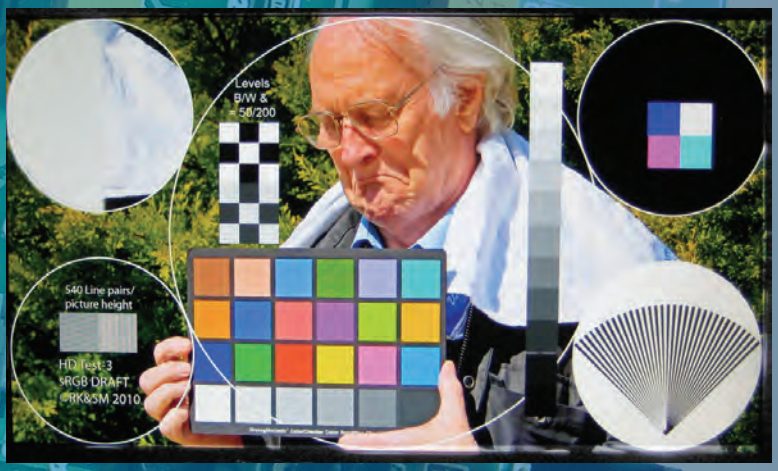
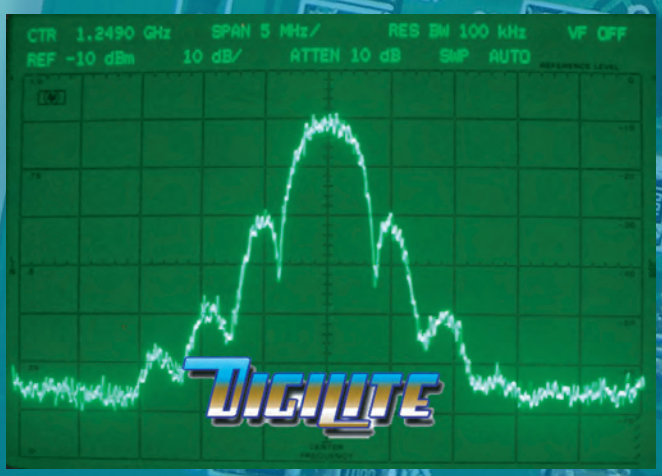
CQ-TV

Issue 235 Nov 2011





THE DIGILITE PROJECT
3D MONITOR REVIEW
A HOME FREQUENCY STANDARD
AMSAT 2011
THE WONDER OF WOONSOCKET
TONY SALE 1931-2011
TURNING BACK THE PAGES

ISSN 1466-6790

www.batc.org.uk

Caption Contest

Here are the entries for last months caption contest:

"Snakes Alive!" Brian a G3KJX

"I did tell you it was a portable station!!" Pete M6PMJ

"Although it was technically inelegant G4BID's Video speed hump did allow his crusty old monitors time to synchronize" Bill G4BID

What do you mean you've lost the live and neutral! How can you lose the live and neutral! G0MNY

"John GW3JGA's new hardwire connection to GB3TM!!" Mike G8CPF

Murphy's first attempt at a colour bar generator was not entirely successful. Terry G4GHU

"I know it's a little extensive but I am going for no line loss to the new ham shack this time" Keith N6GKB

...and the winner is Keith, N6GKB Congratulations, a caption generator will be on its way shortly.

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

CQ-TV 235

Contents

Call or TEXT us on 01400 41 42 43

Front and rear cover design by Steve Harris

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Committee Contacts

President: Peter Blakeborough G3PYB
E-mail: president@batc.org.uk

Chairman: Trevor Brown, G8CJS
Club affairs and Technical queries, especially relating to handbook projects.
14 Stairfoot Close, Adel, Leeds, LS16 8JR
E-mail: chairperson@batc.org.uk

General Secretary: Brian Summers, G8GQS
General club correspondence and business.
9 Prior Croft Close, Camberley, Surrey, GU15 1DE
Email: secretary@batc.org.uk

