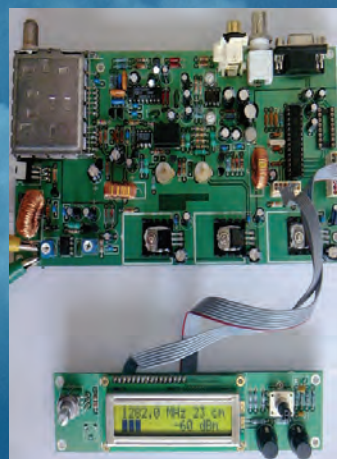
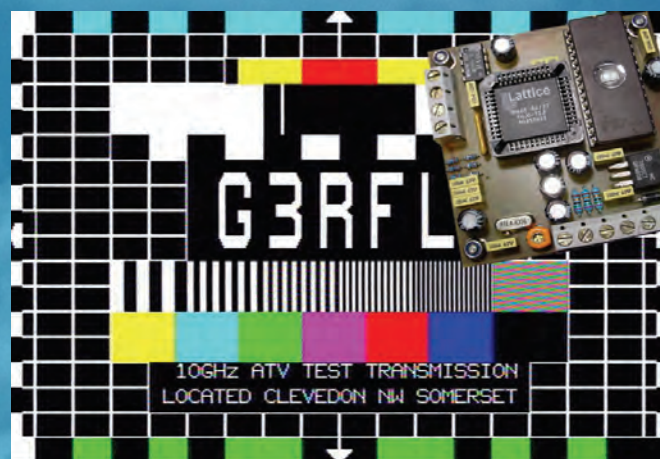


# CQ-TV

Issue 234 Aug 2011



**FREEVIEW TVI FILTER  
DUNSTABLE DOWNS RALLY  
ELECTRONIC TESTCARD  
MKII 24CMS ATV RX UPDATE  
MODIFYING THE SQUARIAL  
OPEN DAY AT HMS COLLINGWOOD  
PIC COLOUR BARS GENERATOR  
TVA 161**

ISSN 1466-6790



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## Caption Contest

We only had two entries for last issues caption contest picture (shown below), come on everybody - it's an easy way to win a caption generator unit, free of charge!

Here are the two entries:

“You will Obey”, In your best Dalek voice (Dr Who)  
Rob Loftus VK2ADG

“No, I’m not one of the official cameramen, but this is the only way I could get a monitor in to the meeting so I could watch the royal wedding.”  
Don Hill, KE6BXT



...and the winner is Rob Loftus, VK2ADG Congratulations, a caption generator will be on its way shortly.

This months photo is below, comments please to: [editor@batc.org.uk](mailto:editor@batc.org.uk)

There is also a prize for anyone that can tell me exactly what the photo is of - what's the prize? Wait and find out in the next issue!



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## Deadlines

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

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

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

# Editors Preamble

Here it is, CQ-TV 234, the August edition. Which means we are on target for three magazines this year instead of the usual four.

It's purely down to the lack of copy being sent in, but what to do about it is a good question. Your committee is considering several options so watch this space...

In order to compensate slightly for having only three magazines this year, we have printed the four centre pages in full colour, showing photos from the popular Dunstable Downs rally.

Another change for this issue, is we have "personalised" the magazine, instead of having a separate sheet of A4 paper inside the plastic envelope, with your name and address on, it's now printed directly onto the rear cover of the magazine. Also, if you take a peek at the inside rear cover your membership number is now printed along the top, so no more emails asking "what's my membership number?". That should cut my inbox down by about half!!

We have a good collection of articles in this issue, which I hope will appeal to all our members. We are trying to include more constructional articles especially, as that is what you have told us you like to see. Thanks to all those who have contributed and please, keep it coming!

Dicky Howett has created a video record of 'work in progress' showing Paul Marshall's OB van restoration Project Vivat! A filleted version is available on the streaming website [www.batc.tv](http://www.batc.tv) in the "Film Archive" - select the "General" category then "Vivat".

In the film Paul describes the basic restoration scheme with shots of the van's 'bare bones' and other select revelations, many very expensive. Part two of the video record is underway already and the final part three will undoubtedly show a pristine van, ready to roll.

The websites have both seen a few changes recently; more functions are now available on the streaming site to control streams and the chat channels.

We are also expanding the range of facilities on the main website, for example we have created a downloadable membership certificate, personalised with your details. You can now download past issues of CQ-TV in higher resolution than available on the public website, whether you are a cyber member or postal member. We've also added the facility for you to configure your own club email - no need to request an email address anymore, it's already there in the members area for you.

The club email option also has more choice of domains to choose from and now comes with Webmail and is fully IMAP compliant as well as the usual POP3

Never before has being a member of the batc provided you with so many additional benefits! If you don't yet have a login, request one now at:

<http://www.batc.org.uk/register.php>

I hope you enjoy CQ-TV 234  
73 de 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 PC and the data files will 'auto-run' when the DVD is inserted.

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

[http://www.batc.org.uk/club\\_stuff/pubs.html](http://www.batc.org.uk/club_stuff/pubs.html)

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

# Chairmans Column

First of all apologies for the late delivery of CQ-TV 233 it was due to a number of reasons one being the lack of copy and another that we have not yet filled the position of assistant editor, so Chris is split between improving and augmenting the batc software, and editing CQ-TV while at the same time scouting for copy. I hope we come up with a solution before CQ-TV 235.

A more personal project for me has been re-launching, what used to be called members services and has now been renamed the batc shop. The first two products appeared in the last issue. One being a new badge, that is proving very popular not only as a lapel badge but as one member pointed out it can very easily be adapted to replace the old equipment stickers, by either drilling a small hole for the pin in the case or by removing the pin and glueing the badge onto the equipment.

The second product was the 23/24 cms FM ATV receiver, this was even more popular and sold out within a few weeks, I now have more stock, but the new Comtech front ends are scarce, these are believed to be more sensitive than the older module used in the G1MFG receiver, the software it very clever and the digital readout for frequency and several other parameters is popular. The RS232 hardware control has not yet been implemented in software, but this is not far away and at least one member is investigating adding USB control to the receiver design.

This issue we have added a further two products, the first being a small self contained colour bar generator, which uses a PIC chip to generate the bars and a small surface mount PAL coder so as to provide a composite output, this is again being supported by a PCB and a bare bones kit of the difficult to source components, and can be easily constructed in under 2 hours

The second item is an electronic test card generator, this first appeared in CQ-TV 201 as a ready built unit, and is now being launched as a kit, it uses

an EPLD (Electronic Programmable Logic Device) which is programmed to generate a number of clock signals for a 27C512 EPROM which is supplied customised to your own requirements. Again this project is supported by a bare bones kit of the pre programmed chips and difficult to source components.

I hope all these projects are popular with all the home constructors out there who have been a little starved of suitable projects of late and as both the colour bar generator and the electronic test card use the same AD 724 surface mounted encoder with it 0.05" spaced pins, a small challenge that I hope proves Surface Mount construction has not brought an end to home construction, although I think it has raised the bar a little.

Last but not least is a project that has been slowly evolving and now has a name DigiLite, this is often referred to as the poor mans route into transmitting DATV, I think I prefer inexpensive rather than poor. The project was first conceived by F4DAY and has since had the software developed by G4EWJ, and hardware by M0DTS and G0UHY and is a system designed to produce a low cost ATV digital transmissions. A number of individual modules are used, one of which is a WINTV PVR recorder card in a PC, this is followed by a new module which takes the USB from the PVR and serialises the streams adding the DVB house keeping codes. A further module then modulates the stream to give the QPSK for a DVB-S transmission.

This concept was seen some time ago, but after extensive enhancements and new code and hardware from G4EWJ and M0DTS the devices are producing 4Ms/s. This is T/Stream rate most frequently used on UK ATV digital repeaters. Several other groups have built and tested systems offering, feedback and results, back to the diverse design group.

The Bournemouth ATV group made the decision to actively convert all their local stations to digital transmission. Then DigiLite emerged as a practical way to achieve a digital transmission system at a low cost. Dave G8AJN and Colin G4KLB have produced PCB modules for their local group, this is documented at [www.g8ajn.tv](http://www.g8ajn.tv) Dave G8AJN has very kindly offered to produce a single PCB version, excluding the separate PVR, which we hope to make available through BATC, together with a series of articles for CQ TV.

We are still planning how this will be achieved, initial thoughts are to have a mini kit with the small modulator chip placed, other SM components should be readily available or can be sourced directly. Code for the serialiser will be in PIC form which Eddie has made available.

[www.g8ajn.tv](http://www.g8ajn.tv) and [www.m0dts.co.uk](http://www.m0dts.co.uk) have information concerning the system and the existing individual module arrangement and watch this space for the single PCB version coming through articles in CQTV.

A new heading has been added to the batc forum so that up-to-date information can be made available as the project progresses, as soon as the PCB design is finalised into a production design, it will be available along with any parts that are not readily available in small quantities, via the batc shop, so please keep a watchfull eye on the batc forum [www.batc.org.uk/forum/](http://www.batc.org.uk/forum/) as well as [www.g8ajn.tv/](http://www.g8ajn.tv/) and the batc on-line shop [www.batc.org.uk/shop](http://www.batc.org.uk/shop) for the latest on this project and availability of PCB's.

Thanks must go to all those who have made this project possible, ideas and design recommendations came from many sources and this is also reflected in the kind offer by G4EWJ for making the latest software available as freeware.

Trevor Brown  
BATC Chairman

# Circuit Notebook 108

by John Lawrence GW3JGA

A 3 Channel Push-button Switcher using Latching Relays

Latching relays

Conventional relays have an operating coil which, when energised by a current, produces a magnetic field that moves a spring loaded armature and closes a pair of contacts. The contacts open when the coil is no longer energised

A latching relay (RS Components 369-602), is shown in Fig.1. It operates in the same way except the armature has a toggle action and two opposing coils, one to set it and the other to reset it.

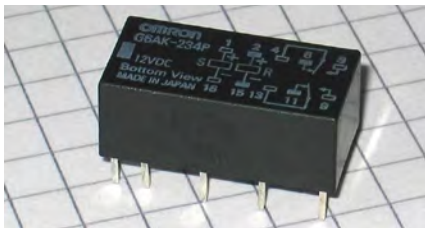


Fig. 1. Latching Relay RS 369-602

Only a pulse of current is required to set or reset it and the relay retains its setting when the energising current is removed. The latching relay can be used to store a circuit condition. GB3TM TX uses latching relays to store and display fault information after the power has been removed.

Push-button, Latching Relay, Control

This push-button switcher uses latching relays and could be used to switch audio, video, D.C. and even mains. The 3 way circuit was developed for a specific project but could easily be extended to 4 or more circuits. Its main feature is that the connections are mutually exclusive and that the settings and connectivity are retained when power is removed.

The circuit is shown in Fig.2. It employs three latching relays, one for each channel. See ref.2. As mentioned, the latching relays have two coils. When the 'S' (set) coil is energised, the relay latches in the 'on' condition with COM connected to NO. When the 'R' (reset) coil is energised the relay latches in the 'off' condition with COM connected to NC. The bi-stable latching action is provided by an internal permanent magnet. (NO = normally open, NC = normally closed, COM = common). See Ref.1.

The setting and resetting of the relays is performed by a number of diodes. For example, if push-button PB1 is closed the 'S' coil of RLA is energised and the 'R' coils of RLB and RLC are energised through D7 and D8 respectively. This ensures that RLA is energised and RLB and RLC are not. An equivalent arrangement applies to button PB2 and RLB. Also, PB3 and RLC.

Each set of COM, NO and NC connections are used to connect to different parts of the external circuit being controlled. A combination of connections can be used for special control functions. The other set of COM, NO and NC connections are used to power LEDs to indicate which circuit is active.

Veroboard Layout

The prototype circuit was built on Veroboard and the layout is shown in Fig.3. The completed prototype is shown in Fig 4. Three LEDs were fitted directly to the Veroboard for testing purposes. Typical connections to the Veroboard are shown in Fig.5.

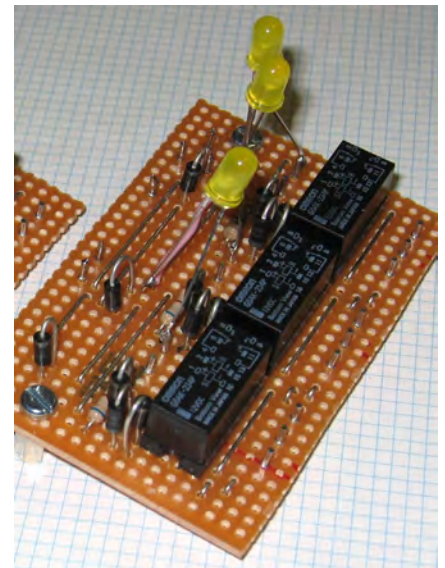


Fig. 4. Completed Switcher

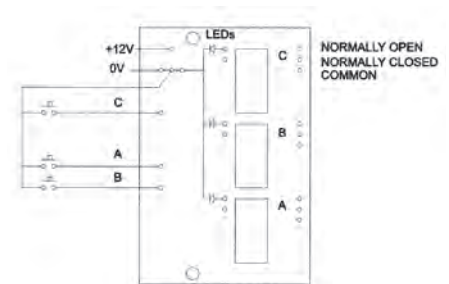


Fig. 5. Typical connections

References

Ref.1 Wikipedia: Latching Relay with Permanent Magnet'

