graham Hill had a working monoscope camera, whilst up in Manchester, Brian Green had got a flying spot scanner in action. Activity in the West Midlands included Brian Smith in Castle Bromwich, who was working with George Flanner and John Symmes. They had an interlaced pulse generator, with various other video circuits feeding a 70cm transmitter that would produce an average video output of 70W into a 16 element aerial.

The magazine also included a notice to members of the Fifth Amateur Television Convention, including the ‘General Meeting’ at 2.30pm, being held at the Conway Hall in London on September 10th 1960. Admission would be 3/6d all day for members, and 5/- for non members, with a reduced rate of 2/- and 2/6d respectively after 2pm. There would be the usual range of members equipment displays, sales stalls and “short talks on various topics of interest to the amateur television enthusiast”. This year’s event is on June 6th and promises a similar range of attractions -- and (unlike 1960) there is no admission charge !!

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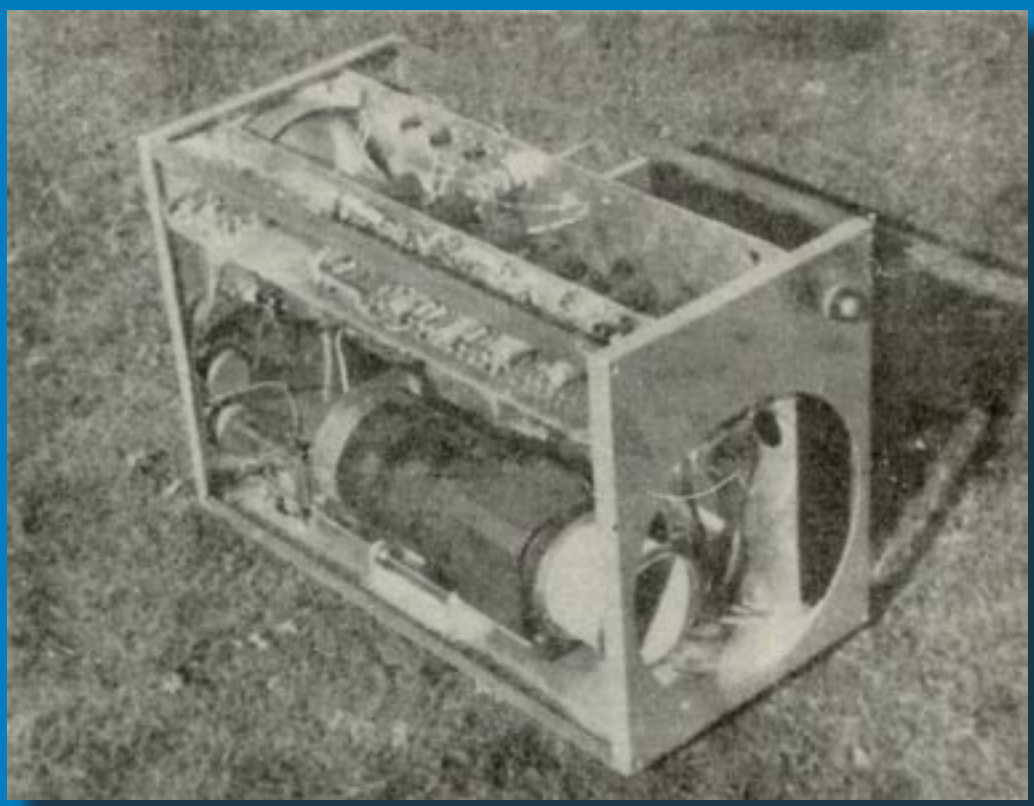
CPS Emitron Camera



Gordon Sharpley


Two examples of Bluff Titler's DPack Templates
as featured in the article on page 17