Hon. Treasurer: Brian Summers, G8GQS
Enquiries regarding club finances, donations and constitutional enquiries.
9 Prior Croft Close, Camberley, Surrey, GU15 1DE
Email: treasurer@batc.org.uk

Membership: Pat Hellen
Anything to do with membership, including new applications, queries about new and existing membership, non-receipt of CQ-TV, subscriptions, membership records,
The Villa, Plas Panteidal, Aberdyfi,
Gwynedd LL35 0RF
E-mail: memsec@batc.org.uk

Club Liaison: Graham Shirville, G3VZV
Anything of a political nature, co-ordination of ATV Repeater licences, etc.
Birdwood, Heath Lane, Aspley Heath,
Woburn Sands, MK17 8TN
E-mail: liaison@batc.org.uk

Contests: Dave Crump, G8GKQ
Wg Cdr D G Crump, c/o Defence Section, British Embassy Abu Dhabi, BFPO 5413, HA4 6EP, UK.
Email: contests@batc.org.uk

CQ-TV: Chris Smith, G1FEF
Anything for publication in CQ-TV magazine, except advertising (see below).
Email: editor@batc.org.uk

Shop / Members Services:
Trevor Brown, G8CJS
See above for contact details

CQ-TV Advertising: Trevor Brown, G8CJS
14 Stairfoot Close, Adel, Leeds, LS16 8JR.
Email: adman@batc.org.uk

Members ads for inclusion in CQ-TV should be sent directly to the editor, by e-mail: editor@batc.org.uk

BATC Webmaster: Ian Pawson
Anything to do with the BATC web sites
E-mail: webmaster@batc.org.uk

Publications: Paul Marshall
Handbooks, back copies of CQ-TV and anything related to the supply of BATC publications; Library queries related to the borrowing or donation of written material; Audio & Video archives.
Fern House, Church Road, Harby,
Nottinghamshire NG23 7ED
E-mail: publications@batc.org.uk

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Size	Mono	Colour
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Half page	£90	£125
Full page	£150	£200

Discounts available for multiple issues.
If you would like to advertise in CQ-TV, then please contact our advertising manager: Trevor Brown, 14 Stairfoot Close, Adel, Leeds, LS16 8JR, England.
Telephone: +44 (0) 1400 41 42 43
Email: adman@batc.org.uk

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

Welcome to CQ-TV235, the "DigiLite Special". One of the things asked for most often are construction articles that are up to date, the most often sought after contructional article is a DATV transmitter. So this should keep a few people happy!

A quick note on last months caption contest photo: Although I did get a few suggestions for the real purpose of the extremely thick cable (as well as some suggestions that I couldn't decide if they were serious or not!) no one actually figured out what it was, although Mike, G8CPF came the closest in suggesting it might be the new DC interlink betweem North Wales and Ireland. It is in fact a power feed from an offshore wind farm, so nobody wins the mystery prize this time! The mystery prize is still up for grabs though, this time I will award it to whoever sends me in the most interesting article for publication in CQ-TV236.

You may have noticed the telephone numbers on the opposite page have all changed.

We have decided to get a single number to make it easier for you to contact us. When you dial the number it will ask you who you wish to speak to and forward your call onto that person. If they are unavailable you can leave them a voicemail, so it should make communication a little easier for everyone.

You can also send a text to the new number, if you prepend your text with any of the following two letters and a space, your message will be sent to that person:

PR	President
CH	Chairman
GS	General Secretary
HT	Honoury Treasurer
MS	Membership
CL	Club Liaison
CO	Contests
ED	Editor; me!
SH	Shop / Members Services
AD	Advertising
WM	Webmaster
PB	Publications

So for example, if you sent the following text message to 01400 41 42 43:

ED Hello Chris!

I would receive the message "Hello Chris". If you don't include any recognisable prefix the message defaults to all the above people, so it's an easy way to get a message to us quickly.