Ref.2 RS Components: 369-602

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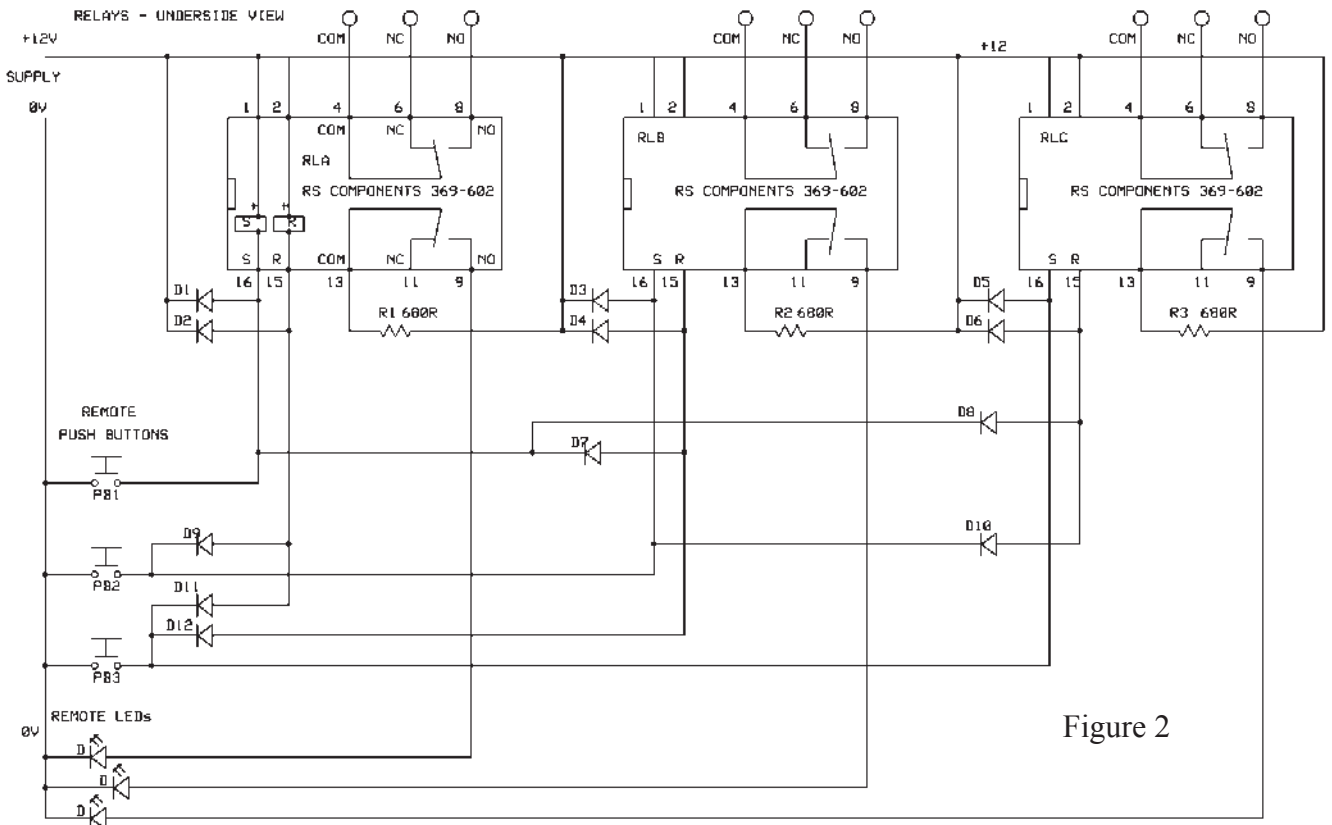
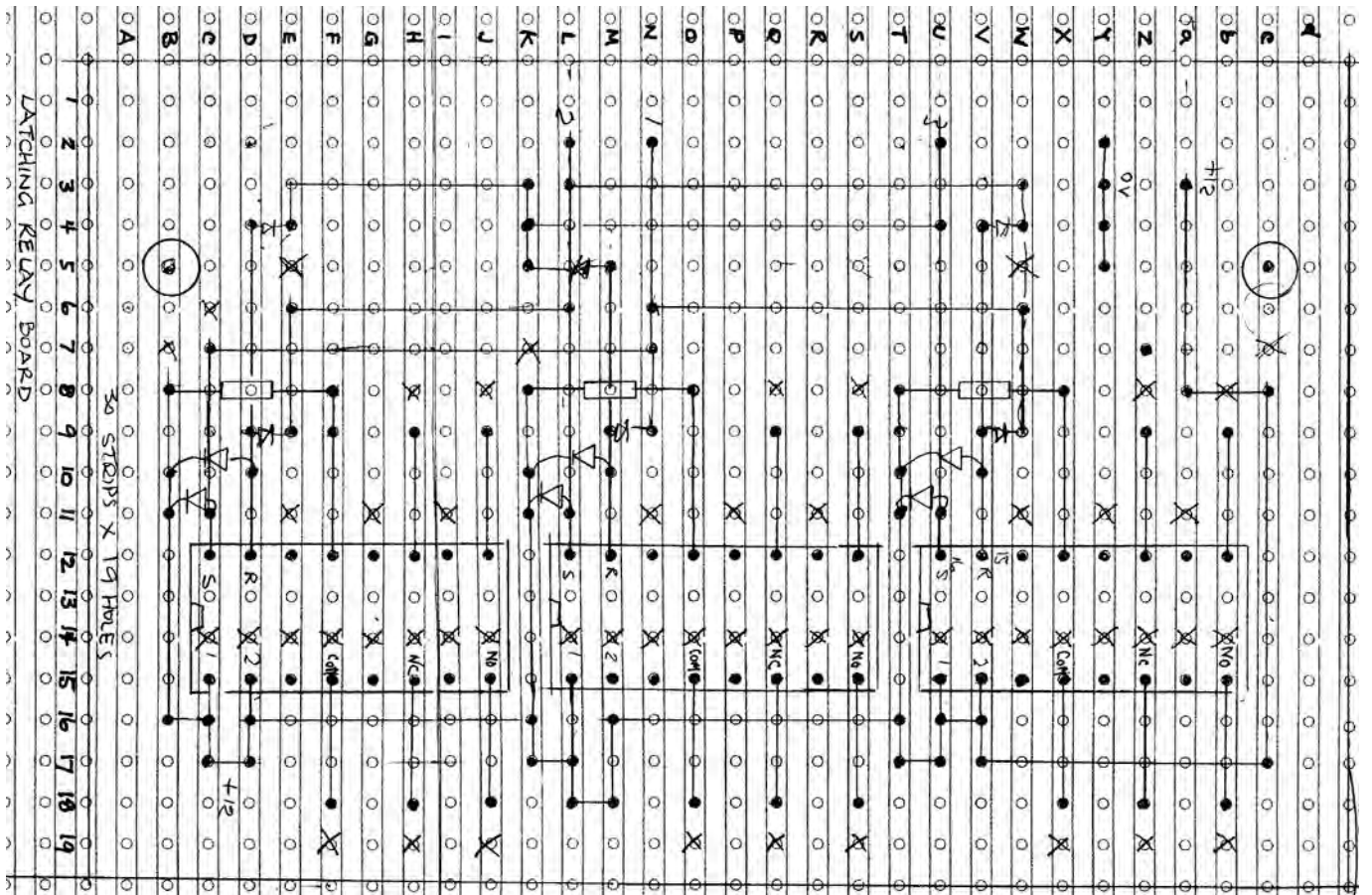


Figure 2

Figure 3





# Modifying the BSkyB Squarial for H-Pol

by John G3RFL

In order to modify the BSkyB squarial for horizontal polarisation, first put the BSB unit on a flat table and remove the 12 back screws.

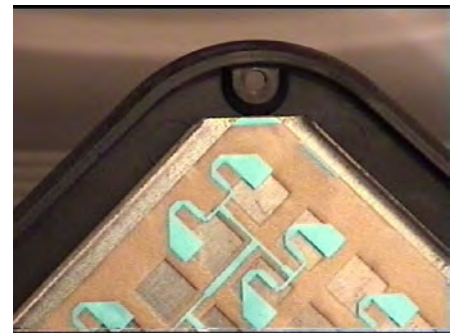
Then remove the screw from in the middle holding the plastic cover for the LNB. Undo the swivel mounting bracket. Unscrew the LNB itself and remove. Remove the front panel.

Next and this is the part you have to mark which was the top otherwise it will all go wrong on reassembly remove the 4 large screws holding the front plate and also the 2 screws holding the waveguide cover.

Remove and store all the plates and place all in the same way. Get the film with all the 256 elements on it and look at how the gap is not symmetrical its offset by a distance this is what causes one half of the system to be out of phase with the other and the result is circular polarization and no good for ATV use.

The corner of this sheet has a nice piece of foil just the correct size to form a quarter wave stub that we require to glue with the wife's nail varnish (not mine) across the present gap. Measure along this part of the foil and find the central point then cut a gap the same as you had covered with a sharp knife.

Now by reassembling the whole thing back but making new holes through the different layers such that the new gap is in the center of the waveguide as before.



# PIC Colour Bar Generator

by Grant ZLIWTT

## Background

Video test equipment has been used as long as there has been video. You need away to a line up cameras, television transmitters and set video levels, this where this gear comes into use.

## Introduction

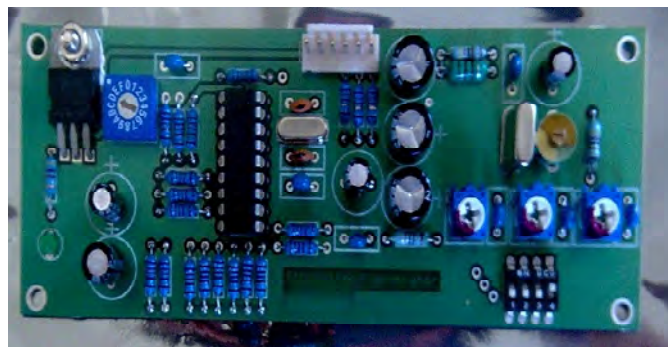
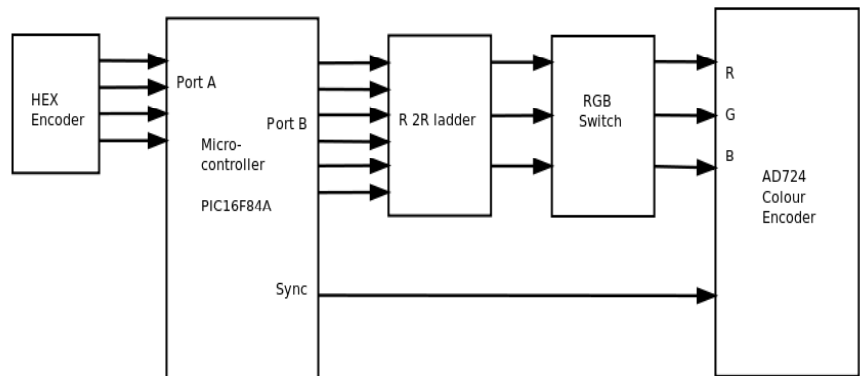
I needed to find away to build a portable video test source, so I started to look around for IC's that would do this job. I could not find anything that was suitable so I ended up thinking how I could put one together, maybe logic gates or an EPROM? Then I had a closer look at what I could get a micro-controller to do. All video is nothing more then a stepped waveform. Sync could be made up out of logic 1 or a 0 it's all comes down to what you could do with the timing. I started out with a PIC16F628A but I could not get this PIC chip to work within this circuit configuration until I moved to the PIC16F84A. With this chip I had eight logic outputs on port B to make use of, this is why I decided to go with the two bit colour. Likewise I also had five pins left on port A, so I made one the sync output and the remaining four as BCD inputs. I ended up with three IC's one being the 5 volt regulator, as you can see there is very little involved within this circuit.

The colour encoding works by converting RGB (Red, Green, Blue) to phased modulated C (Chrominance) as a sub carrier. This works by having a colour burst this sets up the phase reference for that line, in PAL (Phase Alternate Line) TV system this is flipped by 180° on each line. This has the advantage of off setting any unwanted colour phase shift. This has always been a problem that affected the NTSC system. The second signal is the Y (Luminance) this sets brightness level and provides the monochrome picture information. It is very important to have

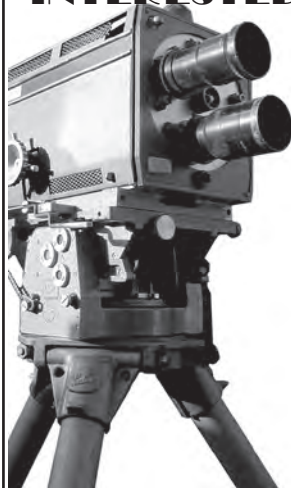
the encoding side levels set for one volt pack to pack into a 75 ohm load. To a line video equipment you need to start with a known reference otherwise you end up going around in circles and getting no where.

## Features:

- Small size
- 2 bit RGB colour
- Low cost simple to build
- 16 Patterns
- Can be battery powered



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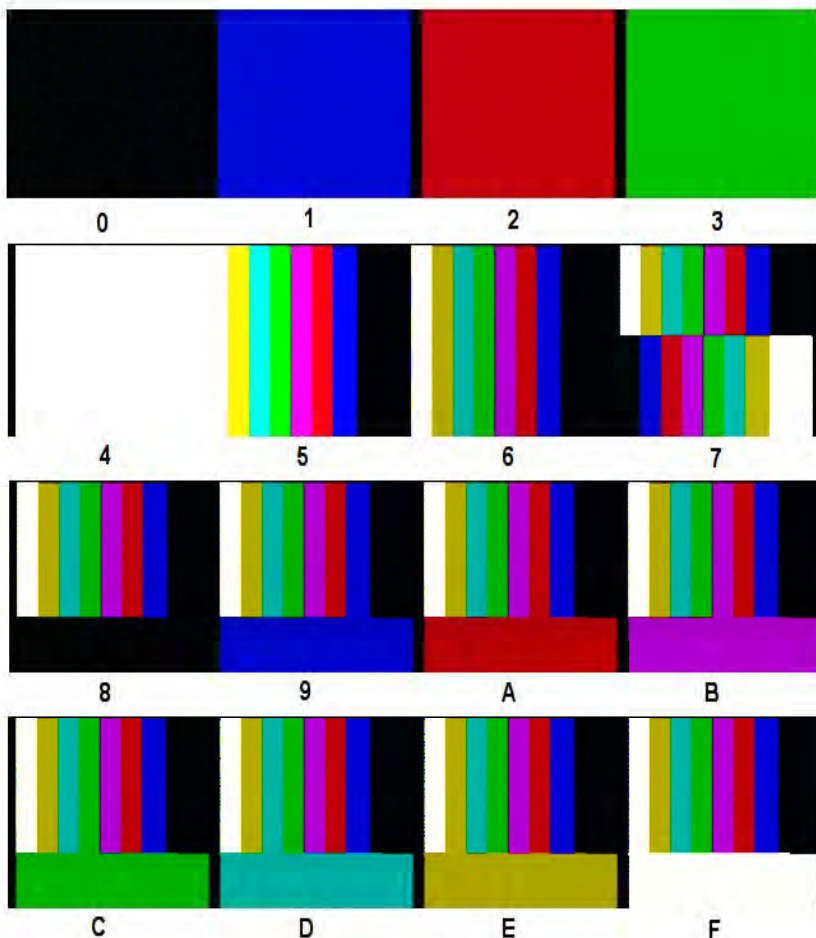
✦ WIRELESS  
✦ TELEVISION  
✦ GRAMOPHONES  
✦ AUDIO & VIDEO  
✦ STUDIO EQUIPMENT

## RGB two bit level drive from the PIC16F84A



<b>Red</b>	11	10	00	00	10	10	00	00
<b>Green</b>	11	10	10	10	00	00	00	00
<b>Blue</b>	11	00	10	00	10	00	10	00

### Test card numbers in Hex



0/ Black level	1/ Blue raster	2/ Red raster	3/ Green raster
4/ 100% white	5/100% bars	6/ 75% bars	7/ Transition bars
8/ Black bar	9/ Blue bar	A/ Red bar	B/ Magenta bar
C/ Green bar	D/ Cyan bar	E/ Yellow bar	F/ White bar

### Specifications:

- PAL-B,G,I
- S-video and composite video
- 1 volt P to P into a 75 ohm load
- Software change required for NTSC version

### Circuit description:

This pattern generator is based on IC1 the PIC16F84A micro-controller with port B set as RGB drive via R 2R ladder network this is made up with 1k resistors. The micro-controller timing is set by a 20 MHz crystal. Port A is the Hex inputs for pattern switching from EN1 (HEX encoder) as well as the sync output drive on pin one. It took all of the 2k memory space to write the code for this project. The hardest part was getting the timing right for the equalizing pulses in the blanking interval. The speed of the Micro-controller also limited what I could do in way of test patterns, my switching time was no more then about fourteen times within 52uS window, the visible part of the waveform. The outputs from port B are feed via S1 a four way switch (for RGB switching) this can turn on or off each part of RGB levels as required, where by the last position is the PAL/NTSC chrominance switch. VR1, VR2 and VR3 are the drive level adjustments. To a line these presets you select pattern four (white block), set for one volt pack to pack and to null out the chrominance.

IC2 the AD724 colour encoder is referenced from 4 x clock at 17.73448 MHz or 1 x at 4.4336 by setting JP1 to ground. The good thing about this encoder is there is no need for a delay line and requires minimal components. The output video is able drive into a 75 ohm load on both outputs the composite and the Y/C (S-video). By connecting the composite and the Y output to a common switch you are able turn the colour on or off.

This pattern generator will provide you an indication to where the levels are, it's not a replacement for professional test equipment. But as a small compact portable signal generator it works well.

# Contest News

## Latest News

### Summerfun Contest/Activity Day

As I write, the logs are just arriving from last weekend's Summerfun Contest and Activity Day. I have been impressed by the breadth of activity reported, with digital and analogue activity on 70, 23, 13, 6 and 3cm. Stations active included G1LPS, G0EHV/P, M0DTS/P, G4FVP/P, G4ZCN, G3KJX, G8BYI, G6MNJ, G3PYB, G8LES, G8ADM, G8GTZ and G0KTD. Thanks to M0DTS and G8GTZ for encouraging much of the activity and for all those who braved the rain – it looks particularly bad in the picture of Eddie, G0EHV's Station (see inside rear cover).

## Internet Help

TV Contesting relies on finding other stations to exchange pictures with, so it is a lot easier if you have an idea of who will be active before the contest. The BATC Forum can be a good place to find out what's planned. So remember to check the General Chit-Chat Section <http://www.batc.org.uk/forum/viewforum.php?f=2> before the contest and post that you'll be active. During the contest, the use of 3G on a smartphone can help when 2 metres is too weak for talkback. There is a low bandwidth text chat channel for this purpose at [http://www.batc.tv/chat\\_only.php](http://www.batc.tv/chat_only.php). It's all within the rules of the contest – just make sure that the numbers are only exchanged on video!

## Contest Rules

Please take a look at the Contest rules on the website before the September International Contest. While I'm prepared to overlook minor transgressions in the National Contests, I can't "look the other way" for the International Contest. The rules on the numbers that you choose are particularly important: 3357 or 1234 are not legal and you must have different numbers for each band.

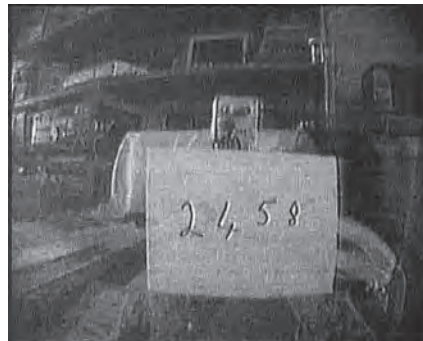
## March Repeater Contest

Just 2 entries for the March Repeater Contest:

### BATC Repeater Contest 26/27 March 2011

Place	Call	Points	Locator	QSO	Repeaters
1	G4OCO	120	IO70MK	3	GB3NQ
2	G3MCD	68	IO70PL	3	GB3NQ

Congratulations to Roger G4OCO and thanks to Keith, G3MCD for his entry and the pictures below.