We are also offering the same service to members - login to the members area of the website and there is a new option that allows you to specify your own prefix,so you too can receive text messages sent to the clubs number. That's not the only new addition to the members area; you can now view your membership details online and renew your membership and, if you pay via Paypal the renewal is instantaneous.

We are also in the process of revamping the streamer website, so watch out for changes there in the coming weeks.

I hope you enjoy CQ-TV235
73's Chris Smith - G1FEF

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

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

Chairmans Column

I am sad to announce the death of Bob Robson GW8AGI, he was not only a member of batc, but also a hardworking member of the committee, in the early days he took a great weight of my shoulders by taking over the designing of club PCB's, he introduced some very sophisticated PCB designs using CAD software, and many of us will have populated his boards to build ATV equipment and not really thought about the effort involved in creating them. He was always at our events either behind his camera, or helping out with radio mic's or as is so often the case both. Bob will be hard person to replace and will be sadly missed by us all.

The committee had an interesting discussion on batc membership fees and the contributions made to the club by cyber and paper membership, CQ-TV 232 paper cost £3.29 to print and post in the UK I.E £13.16 for four issues. So with an overall subscription charge of £15 these members contributed £1.84 to the running of the club. Cyber by comparison contributed £4 and any data costs incurred in sending out the magazine were contained within the clubs data allocation, so all the £4 went to the running of the club, well almost, as the majority of us pay on line both subscriptions are reduced by PayPal charges of 20p per transaction and a 3.4 % charge, this only tips the scales further as we have higher charges on Paper and less income.

We had a long heated debate that each class of membership should contribute evenly to the running of the club. A proposal to set a fixed administration cost paid by all and that this cost included a cyber copy of CQ-TV and an additional cost for those requiring paper copies based on the actual cost. The committee were split on this and agreed on a compromise, to remove discounts on multiyear purchases of paper magazines, increase the cost of paper magazines subscription to £16 PA in the UK, and to revisit overseas postal rates, but to include a free cyber magazine to all these members, and to introduce a discount for 3 years cyber membership. This does not balance the books but goes somewhere to addressing the uneven contributions. I am sure we will revisit the situation in the coming year particularly as the majority of our members now receive the magazine via the internet.

The sponsorship of the batc streaming site www.batc.tv has also been revisited, some of the expired sponsorships have been removed and space made available for mini non corporate sponsors at a reduced rate. We are all conscious of the running costs of this site and that not every member uses it, which is why we introduced corporate sponsorship for the site from its very inception.

The batc re launched On- line shop has been going from strength to strength providing a valuable support to constructors and also delivering a small surplus to batc funds. The products range needs expanding, but it has proved difficult to locate designs to expand with. The FMATV receiver was a huge success, but problems with the supply of front end modules in small quantities has proved a limiting factor and is why we have withdrawn it from sale.

The electronic test card sales have been popular, but again some of the components are difficult to source so that might be our next casualty. The PIC colour bar generators sales have been steady and all the component parts are available for this modern design.

DigiLite sales have just gone through the roof with almost 100 orders being processed, we are on our third PCB run and the supporting article has not yet appeared in CQ-TV although we are putting that right with this issue.

I think the DigiLite success shows the future for ATV is bright and that the future is digital, all of us that grew up with analogue ATV will find this hard, there was something about seeing a picture come out of the snow as beams are rotated, but we have to grasp the nettle, digital is spectrum friendly and the space that was once available for ATV is no longer there. If the mode is to survive it must be spectrum friendly by occupying minimum spectrum space. I hope that this means we can continue using 70 cms for ATV or should I say DATV and that we can come up with a plan for 23cms DATV repeaters that will enable the necessary NOV's to start flowing again.

Can I also remind all members that next year is a BGM year, no date or venue has been selected but we are on the lookout, any thoughts or ideas would, I am sure, be welcome.