### 70 cm Activity

It was great to see some 70 cm activity during the Summerfun. In my view this is the best band for ATV Contest Activity – you only need low bandwidth (analogue or digital) and you can achieve really good DX. Please try to activate the band for the September International Contest.

## Contact

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

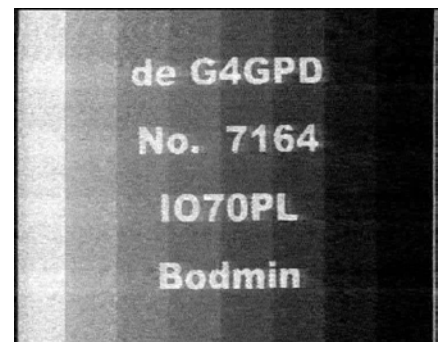
## Contest Calendar

1800 UTC 10 September 2011 - 1200 UTC 11 September 2011  
- International ATV Contest

1200 UTC 10 December 2011 - 1200 UTC 11 December 2011  
- BATC Repeater Contest

1200 UTC 24 March 2012 - 1200 UTC 25 March 2012  
- BATC Repeater Contest

1200 UTC 9 June 2012 - 1200 UTC 10 June 2012  
- BATC Summer Fun Contest



# The care and feeding of MOSFET RF power amplifier modules – Part 1

by J.D. Ingham, ZL2TAR

## INTRODUCTION

Mitsubishi Electric has been making Hybrid RF Power Amplifier Modules, incorporating Bipolar transistors, for more than 20 years. During 2004, they started selling Amplifier Modules incorporating MOSFETs. This article describes the features of the MOSFET modules (model numbers starting with RA) and compares them with the earlier Bipolar versions (model numbers starting with M).

Some features of the MOSFET modules are an improvement on those of the Bipolar modules, but some features are a backward step, particularly the lower DC to RF conversion efficiency of the MOSFETs and their need for higher DC input power and larger heatsinks, when used as a linear amplifier.

## MOSFET MODULE LINEARITY

Mitsubishi MOSFET data sheets state:

“This module is designed for non-linear FM modulation, but may also be used for linear modulation by setting the drain quiescent current with the gate voltage and controlling the output power with the input power.”

Quiescent Current is measured with the normal Drain voltage and no RF Input.

Linearity is not important with CW or FM modulation modes, but is important with almost every other mode, such as SSB, Analogue TV and digital modes, including the common Digital ATV modes: DVB-S and DVB-T.

Figure 1 shows the quiescent current of a typical RA18H1213G MOSFET module (18 Watt RF output at 1240 to 1300 MHz) versus bias voltage. Note the curvature at low bias voltages and the straight line at higher bias voltages.

The dashed line is a projection of the straight line portion. Its intersection

with the horizontal axis is referred to as “Projected Cutoff” in Reference 1. Setting the Bias voltage to the Projected Cutoff value is a good starting point.

Reference 1 provides advice on how to select the optimum quiescent current.

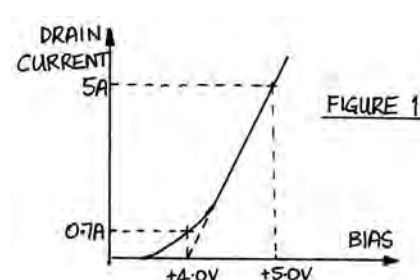
Figure 2 shows the RF output versus RF input characteristic of an ideal amplifier, and the output saturation effects, at higher RF inputs, of a practical amplifier. In a well designed amplifier, saturation is mostly determined by the choice of output device and output matching circuit. There is very little difference between the saturation behaviour of MOSFET, Bipolar (and valve) amplifiers.

Figure 3 shows the RF output versus RF input characteristic of a practical amplifier, at low to medium RF input, with different values of quiescent current. Curve C results when there is insufficient quiescent current; Curve B results when the quiescent current is increased, but is not quite enough; Curve A results when there is just enough quiescent current.

Increasing the quiescent current beyond curve A has little effect on the low to medium RF input linearity, but reduces the module’s power conversion efficiency, increases the module’s dissipation and reduces the saturated RF output power.

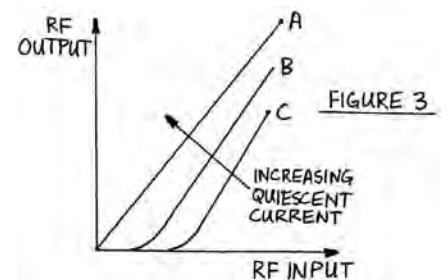
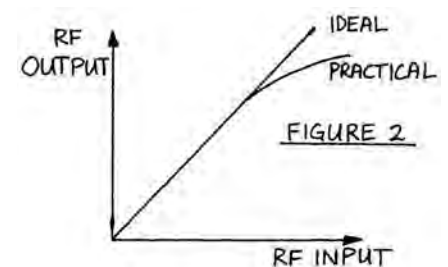
Figure 3 applies to Bipolar, MOSFET (and valve) amplifiers.

The quiescent current of MOSFET (and valve) amplifiers is easily adjusted.



However, the presence of temperature compensating diodes, in the internal bias network of Bipolar amplifiers, reduces their flexibility.

For example, the characteristic of the Bipolar Mitsubishi M67715 (2 Watt output at 1240 to 1300 MHz) was found to be similar to Curve B, at the manufacturer’s recommended bias of 8 Volts, and improved to Curve A at 9 Volts bias.



## HOW IMPORTANT IS GOOD LINEARITY?

Both types of non-linearity (low level and/or saturation) produce in-channel distortion in the transmission, and unwanted emissions in the adjacent channels (splatter). There is a tendency in Amateur equipment to set the quiescent current to less than the optimum value.

## MOSFET DRAIN VOLTAGE AND TEMPERATURE-DEPENDENT QUIESCENT CURRENT

At a given Bias voltage, the quiescent current tends to increase with increasing Drain-to-Source voltage and increasing temperature.

In the case of the RA18H1213G module, at a Drain supply of +12.5 V, the optimum quiescent current for linear operation is about 700 mA at

20°C. The current increases, of its own accord, to about 1 Amp when the module temperature reaches 60°C. This corresponds to a Bias pin voltage of about 4.0 Volts. This current increase with temperature is a well-known characteristic of Power MOSFETs and is not a cause for concern.

### ADJUSTING THE MOSFET BIAS VOLTAGE FOR LINEAR OPERATION

The aim is to discover the minimum value of quiescent current, at which the linearity is OK at low drive levels, to maximise the operating efficiency.

In general, a starting value of the quiescent current, for good linear operation, can be determined by the Projected Cutoff method, described above, or by making the quiescent current between 15% and 20% of the current during peak RF Output.

For the RA18H1213G, the Drain current varies by about 4 Amps for each Volt of Bias variation, so a Bias Regulator is essential. A fixed-output 5.0 Volt regulator is recommended.

A surprising number of Amateur circuits feature pre-set pots for adjusting the bias voltage. The use of pre-set pots is surprising because of their well-known unreliability, and that the failure of a 5p pot can cause the destruction of a £50 module.

The Mitsubishi MOSFET modules are made to close tolerances and their internal bias networks feature high stability, 1% tolerance, resistors. In the case of the RA18H1213G module, the internal bias resistance is usually about 10 K ohms, so an external high-stability resistor of 2.5 K ohms, between the 5.0 Volt regulator and the module's bias pin, produces 4.0 Volts at the bias pin.

To optimise the quiescent current, measure the linearity, at mid-to-low RF drive, with resistor values either side of that calculated, such as 2.4 K and 2.7 K resistors. Try increasing the resistance to 3.0 K if the linearity at 2.7 K follows Curve A, or reduce it to 2.2 K if the linearity at 2.4 K follows Curve B or C, and so on.

### MOSFET EFFICIENCY

The power conversion efficiency (DC input to RF output) of the MOSFET modules, in linear mode, is between about 2/3 and 3/4 of the power conversion efficiency of the older linear Bipolar modules.

For a given RF output power, this means that the MOSFET modules consume more DC power, and require bigger heatsinks to safely dissipate the extra heat.

### SHIELDED ENCLOSURE

The modules should be mounted inside a shielded enclosure, to ensure that radiation from the module, or from the output stripline, does not bypass the output filter, or leak into earlier driver stages.

The size of the enclosure is not critical at 2 metres and 70 cm. However, larger enclosures can be resonant at 32 cm or 23 cm and the coupling between the output and input striplines can cause the module to self oscillate.

The enclosure shown in the photograph (Deltron 459-0140) is free of resonances near 32 cm and 23 cm.

Freedom from resonance can be tested by operating the module with normal DC and RF drive, with the enclosure lid off. The measured RF output power should not change as the lid is brought close to, then into contact with, the rest of the enclosure.

### ADJUSTING THE PEAK OUTPUT POWER

Analogue modulation modes, such as SSB voice or Analogue ATV, should be set to peak at no more the -1 dB RF Output compression point.

The Noughts and Ones of unfiltered digital modes have constant amplitude, but infinite bandwidth. The spectrum shaping, necessary to tame the bandwidth, produces significant phase and amplitude modulation of the transmitted envelope. In other words, digital RF transmissions should be considered to be analogue, as far as the amplifier linearity requirements are concerned.

In the case of the most common Digital Amateur TV mode, DVB-S, the peak power of the envelope is about 2 dB higher than the mean power. The peak power should be set to be no higher than the 1 dB compression point. The SR-Systems DATV modulator modules have a handy test feature for adjusting the amplifier: the modulation can be turned off and the carrier increases to the peak value. Typically, a so-called 20 Watt linear amplifier should be operated at about 10 Watts Mean Power.

In the case of DVB-T, used by Digital Terrestrial TV (and our local Belmont ATV repeater output) the recommended peak-to-mean ratio is much higher, typically 7 dB to 9 dB, depending on the non-linearity of the amplifier and the performance of its associated linearity pre-corrector. Typically, a so-called 20 Watt linear amplifier should be operated at about 3 Watts Mean Power.

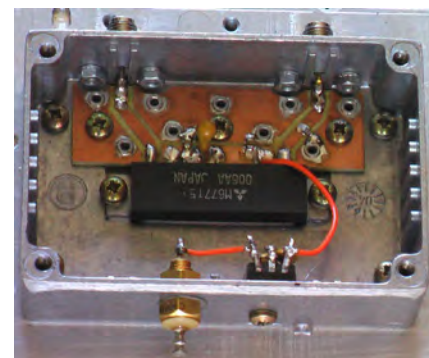
### IN PART TWO

Test results and application advice for the following MOSFET modules:

RA30H4047M	30 Watts	400 to 470 MHz
RA60H4047M1	60 Watts	400 to 470 MHz
RA20H8994M	20 Watts	890 to 940 MHz
RA18H1213G	18 Watts	1240 to 1300 MHz

### REFERENCES

1. Radiotron Designer's Handbook. Chapter 13.



# A bit more about the Emprex BMP001

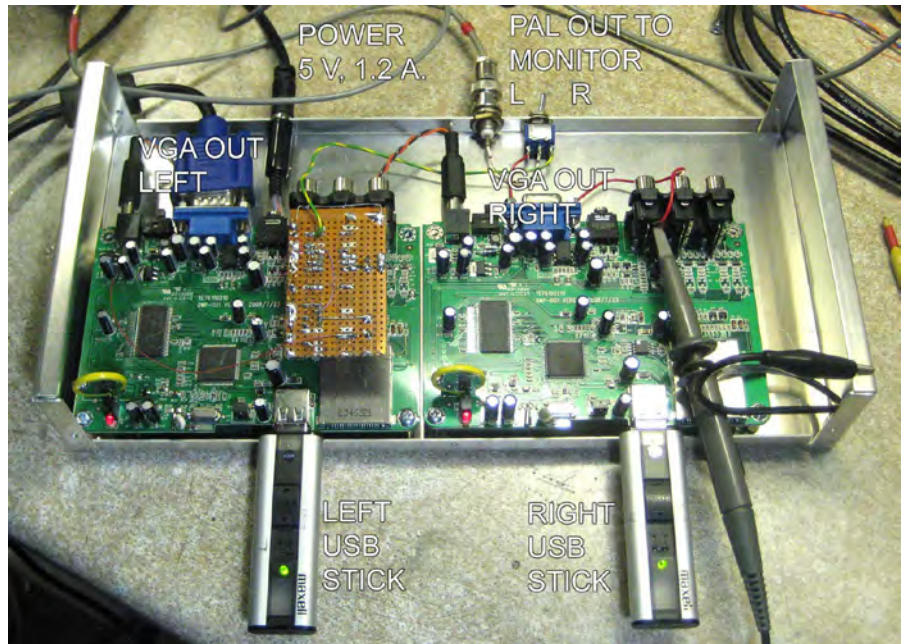
by Mike Cox

You never know what you are going to find in CQ-TV, do you? In CQ-TV 233, John Lawrence introduced us to the Emprex BMP001 Digital Media Box. I was sufficiently energised by this to go on the web and buy one [for about £14].

I too did a mod to get 1 volt into 75 ohms for the PAL and Y outputs. Then I bought a Fujifilm W3 3D stills camera. You can do several things with the pictures from it. You can look at them on the rather nice but small autostereoscopic screen on the camera, you can send the files to Fujifilm who will do you a lenticular print for about £5 a pop, or you can connect the camera to your 3D TV with the supplied HDMI lead, put on your glasses and view your pictures.

The last two options did not appeal as I am a bit of a skinflint, and I have not got a 3D TV, because I will not put money in Murdoch's pocket. But, as I have two projectors in a 3D rig, and they are driven VGA from the replay processor, the idea came that I could view my stills on the rig. This rig is described in CQ-TV 230/231/233.

So I bought another Emprex BMP001 for slightly more money than the original. The plastic outer cases of the original units were put to one side, and fitted into a Maplin's case, KR56L. Figs 1, 2 show the arrangement, with holes for the IR remote control photodiodes, and the USB memory sticks. The PAL outputs of each card are selected by a switch at the rear to drive a small monitor for set-up. A 1A plug top power



supply comes with each BMP001, but to save space on the distribution board, I have used a slightly larger unit to drive both cards.

Fujifilm give you a bit of software with the W3 camera that will decode the

.mpo file that is produced [it also gives you a .jpg each time] into left and right .jpg files.

Put these on two USB memory sticks, and the dual BMP unit drives the projectors.

## !!! Your Club Needs You !!!

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

[editor@batc.org.uk](mailto:editor@batc.org.uk)

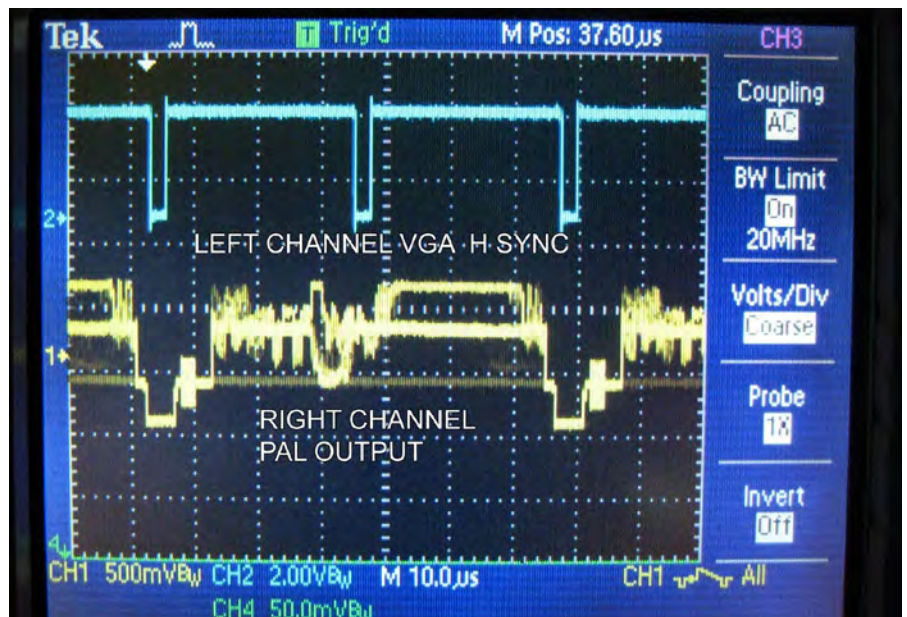
Or you can make a plate with 1/4" holes at 65 mm spacing, and use your ordinary digital camera and take 2 pictures of static objects, one at each position. When you look at them, re-label them left and right and keep them in 3D stills folder. This works well, but is a bit more fiddly than the W3.

There has been some fun and games along the way. Initially, there was a distinct flash at the changeover between slides, which got progressively worse over time. On looking at the PAL output of one card, and then looking at the second, it was not running through steadily as you would expect two crystal locked sources to do – it was galloping through.

I then looked at the VGA H and V sync signals. One was 31.25 KHz [H] and 50 Hz [V], while the other was 31.5 KHz [H] and 60 Hz [V]. A quick look at the system set menu showed that it was set to NTSC. I suspect my bench monitor was dual standard, and was happily displaying an NTSC page.

Once the menu was corrected, all came good, and the stills change over together after several hours running.

Fig. 3 shows the 'scope trace with one channel locked to the PAL output of one card, and the other trace showing the H



sync of the other VGA output. The left and right files have to be put onto the USB sticks in the same order, otherwise they will get out of order as the slide show progresses.

The remote control needs to be held about 1 foot away from the unit, and roughly between the memory sticks to ensure that both cards react to your commands.

One problem that remains is to make a simple changeover switch between the BMP output and the replay processor output. This involves 10 contacts as

each VGA connector has R, G, B, H sync and V sync, and there are two VGA connections. Relays may be the answer.

I have recently given a talk on 3D TV to the Echelford Amateur Radio Society, and in August, to the Sutton ARS, when I hope to add the dual BMP001 to the rig.

If any one wants a BMP001, try eBay, or Amazon. Which leads to the thought for this issue – How did John Logie Baird manage without RS, Rapid, Maplin's, eBay or Amazon?

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# Open day at HMS Collingwood

G0LFI was approach earlier in the year with a view to introducing TV coverage of the Open day through the station facilities at GB3RN.

The GB3RN club station has excellent facilities including 23cm antennas which would allow access to the Isle of Wight ATV repeater. An evening of tests proved we would have a good signal in and out of the repeater, allowing the streamer to take any coverage world wide.

However a later test on club internet circuits worked well, enabling a direct input the batc.tv streamer. We had more “strings to our bow” than anticipated. We now began to plan how we could cover the extensive event from a live television point of view. Achieving coverage of the large site proved to more of a challenge, fixed cables for cameras, in the public walking areas, was not acceptable from a safety point of view, or very limiting.

## The Parade ground.

Covering the main parade ground was the key issue, this was where most of the interesting events were taking place. It was about 150 mtrs from the GB3RN station buildings, but with an obstructed radio path. We obtained the use of a 13cm digital COFDM man pack ATV transmitter which could operated on obstructed path mostly by reflection from nearby buildings. We were offered the use of a first floor roof overlooking the Parade ground, but access was quite difficult, and had buildings security



**Video control point, and streaming station.**

limitations. On the day Rosie the Warrant officer assigned to assist us came up with an office window view point.

Frank and Simon G0IEY manned this view point, and the 13cm radio camera worked well back to the club station building by rigging two directional antennas (for diversity reception) towards the parade ground. The digital radio link had exceptional good digital audio and we used this for commentary and background effects.

## Managing the video production.

Audio and video control point was assembled in the GB3RN club room. This consisted of PC based hard disc recorder, a simple “cut only” AV switch, a slide store for captions. Additional fixed camera were rigged close the club station.

A small audio mixer added the capacity to make announcements on the main output feed. The aim was to run live tv for the special events and record them at the same time, then replay later in the day in-between events.

Tracking the events, and anticipating the timing of the, schedule proved to be challenge, and were busy all day. The assigned HMS Collingwood staff gave

brief introduction to the events, at the radio camera. It was a busy time manning the camera position overlooking the parade ground and long walk round the building to the security access.

In the event coverage was good from such a simple set of equipment. The view from the office window proved to be ok for the parade ground but tracking the Sky Diving event was almost impossible as we had limited view vertically.

Thanks must go to the hard working camera crew Frank G0LFI and Simon, plus the those at the control point G3PYB including Julia G0IUY and Christine M6UBI who helped to rig and de-rig, plus ferrying the rechargeable batteries and drinks to the radio camera crew on a very hot day on the south coast.

The main HMS Collingwood club also ran several other bands on the same site, producing RF on a range of frequencies, fortunately with little QRM to the tv operation.

Thanks also to Doug Hotchkiss G4BEO for organising the GB3RN facilities including the Internet streaming point.

More photos on the covers.



**Parachute event into the Parade ground**

# When is a TV not just a TV?

by Mike Sanders

These days a TV becomes more than just a TV with an antenna and maybe a satellite receiver connected. Just on that simple bit first, many of the new TV's have both Freeview and FreeSAT built in. Note: only FreeSAT is carrying HD channels until digital switchover, except in the London area where analogue and HD Freeview are all on together from the Crystal Palace transmitter.

FreeSAT can be obtained by sticking an extra cable in the SKY LNB (Low Noise Block converter) residing outside on the dish, and if you don't have one of your own, it can even be a from neighbours system (by permission of course as it won't cost your neighbour anything to let you do this), provided that it is a newer style LNB with spare sockets on the bottom. Huge long runs of cable are to be avoided but there are in line boosters you can get to help with that problem.

So that's you receiving TV but what else can you do with a Smart Tv?

The Samsung comes with apps built in to use on the web.

You can either connect your TV with a wired LAN connection or wirelessly to your broadband hub. Quite honestly the

Also there is some AllShare software which has to be installed on each PC or laptop that is connected to your home network you need to download from here:

<http://www.samsung.com/global/allshare/pcsw/index.html>

and for those with Macs there is TVmobili:

<http://www.tvmobili.com/download.php>

This means that the Smart TV can connect to your computers on your network and stream movies stored on your hard drive(s) providing you have an up to date codec pack on you computer that can read all the video files in you desktop media player. Try playing them first on your computer. You might find stuttery playback problems though if someone else in the house wants to watch BBC iPlayer at the same time.

On the computer you choose which folders you want AllShare or TVmobili to be able to access (ones that contain media). On the TV you simply go to the source button on your TV remote, scroll down to AllShare and your enabled computers and the folders you have decided to media share will show up. The TV can't play anything and everything, and has been pointed at the PC market first, but the Macs are catching up.

And of course you can update your TV built in software as a download from the web, do it on your computer by going to the manufacturers website and selecting the model number and downloading the software. This is best done with a USB memory stick plugged into the TV onto which you have transferred your download. I have bought a USB extension cable to save fiddling round the back of the TV as mine is wall mounted.

TV recording is done with a USB memory stick or USB disk drive attached. When you have attached it, press the record button on your remote control whilst watching your programme and a message will come up asking you if you would like to format the drive. No choice, select yes. ALL YOUR FILES WILL BE DELETED so use only a new empty drive or stick. Then the drive is tested by the TV for recording and if it is accepted you may now use it as a video recorder. The drive format comes up on a PC as RAW so you can't look at the files on there and the TV is a Linux based operating system. Even if you find a way of mounting the drive the files are recorded in \*.SRF format which contains a digital signature for digital content protection. In fact when the TV formats the hard drive or USB stick it is then tied to the system board serial number in the TV, and will not work on a friend's TV. So if you want to take TV programmes away with you to watch, get a USB TV card for your Laptop, and it will record programmes onto your laptop hard drive without trying to find a way of cracking the system.

There are currently alot of criticisms of the EPG (Electronic Programme Guide) being out of date now and again or not cope with progamme overruns so you may not get all you wanted to record or even the wrong thing entirely. That is I am afraid down to the broadcasters to get right.

So there we are, when is a TV not just a TV? - right now



remote control is useless to do anything seriously on the web so Samsung have come out with a new remote control:

# Dunstable Downs Rally

by Peter Blakeborough G3PYB

The Dunstable Downs Radio Club holds one of the largest boot sales in the UK and attracts a large numbers of attendees.

The rally site is relatively close to London and has a number of active ATV repeaters close by. For the first time at this venue a marquee was devoted to all aspects of ATV with streamer “live” feed via [www.batc.tv](http://www.batc.tv).

The aim in providing a “live” stream was to try a different approach to presented material through the use of a PC based



hard disk recorder and recording short interviews or presented segments which could be replayed from a simple “semi automated “play list through the day.





### Recording equipment.

Providing interesting “live” material through out the day is a hard task master, and this approach allowed the stream organisers time to set-up the next segment. Black Magic Intensity card in the PC and it associated software, allow simple recording and storing (uncompressed) of material plus the formation of a simple automated play list.

Rigging time can be an issue with a complex set of equipment so our aim was to use the minimum of equipment and rely on a presenter to set the scene at the beginning of each segment. We deployed a 13cm COFDM radio camera with diversity RX to enable segment to be recorded anywhere in the site.

John G0HAT brought along an 860MHz low power link for reverse talk-back and cueing and acted as the opening intro presenter. Two other stations from the Bournemouth area made up the recording crew John MIBAI, Colin G4KLB all had worked together with a radio cameras systems at other events, such as Flight Refuelling open days.

Only one other video source as used as a caption source. Some very short segments were run live from the radio camera to link the segments, or stills were derived as freeze frames from the material.



## Streaming

Streaming out through a 3G dongle on a laptop worked well, and apart from, a forced power down to “fill the generator with fuel” we had little interruptions.

Segments recorded included presentations from GB3EN, GB3TV and GB3TZ representatives, plus a short presentation from Colin G4KLB on the most interesting DigiLite digital encoding and modulation project the DigiLite project offers, for the first time, the prospect of a low cost digital encoding and modulation package.



The very early, and cold, start to the day and the assembly of the marquee created a few challenges but thanks must to those who created the event and manned the stand. Very much a team event.



## New and Old

To the right is a picture from my viva (thesis defence). The people are (L-R):

Dr James Sumner (my PhD supervisor), \*me\*, Dr David Kirby (internal examiner) and Prof. Graeme Gooday (external examiner).

My thesis title "Inventing Television: Transnational Networks of Co-operation and Rivalry, 1870-1936 University of Manchester"

Cheers,  
Paul M

PS Strictly speaking, it's all still awaiting 'minor corrections' - the norm for this kind of thing - but it's all close enough and it is official.



*Congratulations! It is now official: Jill and Paul Marshall at the University of Manchester PhD graduation ceremony on 18th July, 2011. Please, do not adjust your colour controls - that really was the colour!*



I was walking past the site of Southern's TVS's - Meridian's old Northam Studios at Southampton this morning and thought that you might be interested in the current state of this once busy complex.

The Gatehouse at the entrance is still there, as is the Meridian" sign - but there's not much else! What a sad end to Worzel Gummidge's birthplace !

Regards  
Howard Chapman G3NZL



# Update on Panel Antennas

by Maurice Richards, G3WKF

This article describes some innovations and construction details, which may help you get the best out of working portable with the panel antennas described in CQ - TV182 "23cms Panel Antennas" by G8GML & G3KKD.

Excellent results have been obtained with the original designs of these antennas in different combinations, but the China Clay hills in Cornwall make ATV working on 23cms very challenging.

The answer is to go portable, but it is easy to damage the antennas and elements when repeatedly transporting them in the car boot. Working /P has led to modifications in the antenna design so that it hinges vertically or horizontally and folds over on itself to protect the vital aligned parts and elements. (See photo)



In order to make the elements give an accurate and repeatable performance (plus a low SWR) a jig was constructed and has been used by many local amateurs (see photo below). The element centre incorporates a sliding "trombone" arrangement and coaxial balun for final frequency and SWR adjustment.



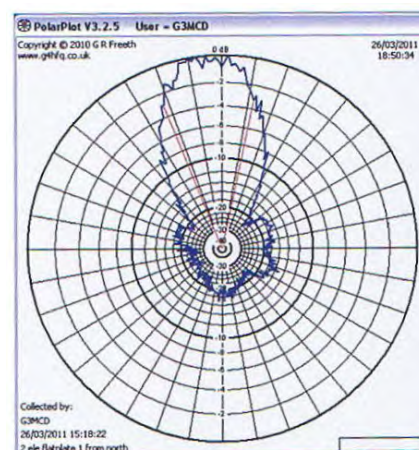
Copper wire (2mm diam) is wrapped around the far pins of the jig and at the first cross over point a short length of heat shrink sleeving (RS 397-641) is placed. This is repeated at each cross over then finally tension the copper wire around the pegs of the jig. Applying heat to the copper wire and spreading apart the jig to its stop position makes the elements the correct length. Where the element wires cross, insert a short length of PTFE sheet material (approx. 20mm) and then apply heat to the heat shrink.

Two centre supports have been made from 40mm. O/D PTFE or PVC bar with a 25mm thread and nut to go through the frame with its 'N' plug. A brass tube 7/16" M.S.137 through the centre provides the balun, pushing up the braid with two plated brass washers either side provides the connection to the 1/4" - 6mm. connector (RS 835-430). These need to be drilled out to 5.5mm. for UR43 or better. Below the centre connection point, a PTFE or nylon washer separates the brass tube from the coax screen, the ends are spread apart connected to 2.5mm. M83 brass tubes. These form a "trombone" on each side to give frequency and SWR adjustment. The ends of the enamelled wire are cleaned and straightened with a pair of parallel pliers and gently tapped on a flat surface to make easy movement inside the tube. This method of extending or reducing the element length with the two "trombones" really works well for SWR adjustment, but make sure each side is equal. The other 30mm. 0/D is probably better from a technical point of view but much more difficult to attach the coax. Once finally set, solder the tubes to the wires and cover all soldered joints with protective glass fibre resin or Evostick. Do not fill the centre connection point on the 40mm. centre or the frequency may change.

A top cap screwed to the centre provides additional mechanical support, but use nylon screws on the brass strips. The ends of each element are supported by slotted pillar boxes. Each coax length needs to be kept the same for all

elements on a panel and phrased. For use with test gear, most amateurs prefer 'N' type plugs and sockets, but on a large array TNC connectors could be used to keep the cost down.

The original article stated that you could stack 2 bays or 4 bays either horizontally or vertically and feed them by using 2 way or 4 way 50 ohm splitters. These can be made as described, but are quite critical for a 25dB return loss. The spacing of the elements will affect the polar diagram. Space them at 16.5 cm for clean side lobes or 24.5 cm for maximum gain. (see photo below for a typical 2 bay 2 element polar diagram with the elements spaced at 16.5cm).



To mount the flanged 'N' sockets for the couplers use 1" square alloy bar with a centre cavity hole of 18mm for a 2 to 1 coupler. The holes are 1/2 wavelength apart ( 118 ) mm. with a centre brass tube 7/32" MS130. The 4 to 1 coupler is also 1/2 wavelength long with two sockets at each end and the common point at the centre. Make use of the soldering hole with a PTFE threaded slug to achieve some frequency shift. The hole cavity diameter is 16.5 mm and the tube 9/32" MS132. Both couplers need to be enclosed in weatherproof protection. On a permanent location, earth the couplers to the frame and the longer cables should exit from the bottom of the box. To achieve maximum efficiency for ATV, separate RX and TX antennas are used (one above the other - see photo on next page).

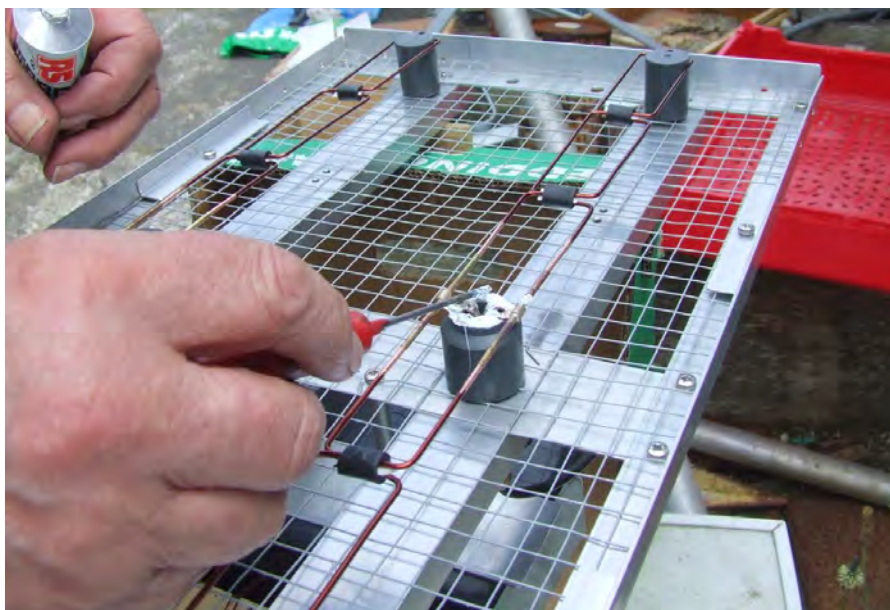


The frames are made from 3/4" x 3/4" angle on the sides with 1" x 1" at the top and bottom for standard 50mm. exhaust clamps to fit to a scaffold pole. The centre support being 1 1/2" x 3/4" x 1/16" box, this help stop any twisting. The hinges can be fitted to the either sides of the frame. Being a progressive building system these array panels can be 2 bay or 4 bay also can be used for SSB when set to the required frequency.