Trevor Bown G8CJS

Make a note of the new batc number:

01400 41 42 43

You can also send us a text message on the number see the Editors Preamble for full details

Treasurers Report for 2010

The club has made a modest Loss in 2010, mostly due to the fall in interest rates and the equipment purchased during the year. But the club remains in a financially strong position.

Publications and Members Services

The sale of DVDs to our members produced a surplus of £55.00. The DVD incorporates much of the written archives of the BATC, including back issues of CQ-TV and the "Television and Lighting" book. A new printer for the DVD labels was purchased. Paper back issues of CQ-TV are still available.

batc.tv

This most successful service is funded by sponsorship and donations, when you visit the streamer do click on the sponsor's links, their sites are well worth exploring and their support is appreciated. The club has funded some of the peripheral equipment associated with the streaming of events to make up a portable "kit".

PayPal

The PayPal payment system continues to work well. This payment system is available to all, you do not need a PayPal account to use it, and it works with credit/debit cards just fine. If you are in the UK a cheque in the post is very acceptable and avoids the commission charges levied by PayPal. There are a number of other possible payment methods, and if you have problems please contact me, Brian Summers the Hon. Treasurer.

Investment accounts

The BATC has a number of accounts were our reserves are kept. In the current economic climate the interest paid by these accounts has fallen to a very low level. I have closed one deposit account held with HBOS. Our accounts have to be of the "treasurer type" and have never paid much interest and the bulk of our reserves are spread between three different building societies.

Brian Summers Hon. Treasurer
October 2011

BATC BALANCE SHEET AT 31 DECEMBER 2010

Fixed Assets	2009	2010
Equipment purchases	200.00	865.81
Less depreciation	-200.00	-865.81
Current Assets		
Stock, members services & publications	399.54	399.54
Building societies	18,213.62	56,305.80
Bank deposit, HBOS	33,402.54	0.00
Current account HBOS	4,947.94	5,052.44
Current account A&L	3,542.85	1,426.35
PayPal account	4,717.45	457.50
Less Current liabilities		
Subscriptions received in advance	8,375.93	7,035.29
	£56,848.01	£56,606.34
Represented by Accumulated fund		
Balance brought forward	55,932.15	56,848.01
Surplus	915.86	211.67
Balance carried forward	**£56,848.01**	**£56,636.34**

BATC INCOME & EXPENDITURE ACCOUNT YEAR ENDING DECEMBER 2010

Income account	2009	2010
Subscriptions	8,756.13	7,589.00
Postage, airmail	166.50	84.00
Members serv. Surplus	-6.75	0.00
Publications Surplus	117.59	55.49
Donations received	0.00	40.00
Interest received	910.50	195.77
Miscellaneous Items	202.00	3.00
	£10,145.97	**£7,967.26**

Expend account	2009	2010
CQ-TV Printing	4,278.24	4,262.75
CQ-TV Postage	1,894.24	1,646.01
CQ-TV Production	0.00	0.00
Web & internet	0.00	833.94
Conventions & BGM	2,164.34	745.00
Committee expenses	0.00	0.00
Benefits & Projects	224.99	0.00
Legal & RSGB aff.fee	44.00	48.00
Office expenses	207.59	48.58
Bank & Paypal fees	416.71	454.81
	£9,230.11	**£8,039.09**

The Digilite Project - Part 1

by Dave Kenward G8AJN

Background:
Why should we care about digital ATV? What's wrong with analogue tv ? Actually, not much really. I have to admit to a personal preference for a good analogue signal over a low resolution up-scaled digital signal. Perhaps non-HD digital is clean rather than clear, however on a fair comparison the digital signal is vastly more efficient on bandwidth and power. If looking for dx tv, an analogue signal is simpler to find than a digital signal, whilst ploughing through the noise at least as well, digital has numerous different formats that might prevent you decoding the data. But the reality is that we are being squeezed into ever shrinking band spacing. So whilst the analogue has served us well, it does use a large chunk of bandwidth that looks profligate in comparison to a 6MHz digital carrier.