Making antennas for this band is a mechanical engineers paradise, but it helps if you have a lathe or know someone who has. Several prototypes later, we are now very close to the magic 25dB return loss for the couplers.

May I thank everyone who has helped me with technical and practical ideas.

G3WKF/P



**Remember, we will pay you for constructional articles published in CQ-TV.  
Send in your latest project for publication and earn some money!**



# MKII 24cms FM ATV Receiver Updates

In the last issue Grant ZL1WTT contributed his design for a 24 cms FM receiver. The design was supported by the batc shop as bare kits consisting of front end module, Display module, PCB's and pre-programmed PIC chip. For those of you with depleted junk boxes we have now made available, through the batc shop, some more of the components required to populate the pcb's without the problem of using multiple source suppliers and being subject to minimum orders.

Several of the units have been built using the new tuner unit with switched filters and extended I2C commands, which offer a number of improvements. Initial user reports are that it outperforms the G1MFG receivers both in sensitivity and video response.

## Information updates

One or two bugs have also shown up, the original schematic shows R19 as 330 ohm and the component layout diagram shows it as 68 ohms. TR8 is on the circuit diagram as a BC548 and on the layout as a BC458. The print that earths the centre pin of the sound ceramic filters is floating, a local link to ground is required.

Batches of the NE592-N8 video amplifier give slightly different DC conditions on the differential outputs, Grant's original receiver the voltages were as follows:-

Pin 1 4.55v	Pin 5 6.59v
Pin 2 3.85v	Pin 6 8.95v
Pin 3 0v	Pin 7 3.85v
Pin 4 6.63v	Pin 8 4.55v

The voltages experienced by our constructors were considerably higher, pins 4 and 5 typically being 7volts.

Grant then populated another PCB and also came up with similar results and has changed two of the resistor values on the PCB. The video section is DC coupled from the tuner up to the final output stage, with one capacitor on the video out. DC coupled video amplifiers perform better particularly at LF, but any DC offset problems are also amplified. I have reproduced a section of the original schematic diagram with Grants revised component values, and again the same for the component layout:

- Replace R23 with 270 ohms
- Replace R19 with 470 ohms
- Remove C31
- Add a link to ground under the ceramic filters
- TR8 is a BC548 on both diagrams.

## Software functions

The interesting part of the design is the software which controls the receiver and provides some interesting features. Unfortunately the remote control byRS232 has not yet been implemented as Grant ran out of room in the 8K pic and so a re write might be on its way. The software is simple and intuitive to

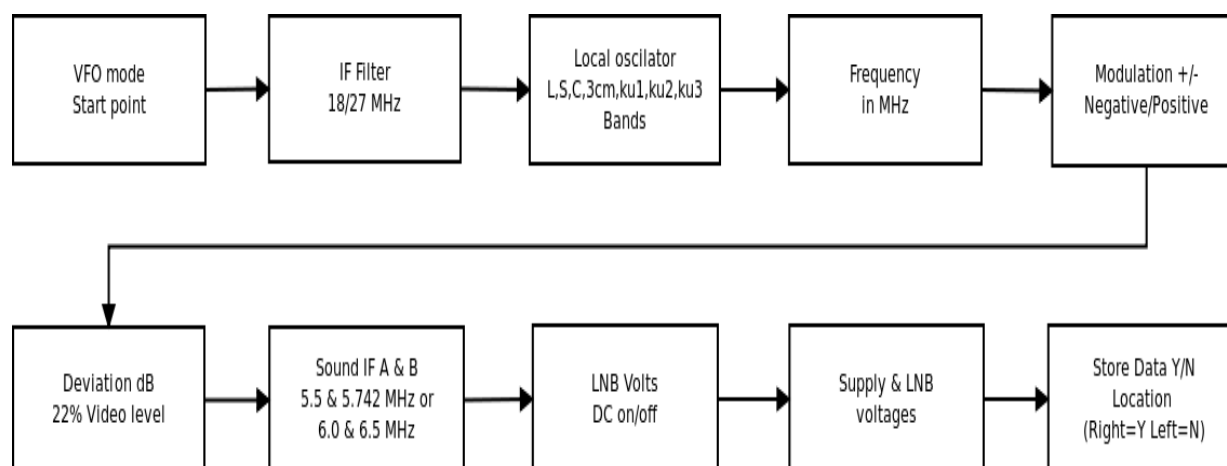
drive from VFO display the left button goes into the menu as per the diagram below. By re-pushing this button you are able to move through the various part of the menu. The rotary encoder changes the values as required. When storing the data the left button will exit without saving and the right button will rewrite the information to memory location selected.

When in VFO mode the stepping sizes are 100 kHz or you can jump to 10 MHz steps by pushing the button in on the rotary encoder and holding in.

Right button will take you into memory mode where you can load data out of any one of 40 locations by rotating the VFO knob.

## Construction

Construction, should not pose any real problems for anyone used to working on PCB's, all the holes are plated through. Remember a via down to the ground plane will dissipate a considerable amount of heat when soldering. My preferred method is to start with all of the components that are flat to the board, pay particular attention to the ic sockets they should ideally be the turned pin type. This will prevent problems of bad contacts for the IC's. I used only two connectors for the display, I fitted the cables from the display direct into the display pcb, then ran some Araldite over the wires on the pcb. This will prevent the wires from breaking at the soldered



joints (this method was always used at work because it saved 2 places to go wrong) with the pins fitted into the main pcb in that way you can easily remove the display should you need to. When fitting the display to a box front remember to allow the correct dimension for push buttons. At this point I then fitted all of the transistors, as it was easier given that all of the electrolytic's are taller than the transistors. The dual phono sockets supplied with the component pack are a little too big for the plated through holes but they are the correct spacing, if you drill out plated through holes ensure the connection back to the pcb circuit is made. Be sure to use heat sinks on the regulators as the main 5v regulator runs

at a constant 40 deg C when the board is fully populated.

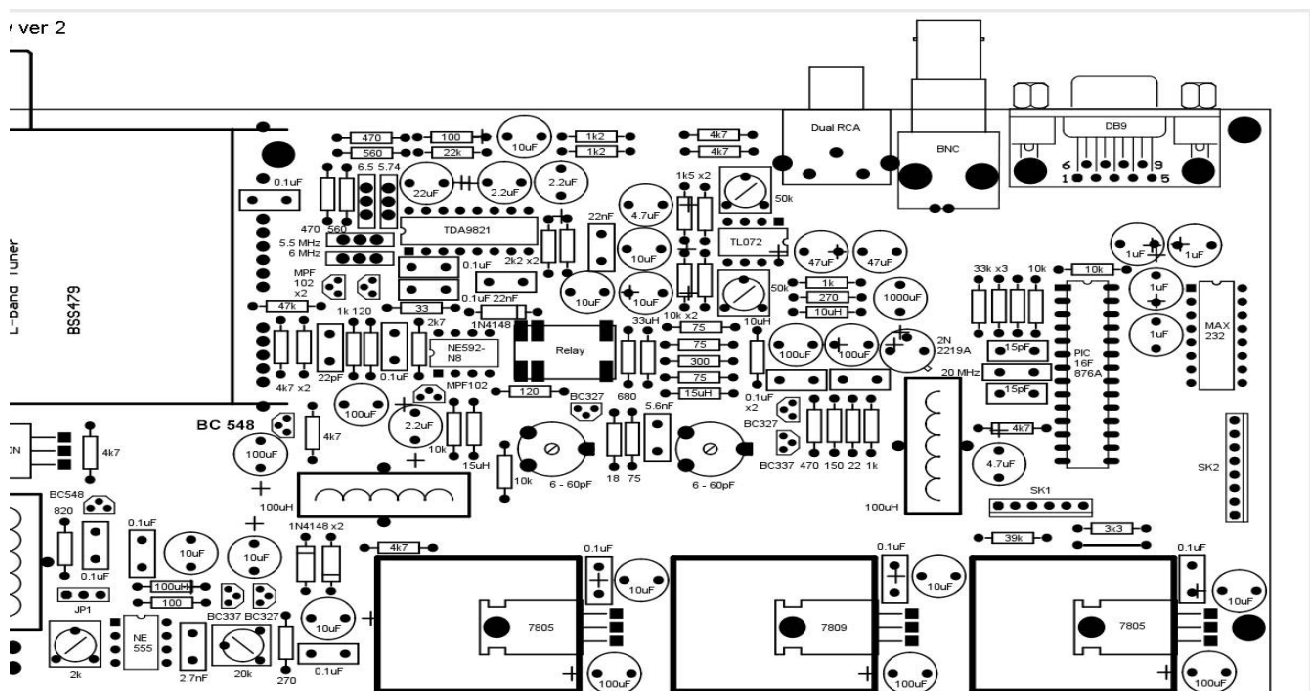
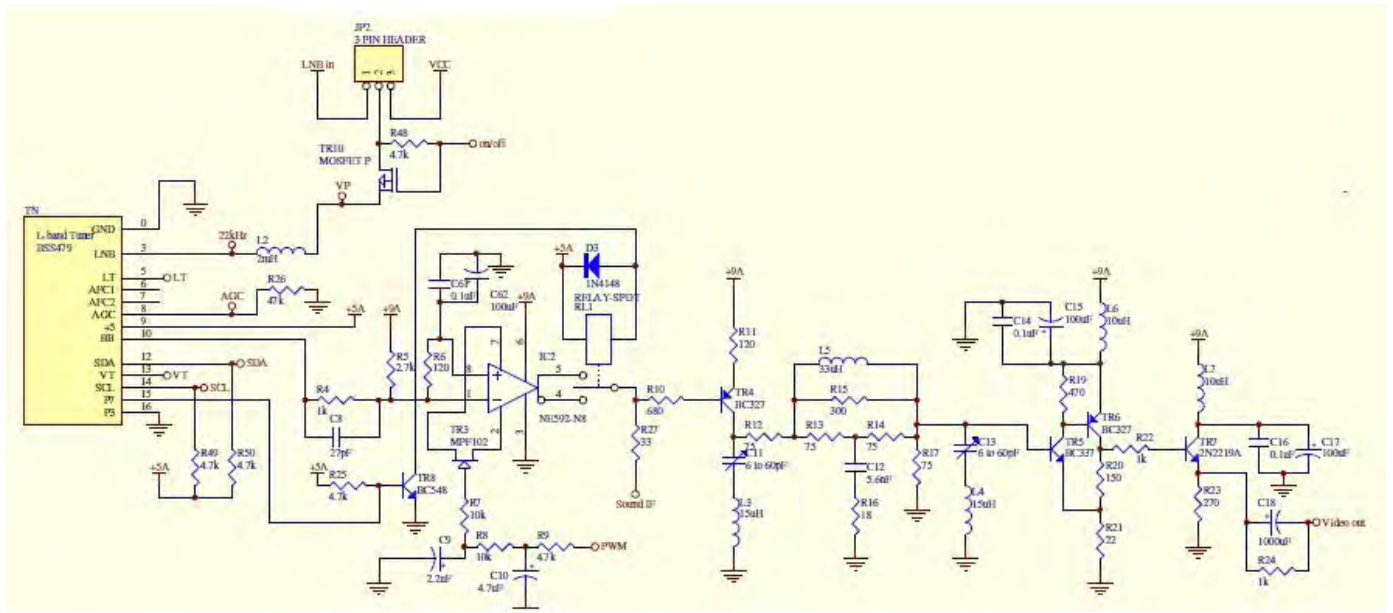
Before fitting any ic's I powered up the system and checked supply to all of the ic's, use a meter at the pos and neg on each ic socket, then you don't you run the risk of getting a positive supply indication with no return path ( I know I spent many hours trying to track down a fault on a frame store for failing to do that check!) If all is well, load up the IC's and monitor current consumption from the supply it should not go above 400ma. If you can you should now be able to try the Rx on the local repeater, again make sure you have a signal/picture on your old Rx before

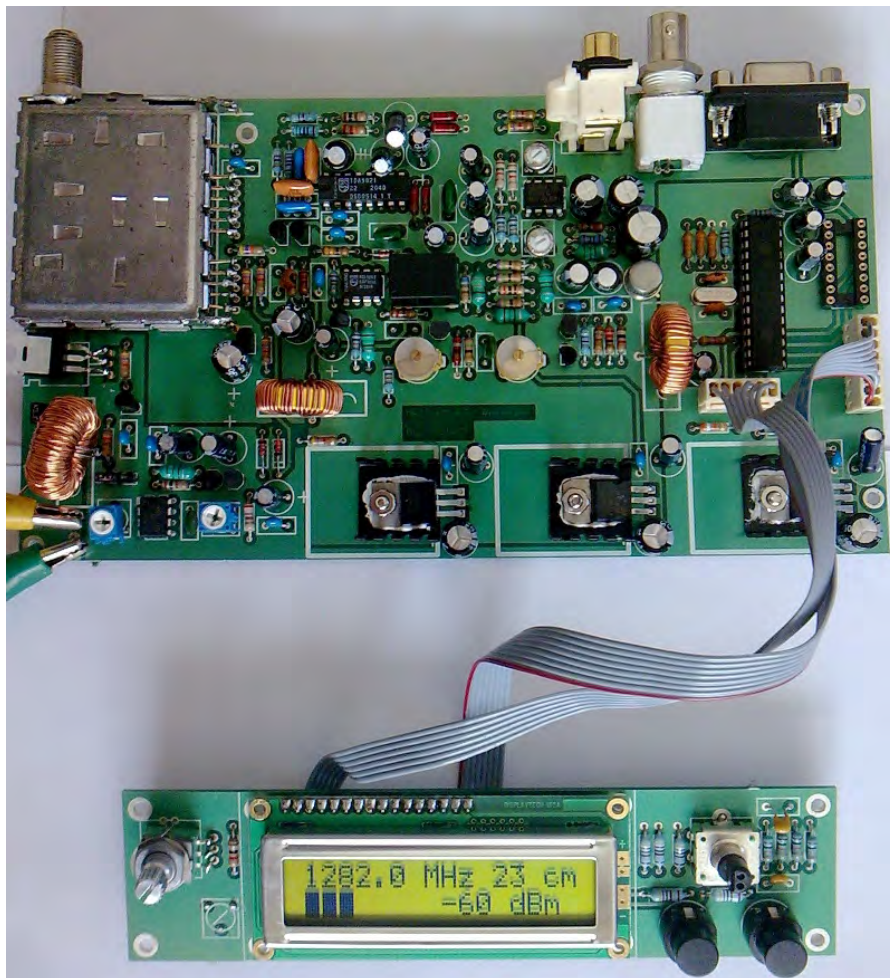
swapping over to the new one. Using the left button page through the settings, choosing the appropriate values by using the tune knob and then move on using the left button, at the end you will be given the option to save to memory, the settings.

Above Receiver running at Dave Kemplen G1NSV's Shack

Left Off air pictures  
From John Hudson G3RFL

Article notes derived from G1NSV, G3RFL & G3PYB. Edited by T Brown and P Blakeborough

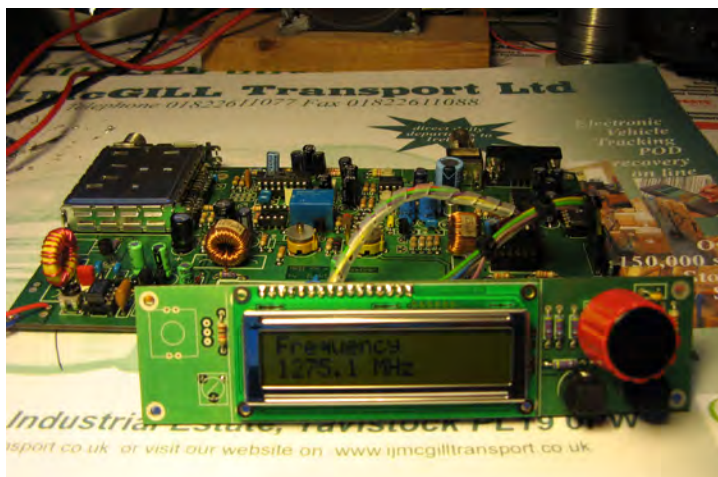




Members who bought the receiver kits have been sending in their photos, not just of the units, but off air pictures as well.

Pictures courtesy of Dave Kemplen G1NSV, John Hudson G3RFL & Peter Blakeborough G3PYB

The batc shop now has more stock, however this project is proving very popular and the previous batch sold out, so don't delay in ordering if you want to build this receiver.



# Comments on 3DTV

by *mike Sanders G8LES*

A few comments on 3D viewing. Where it works well it is well worth it, but as you will see from my arguments below it needs more thought, and I am not in any way against it as a visual experience but please let's have it done right.

My new TV (Samsung PS64D8000 SMART TV) has several modes which split into native and simulate 3D. DVD is automatically selected for 3D sky side by side (half HD resolution, by transmission method) has to be manually selected.

I am pleased I went for Plasma now rather than LCD because although less impressive in the shop, the skin tones are way better on Plasma than LCD, also the LCD just has (unless you go for LED) a fluorescent tube lighting it up which will age and deteriorate. The most impressive programme so far in HD is Britain's Got Talent - really cracking.

So back to 3D. Taking a cinema film with a decent 35mm pickup in camera - either film or digital (video), and putting the TV into simulate mode is extremely acceptable as most shots have a shallow depth of field. This is fine as the director is determining what you look at in frame as that's the only item in focus, so your eyes don't flit around the screen.

Now the problem we now have, is that in HD, the shots almost want holding for longer as there is so much detail in the frame, and it's more like putting up a photograph, in that you want time to absorb all the things in the frame. Indeed this holding the shot still for longer was tried with "Last of the Summer Wine," and it got appreciative audience comments.

But in 3D terms that's exactly NOT what you want to have the audience do - have their eyes flit around the screen. What works well in 3D is Natural History programming where you are taken in close up to bugs on leaves - that sort of thing. Again of course its shallow depth of field.

Where it goes wrong is in wide angle where everything is in focus and the scene just frankly looks like a pop up cardboard cut out scene in a children's story book.

This applies to quite a bit of material and sports matches on SKY 3D. Wide angle far away shots look fine as items at a greater distance will be all in focus to the eyes. So that looks ok. But to put a group of players close in on screen in a football/rugby match and still have perfect focus in depth, and to add to that the crowd are also in perfect focus behind, is a complete brain no no, but that's how they shoot it. It looks like an over the top gimmick which quite frankly distracts from the content.

A director commented in High Definition mag, just give me a good screen with plenty of detail in 2D and smooth motion, and I am very happy, I don't want gimmicks.

Interestingly my colleague watched the football final in 3D and he made two comments: (a) I didn't realise the players ran so much, and (b) I have lost sense of the game as I am absorbed by the 3D.

Of course, our perception of depth in 2D is given by the foreground moving faster than the background on a camera move. But to have that added to everything in perfect focus doesn't work as it makes

the scene look as if the distant hills are a painting hung up and the medium foreground is unreal like stuck on a clear plastic strip.

At my film club I made these comments the other day and got an immediate response from a member who said that's why in the 1950's PYE rejected 3D for exactly the reasons you are giving, that scenes just look unnatural.

Some dissolves are very disturbing to look at, and items that come into the screen bottom left or right corners seem also disturbing.

For 3D viewing it is also a shame that the LCD glasses reduce so much of the screen brightness. Also because of the left eye right eye switching any kit with front panel displays flicker noticeably (because the electronics are scanning the segments) and room lighting needs to be high frequency fluorescent or DC not ac mains based so as not to flicker.

I have to say having watched various material I am much more conscious of how my eyes work, like picking out a group of people at a table say in a bar, they are the only ones in focus, all other tables are still there but no longer clear. The amount of pulling focus is going to be the nightmare, but decent feature films seem to manage it, it's the documentaries and sport that are going to be much more difficult, where nothing is as pre planned as a scripted film.

This needs the broadcasters and programme makers to reconsider how this should be presented to the viewer otherwise they are going to kill it and consign it to the gimmick box.

**Drop me an email, let me know what you're doing  
with ATV. It's good to talk:  
[editor@batc.org.uk](mailto:editor@batc.org.uk)**

# Electronic testcard

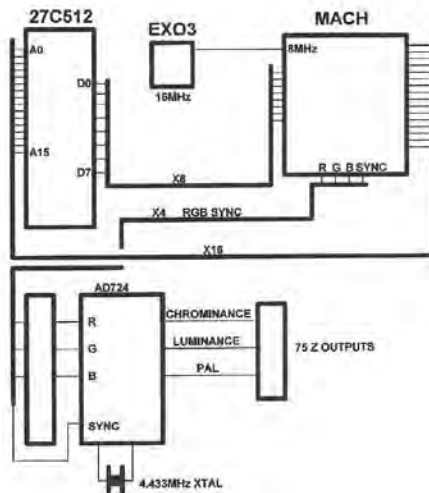
by G3RFL

This is a home constructed test card providing PAL and Luminance and Chrominance outputs. It uses two pre programmed chips so as to keep construction to a minimum. Because the logic has been programmed into a 44 pin Lattice array it has been produced as a block diagram rather than the more conventional circuit diagram which would show all the TTL gates.

The Test card generator needs a DC supply of between 8 and 12 volts at about 80 to 90 mA. The input voltage is sub-regulated down to 5Volts with an onboard TO220 regulator. The main logic is programmed into an ispMach44 pin PLD 44pin IC. This has several counters such as Pixel, Character Column, Sub Character, Line and Character Row. The main clock is at 8MHz and sub divided down to 4, 2 and 1 MHz.

The next section is the EPROM multiplexer unit containing a latch and 11 x 4 multiplexer that control the Column, Line, Row Character and Palette. The next section (also in the Mach) is the bit pattern generator that contains an 8 x 2 multiplexer, 4 D type latches a further 8 way multiplexer and a 250 nano second digital delay line. The final part of the Mach is a Colour/ Control latch which switches between the background/Foreground Palettes, this contains another 6 x 2 way multiplexer and 6 D type latches with extra logic for control, plus field reset with interlace.

Then we come to the video output stage buffering the RGB and providing a Teletext input if required. There is also page selector for stepping the preset test cards on an external push button. The RGB and sync signals feed a modern surface mount RGB to PAL encoder mounted under the PCB and not shown in the picture. We have three basic outputs Luminance and Chrominance for "S" video out and PAL output. All outputs will drive a standard 75 ohms load. Well over 80 TTL gates are programmed into the Mach device

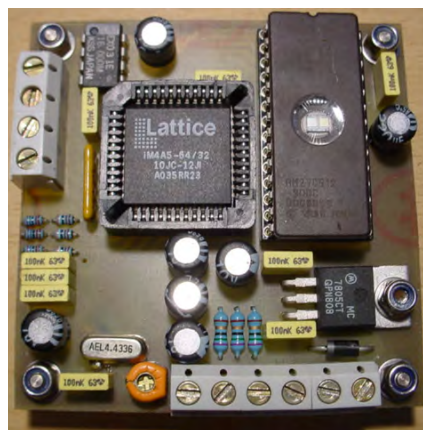


Construction uses a single side PCB available from batc shop along with the pre programmed Mach chip and the custom EPROM, containing your personal text and call sign, please supply this when placing your order. The AD724 PAL coder is also available as part of the kit this is a surface mounted chip with 0.05" pin spacing requiring a very small soldering iron bit and a great deal of patience to fit.

The end result is this very attractive test card pattern pre programmed to you own personal requirements

The BATC bare kit contains

- 44PIN SOCKET SK1
- MA45 MACH IC2 Pre-Programmed
- 27C512 IC1 Pre Programmed
- AD724 IC4 PAL Coder
- 4.433MHz XTAL XC1
- 8MHz Xtal XC2
- Pre drilled PCB



## Connections

(6 way terminal block TB2)

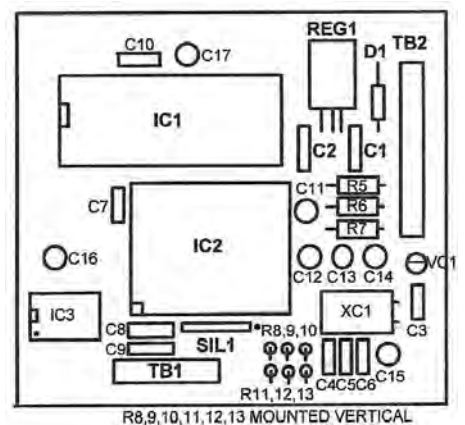
1. Video gnd/ page selector push button gnd
2. PAL video Output
3. Chrominance Output
4. Luminance Output
5. 0v supply
6. +12 volt supply

## Connections

(4 way terminal block TB1)

1. Page rest Push button
2. Page selector push button N/O
3. Teletext Gate (optional)
4. Teletext data input (optional)

- 75R RES R5,R6,R7
- 3K3 RES R8,R9,R10
- 1K RES R11,R12,R13
- 100nF CAPS C1,2,3,4,5,6,7,8,9,10
- 220uF 10V ELECT C11,12,13,14,15,16,17
- 30pF TRIMMER VC1
- 27C512 IC1
- MA45 MACH IC2
- EXO3 IC3
- AD724 IC4
- 4.433MHz XTAL XC1
- 7805 5V REG REG1
- 1N4001 DIODE D1
- 100nF CAPS 63V
- 30pF TRIMMER
- 220uF 10V ELECT



See the photo on the front cover for a typical test pattern.

## Northern Germany ATV meeting 2011

Because of the splendid weather some guests wanted to sit outside, but viewing conditions were much better in the hall of "Dahses Erbhof" in Glövzin between Hamburg and Berlin. So many ATVers watched the interesting lectures assisted by video projection. Hans, DC8UE, started with helpful information on analog and digital interfaces, and Michael, DF4HR, reported from his latest experience with the digital ATV repeater in Hamburg. Roland, DL8OBA, surprised us with home developed Micro-Controller devices for ATV usage and presented each one live in action.

For accompanied YLs there was given a nice "replacement" program by Marita, XYL of Rolf, DJ9XF. She organized a visit to the "DDR" history museum in Perleberg, many thanks! After the official lectures, part time streamed onto the web via DATV repeater DB0EUF, the OM met outside "Dahses Erbhof" under big trees for a coffee and get together. Thanks to the supporting team with Margarete at the reception and Harry, DG1SUL, and Karl, DM2BMB, at the audio, video and rf equipment. See you again at ATV meeting 2012!  
Rolf Rehm, DJ9XF



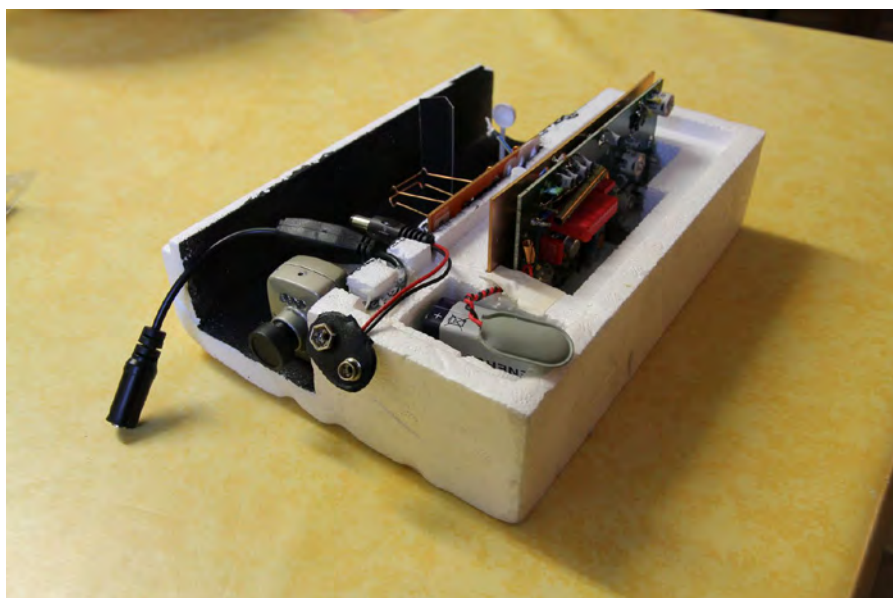
Balloon project K11

On 15th of May 2011 our second weather balloon mission started in the park of Herrnsheim Palace near Worms in southern Germany. Four weeks earlier the real preparations had begun with collecting all needed parts, and the balloon "train" showed like this (from above): balloon containing 2500 liters Helium; parachute 80 cm diameter; radar reflector 50 cm wide; 7 m dipol part for the 3,6 MHz tracking transmitter; 80 m TX styrofoam box; second 7 m dipol part; 144 MHz APRS half-wave antenna; styrofoam payload box with APRS TX, GPS RX, low-cost mobile phone and FlightCamHD; styrofoam payload box with mil. weather data TX (403 MHz), 2,4 GHz ATV TX and video camera.

On Saturday the whole equipment was loaded into two small lorries, one trailer and two private cars. At the launching area we erected two party tents for the radio equipment like several 2m/70cm TRX, APRS receiver, mil. weather data RX and the needed aerials. Two men stayed there overnight for safety reasons, and on Sunday at 10 h the whole crew from DARC section K11 and neighbouring sections were present. At first the ATV link from launching area to our section home in Worms and then to ATV repeater Hornisgrinde in the northern Black Forest was tested, and in spite of radar interference and a low accumulator replaced by mains power the wanted 10 watt rf on 23 cm got on air at 12 h.

Now the big box with all balloon train parts was opened and spread over a large blanket on the grass. We connected all batteries and tested system functions again. At last the balloon was filled with Helium gas to be able to lift the 1,7 kilogram payload. One after the other all train parts slowly went up in the air, and at 12.30 h the release permission arrived from air traffic control. After a final "ok" from the tent crew the launch got off at 12.45 h, and the wind took over balloon and 30 m payload rope. With applause from many spectators the train vanished in the clouds after about three minutes.

Launching actions were transmitted by ATV link to Hornisgrinde repeater,



but the 2,4 GHz balloon cam did not show it from above as planned. So we had to wait for the pictures from the "FlightCamHD", and the balloon drifted into south-eastern direction. APRS data was shown on an online-map on the Internet, and the weather data was received well. Temperature at ground level was +15 degr. Celsius, but after some hundred meters elevation only zero degrees. Balloon chaser teams drove on to the opposite side of Rhein river, and many receiving reports arrived in the online blog. The APRS signal was heard also outside Germany in Switzerland, Belgium, Luxemburg and the Netherlands as well as in Tschechia, France, Austria and Poland. There the ODX was reported by SR3NJE at 559 km distance. At 14.20 h the 403 MHz signal faded down, and this confirmed that the balloon had burst at 23 km altitude and -65 degr. Celsius. At 15.05 h with 610 m altitude all signals fell silent, the last position message showed up on a mountain near Schlossau in Bavaria. Chaser teams were only 15 minutes away, and soon the lucky recovery message was received over 2m FM repeater Melibokus. The "FlightCamHD" had shot several thousand pictures during flight to the delight of the whole tent crew - mission fulfilled. After two hours of rising the balloon had burst and parachuted to the ground in 45 minutes.

At 17 h the chasers were back showing the balloon train to the spectators at the launching area, and from 17.30 h all equipment was packed and brought home.

DF3WG, DN3WG, DL0WJ



New 3D-TV format "3D-Tile"

End of May 2001 a new 3D demo channel appeared on Astra 19 degr. east showing a very odd picture format called "3D-Tile" (made by "Sisvel"). All known 3D-HD channels are using "side-by-side"-3D with two stereo-3D pictures squeezing the Left and Right images (2:1 horizontally each one) in a single High Definition frame. The resulting video will not be service (backwards) compatible: legacy HD decoders will be able to decompress the video, but 2D-TV sets will display the composite picture and not, as it would be desirable, one of the two composing images (L or R) in a correct 16:9 aspect ratio.

To overcome the above problems, "3D-Tile" is using two 720p frames in a single 1080p frame: in this case, if the L and R pictures are originated in the 720p format, no decimation is needed and the reconstructed L and R pictures will preserve their original resolution and will not suffer from the unbalance of the V and H resolution. The left 3D image is shown correctly full-frame by compatible HD decoders, the right 3D image is packed besides and under this divided into three segments. A 3D-HD decoder compatible to the "Sisvel" 3D-Tile format will recombine the right image slices and feed a normal 3D display with Stereo-3D video.

[www.sisveltechnology.com/3D\\_tile\\_format.asp](http://www.sisveltechnology.com/3D_tile_format.asp)

YouTube videos with 3DVision

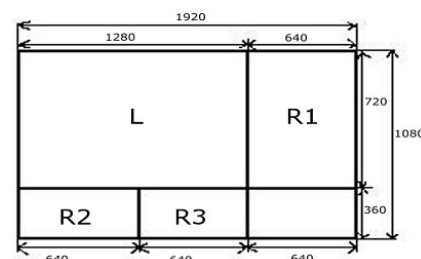
Many stereoscopic online videos at YouTube can now show up spatially

inside the Firefox web browser with Nvidia's 3DVision shutter glasses. Until lately this was only possible with anaglyph red-blue glasses or with polarized glasses and compatible monitors. 3DVision users had to download the side-by-side version (up to 1080p HD) and show on the 3D display with a 3D video player software like "Stereoscopic Player" ([www.3d.tv.at](http://www.3d.tv.at)).

The new 3D YouTube will work only with latest Firefox versions under Windows OS, a 3DVision compatible graphics adapter and latest GeForce driver versions (from 275.27), a "120 Hz 3D" compatible display (or HDMI 1.4a) and 3DVision shutter glasses. Activating the "HTML5 Stereo View" inside the YouTube browser window, a "WebM" coded version of the wanted 3D video will load, but not all stereoscopic videos are available yet.

[www.youtube.com/watch?v=2bzNBile5iw](http://www.youtube.com/watch?v=2bzNBile5iw)

A lot of home made 3D videos are also found at [www.3DVisionLive.com](http://www.3DVisionLive.com)



Tranlations by Klaus, DL4KCK  
[www.agaf.de](http://www.agaf.de)

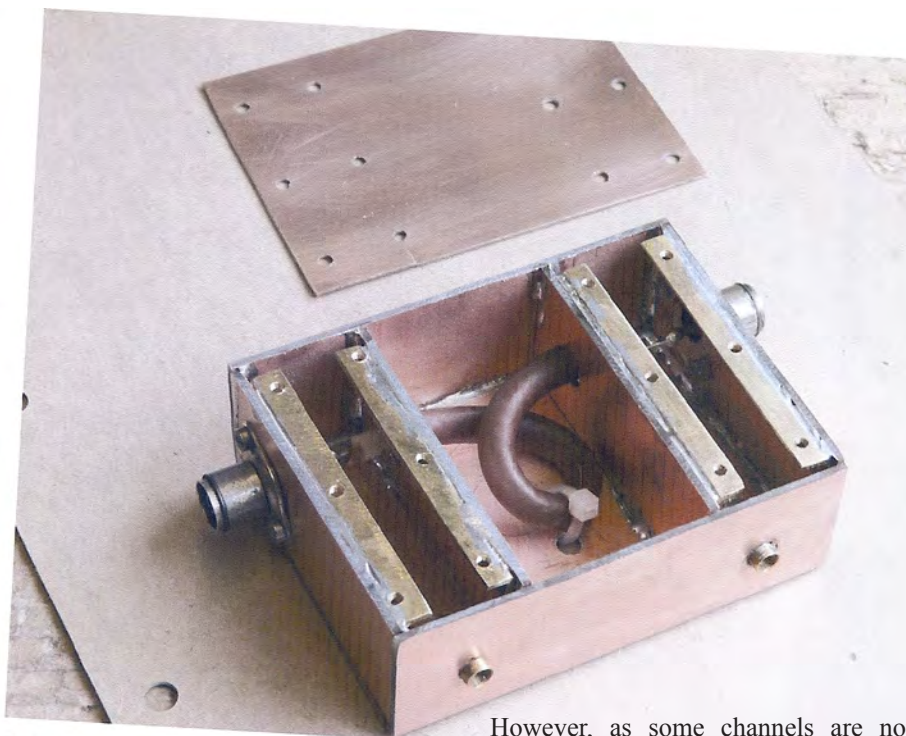
# An Old Enemy Returns

by Ian Waters G3KKD

In the early days of ATV the 1950-60's, when broadcast TV was 405 line black and white transmitted in bands I and III, our transmissions were sufficiently removed in frequency to cause no interference. However when broadcasting moved to 625 line colour transmitted in bands IV and V problems were encountered. Our AM signals intermodulated with the AM TV causing our pictures to be seen drifting through the neighbour's programme. As it was obvious who was causing it there was soon a knock at the door. A solution was found by fitting a high Q notch filter, usually a helical type, in the neighbour's feeder and tuning it until the ATV disappeared. This worked unless the neighbour had a mast head preamplifier when it was impossible to put the filter ahead of that. Later when ATV started using 625 lines and colour our bandwidth was too great to be accommodated in the 70cms band, so we moved to 23 cms and higher bands and the problem went away. Until recently there has been very little activity in the 70 cms band.

Now things have changed again. With the availability of digital compression we can use a 2M bits/s QPSK modulated signal to transmit good quality colour with sound, only requiring an occupied bandwidth of 2MHz. This has allowed the 70cm band to again be used for ATV, with it the old enemy has returned, but with a difference. The difference is now there is no interference visible on the neighbour's TV screen, the set just stops working, probably displaying an OSD weak or no signal. The neighbour may call for a service visit, but when this happens all is normal. This is not true of one's own domestic situation, her indoors knows what is happening and one is soon told to stop !

I have an ERP of about 10KW on 436 MHz. The transmitting aerial is at about similar height to the domestic Yagi and is only about 50 ft from it. Fortunately the TX aerial is behind the TV Yagi, but I doubt it has much of a front to

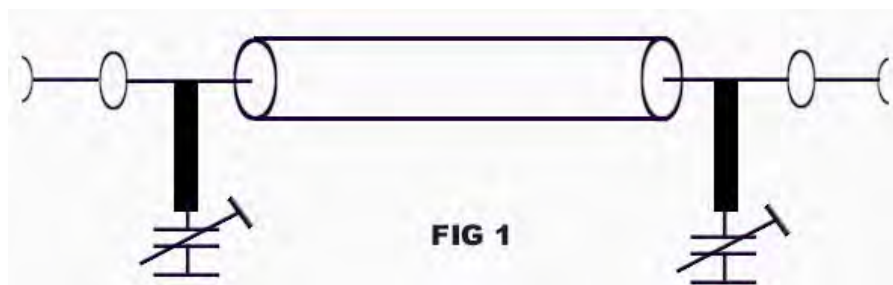


back ratio so far away from its design frequency. To get some measure of the problem, with the TX aerial pointing towards the TV aerial, I found that my QPSK was some 70dB stronger than the wanted multiplex. I also connected a power meter and found a level of about 100  $\mu$ W or -10 dBm. Needless to say the TV set did not like this.

I casually enquired how my neighbour receives their TV and was relieved to find that all but one, it had to be the nearest, used satellite. Tests showed my Freesat system to be quite immune. The nearest neighbour has a bungalow and a very low aerial. He often complained of poor Freeview and to my horror has a mast head amplifier installed. Without revealing my hidden agenda I innocently suggested he would get much better results with Freesat and he bought the idea.

However, as some channels are not available via Freesat, I thought it would be a good idea to try and cure my Freeview interference problem. My first attempt was to find one of the helical filters, used in the 60's and try that. It was found to have a Q such that the notch produced could only suppress part of the 2MHz wide QPSK spectrum. Any attempts to widen the notch resulted in inadequate rejection. It might have been possible to use a cluster of filters, but as these are quite complex to make and expensive in time and material, it did not seem a good way to go.

After sundry experiments, including making a high pass filter, which had too much insertion loss, the arrangements shown in figs 1 and " and the photo was arrived at. Two series resonant strip line circuits, of medium Q, are connected across the TV feeder. They are separated by a piece of 75 ohm TV coax a quarter

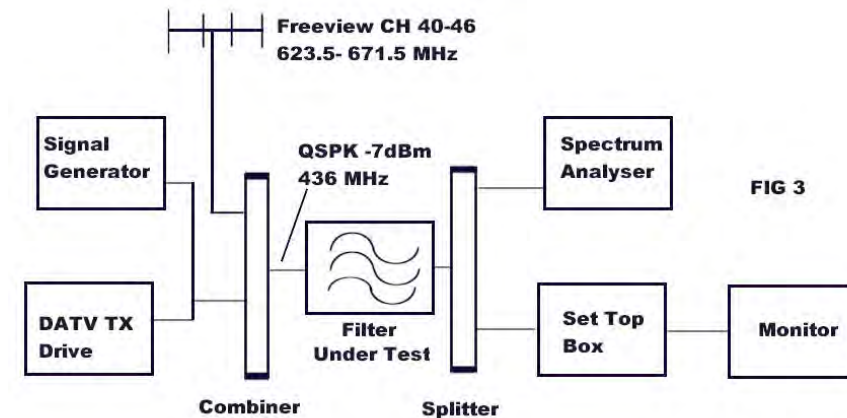




of a wave length long, allowing for the velocity factor of the cable, at 435 MHz. This coax provides isolation between the tuning of two lines. I considered using a third strip line separated by another length of coax, but it was not necessary. The assembly is contained in a three compartment box made from pieces of double sided PCB soldered together. The Q of the lines is such that the notch produced is wide enough to suppress 2 MHz wide QSPK spectrum. When optimally tuned the two lines together attenuate the 436 MHz signal by about 70dB. In fact it disappears into the noise floor of the spectrum analyser. When attempting attenuation of this order it should go without saying that good mechanical construction and attention to screening are essential.

A test set up as shown in fig 3 was used. A CW carrier from a signal generator, or a QSPK from the drive stages of my 70 cm TX, was combined with the Freeview multiplex signals from an aerial. This was then passed through the filter under test and split to feed a spectrum analyser and a STB feeding a monitor .

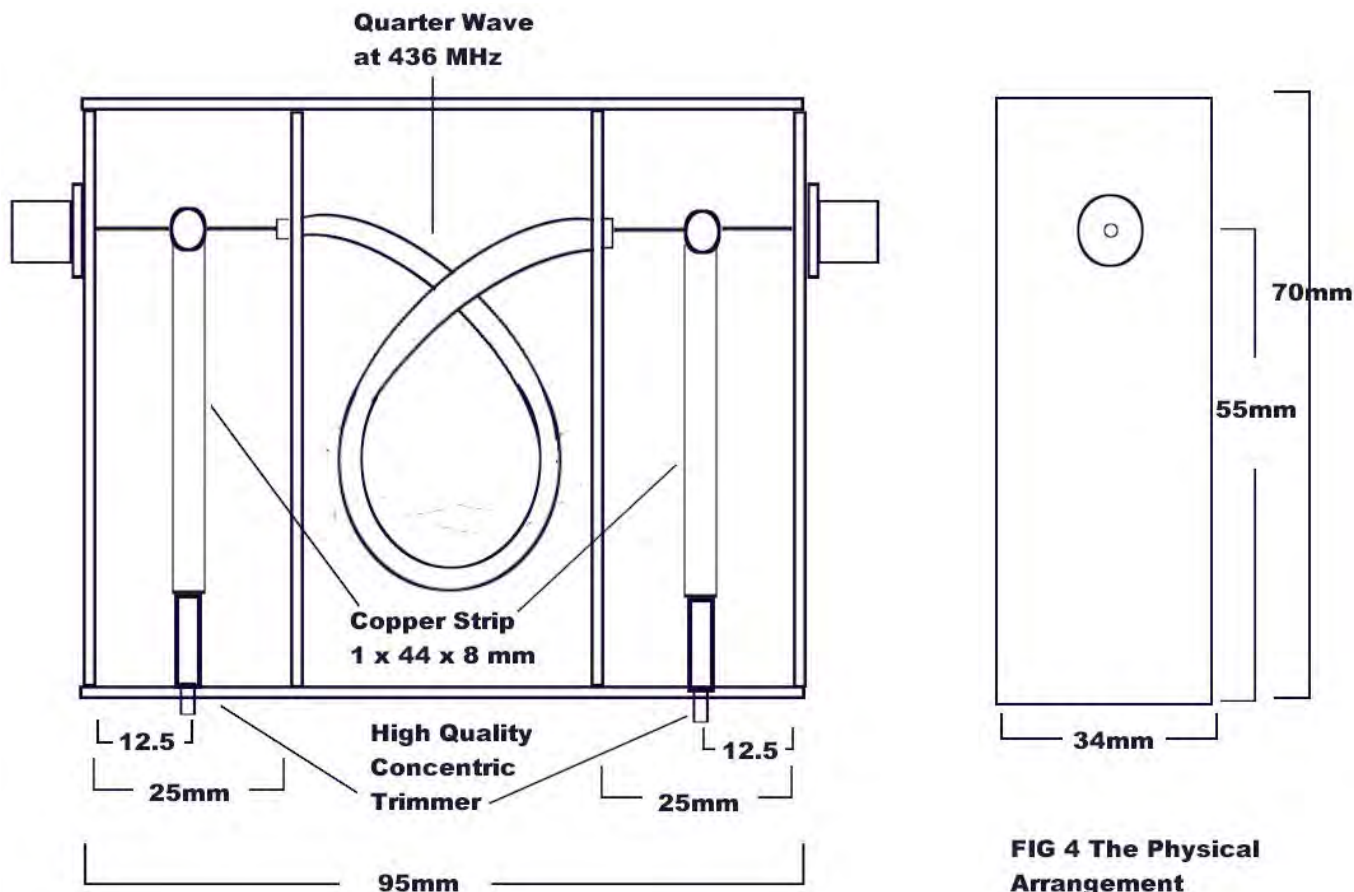
The STB used first was an old Pace On Digital DTR 730 that happened to



be available in the shack. Using the CW signal from the generator it could be demonstrated that the STB had remarkable immunity to interference. A signal at least 30dB stronger than the MPX and only 10MHz removed from it did not cause any malfunction. This is presumably how analogue TV, until switch off, can coexist in the UHF band. However when the QPSK drive was substituted a very strange effect was observed. With the filter attenuating the QPSK to be 10dB or more weaker than the MPX and 180 MHz from it, the STB instantly stopped decoding! Baffled I tried two other STB's a Humax PVR-9200T and a Philips DTR 219/05. Both of these operated normally. By

way of explanation it is known that early STB's converted the signal to an IF before demodulation. More recent STB's employ the so called zero IF (ZIF) arrangement, also known as direct conversion without using any IF and was suffering from IF break through from my 436MHz signal.

Having completed testing in the shack, I transferred the filter to the domestic receiver feeder and turned on the DATV TX at full power. I was relieved to find that the all programmes could be received without any problems.





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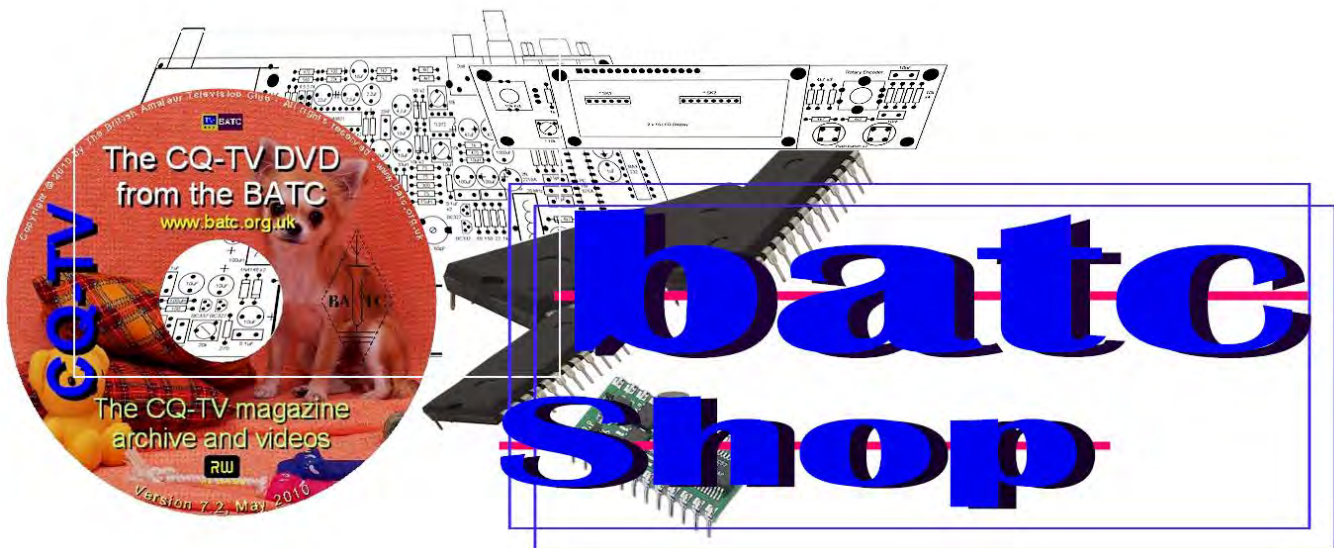
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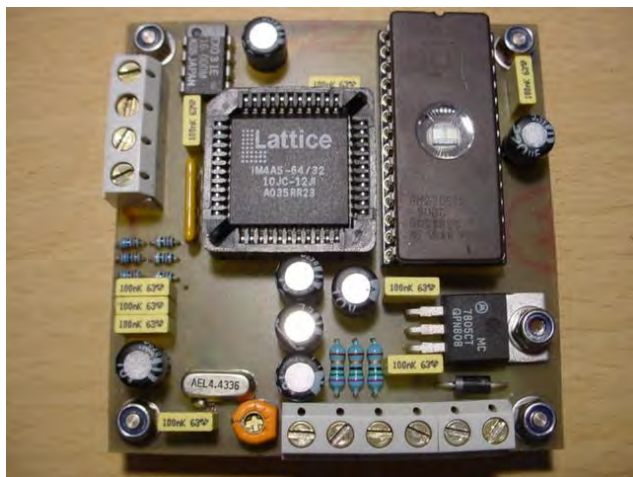
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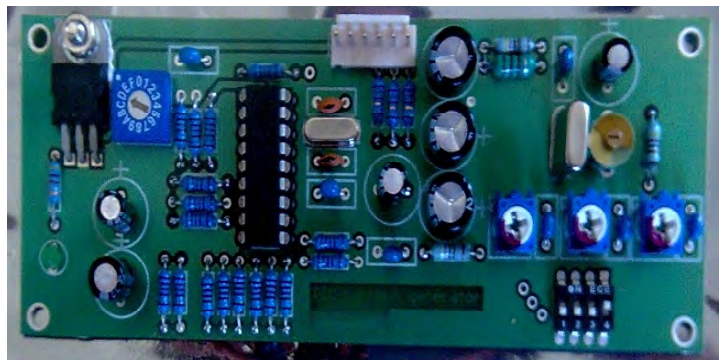
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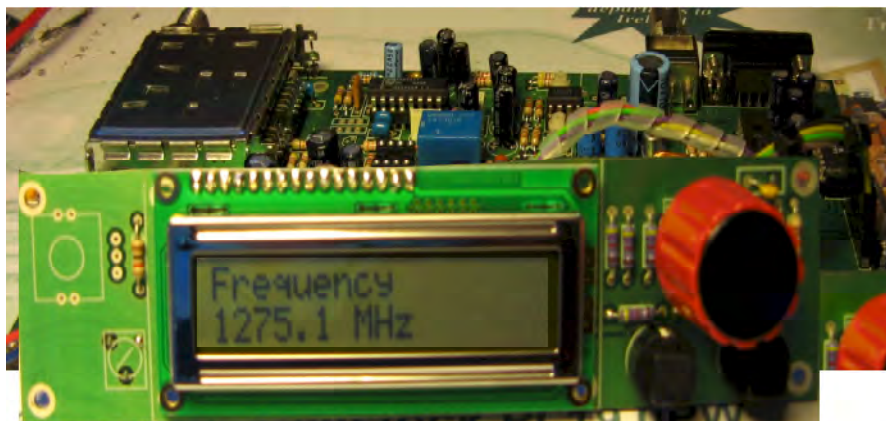


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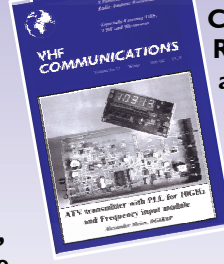
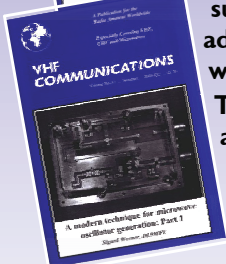
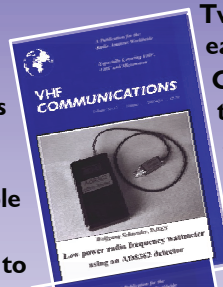
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# Turning back the pages

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

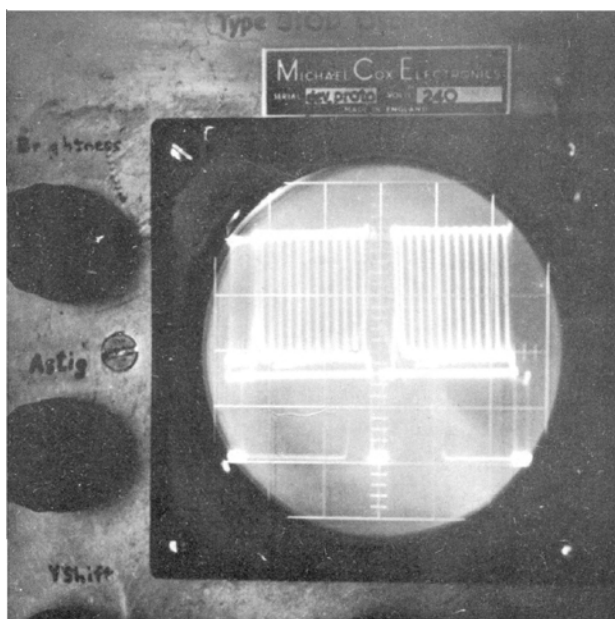
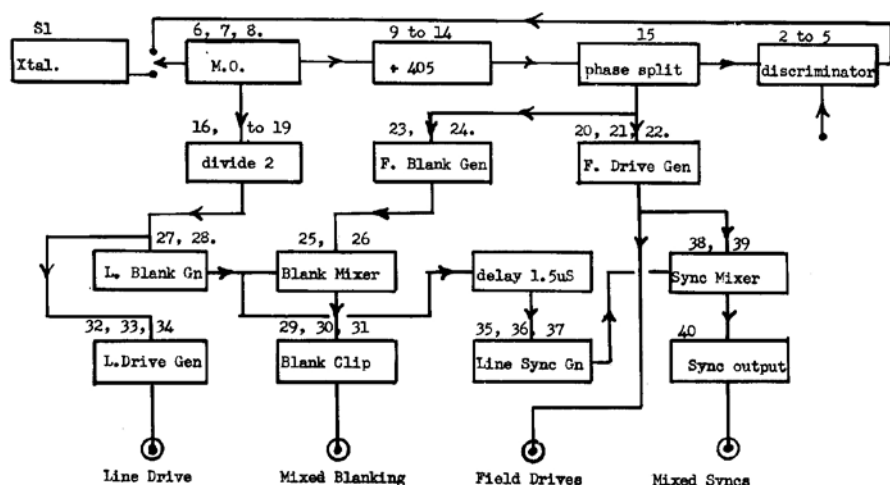
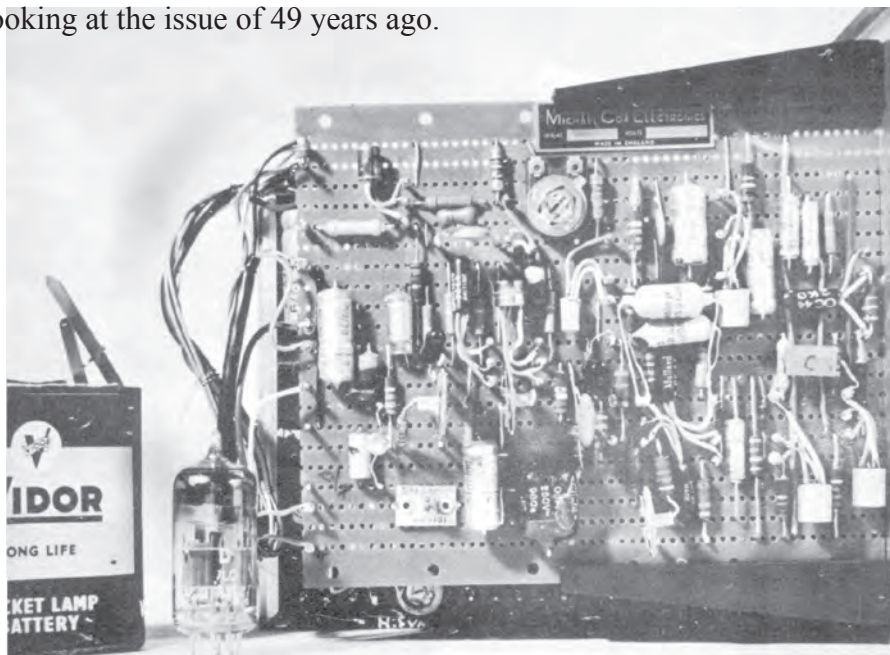
by Peter Delaney

CQTV 48 was undated, but was issued ahead of the BATC Convention held on 8th September 1962. It contained just one main article, plus the usual 'What the Other Chap is Doing' and list of new members columns. The latter would not be 'allowed' in these days of Data Protection, but was a valuable way for members to find those of a 'similar mind' at the time.

The technical article was one of the first fully transistorised projects in CQTV - a pulse and waveform generator designed by Mike Cox (yes - he was 'state of the art' that long ago as well as 'currently'!). To give readers an idea of the small size of the boards, two of the photographs included an E88CC valve and a '1289' type 4.5V battery for comparison. It was designed for the 405 line system, and generated the usual line and field drives, mixed blanking and mixed syncs, along with a sawtooth and a grating pattern (as seen on the photograph of the oscilloscope trace) test waveforms. The outputs were designed to give a 1 volt waveform across a 75 ohm load, and the pulse generator needed 150mA at 9V centre tapped (which could be provided by a pair of the 1289 batteries) as a power supply.

The method of operation of the pulse generator can be seen from the block diagram - the numbers above each box correspond to the transistor numbers on the circuit diagrams. The master oscillator could be locked to the mains supply, or to a crystal reference oscillator. The components were assembled on two 6" x 5" 'Paxolin' boards with Harwin pins, although the (then new) Veroboard was mentioned as an alternative method. Future development was planned to allow operation on 525 or 625 line systems, and to generate 2 volt pulse outputs.

The sawtooth generator was driven by mixed blanking, the integration of the waveform being done by S3 and S4 and



the .005 mF capacitor. By adding mixed sync pulses, a composite test waveform was available. It was built using Veroboard - the same piece also holding the grating generator. The latter comprised two multivibrators, one gated by line and field drives, and triggered from mixed blanking at S6's collector, so that the oscillator starts in the same phase on each line - to ensure the vertical bar pattern of about 20 bars is stationary. S10 and

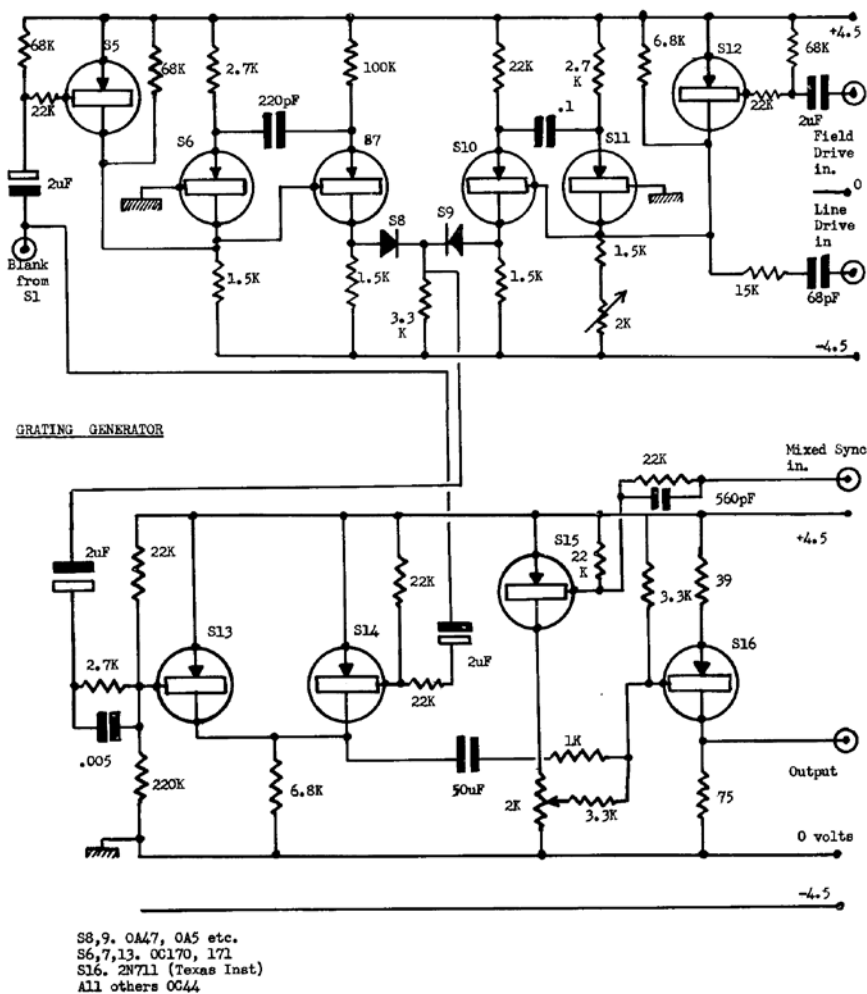
S11 generated the horizontal bars - the line drive being inserted to again make a 'locked' pattern. The vertical and horizontal bar signals were then gated together by diodes S8 and S9, before having blanking added at S14, and syncs, having been clipped at S15, are added at the emitter follower output stage S16. The complete sawtooth and grating generator needed just 15mA.

News from members came from Bangalore in India; Singapore; Queensland and Brisbane in Australia; Pittsburg, Albuquerque and New York in the USA and Winnipeg in Canada.

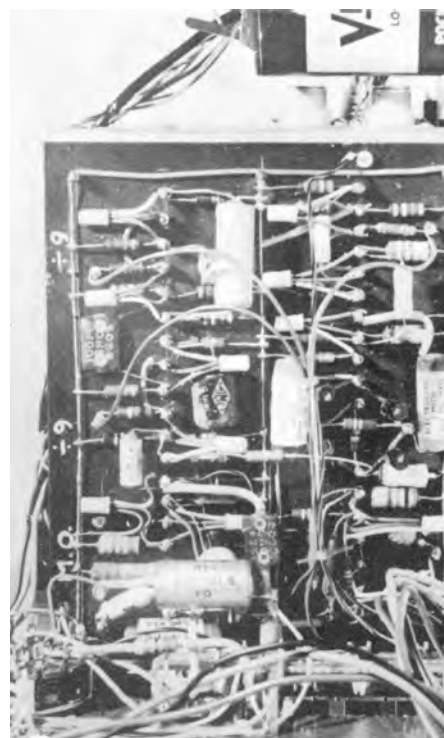
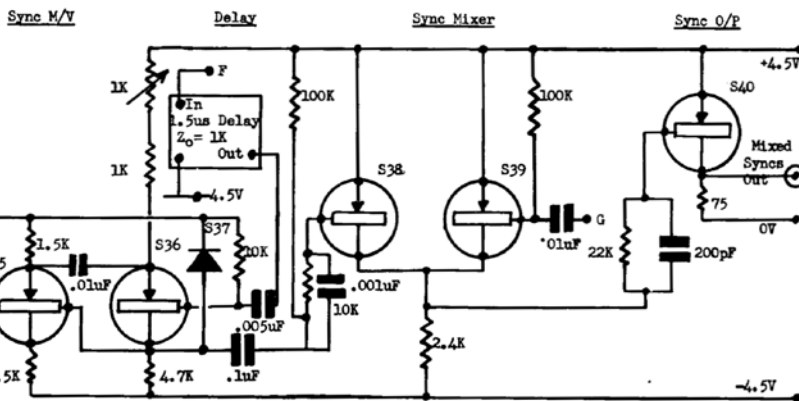
Members had been working on cameras using either vidicons or image orthicons and telecine equipment. John Lawrence had been able to demonstrate colour television, using a projection tube and a spinning colour filter disc. Several members were making flying spot scanners - most based around a 5FP7 type crt and a 931A photo-multiplier cell. Other members were busily working on the RF aspects of the hobby on 70cm. As a contrast to the 'technical article', Bob Mangold in Pittsburg had built a new sync pulse generator - this one 'only' used 22 valves - compared to the 65 valve circuit of his previous version.

A novel - for the time- development was the latest project of Warren Jacobs, in Australia. He was building a video tape recorder using 'standard width tape, scanning the tape at an angle along its length, as in the Japanese and American one head recorders'. The video head was home made - the main snag he anticipated was 'in keeping the gap width as small as possible'.

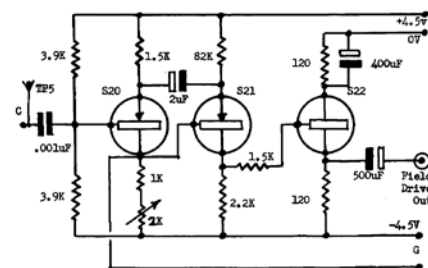
BATC members 48 years ago had to be multi-skilled - cameras, tele-cine, video recorders or transmitters simply were not available 'to buy' !!



S8,9. 0A47, 0A5 etc.  
S6,7,13. 0C170, 171  
S16. 2N711 (Texas Inst)  
All others 0C44



Timer PCB



Field drive



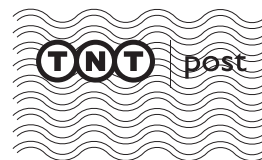


Eddie, G0EHV  
in the rain.  
See Contest News



HMS Collingwood  
open day page 15





Peter, G3PYB, on the North Yorkshire moors with a DATV link on 70 cms and 10GHz