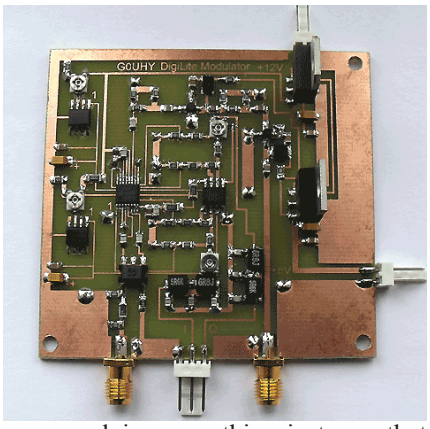
At the Bournemouth Amateur Tv Group we have been attempting to get permission for a 23cm atv repeater GB3SQ for four years and took the radical decision to change the application to digital only. So what does this mean for the local repeater users? We are in a location that doesn't receive the Isle of Wight atv repeater GB3IV very well, but a signal aimed that way will often get in. This means that we had to choose an input channel very carefully to avoid accidentally opening up the GB3IV input. By using digital-only input it will be possible to co-exist. Currently the Bournemouth repeater is on test and will accept analogue or digital inputs until all the locals have converted to digital transmitters.

When we heard of the system that Brian G4EWJ had been working on with others helping with the prototypes and beta testing we asked if it would be ok if we built some digital encoders using his software and serialiser design. Visit M0DTS website (ref 1) to read about the early development history. The first few locally built boards were made and tested by Colin G4KLB and were very impressive, comparing extremely well with the SR Systems boards and the older NDS 3000 tower systems, even at 4Ms/s. Where previously Colin has required about 40W input analogue signal to get a good P5 into the repeater he was getting an unbroken signal in using 5 W. The boards were based on G4EWJ serialiser board and Malcolm G0UHYs design modulator panel (photo right).

The BATG members decided that this was the way forward and that is when I realised what an important development Brian had achieved and was determined that it should be made available for everyone to build.

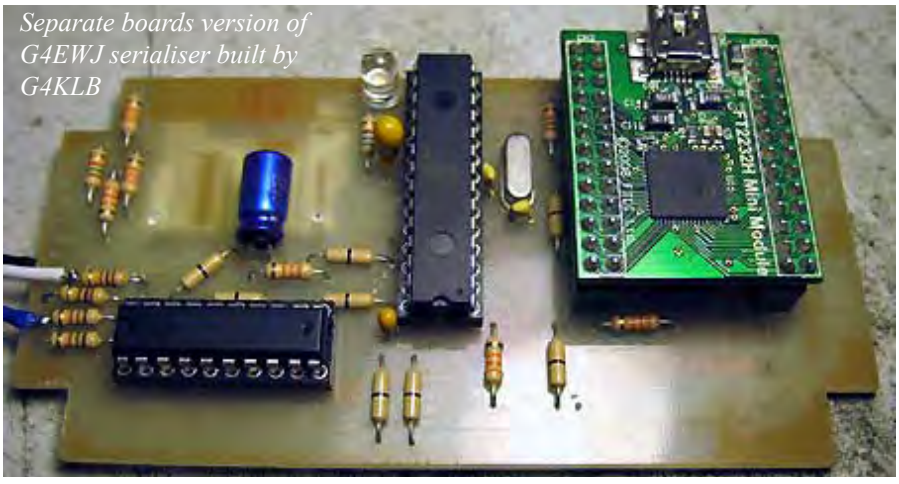
He generously agreed to make the software available as freeware and after some consideration the project was renamed DigiLite. My website was selected to host the initial information and to allow contributions to be collected together to make access simpler. The difficulty with websites is that not only are they easy to setup they have a nasty habit of evaporating equally quickly. A decision was made to transfer all this information to the printed form for posterity.

The original project used separate serialiser and modulator boards. My contribution to the information contained in these notes has been to produce a single pcb with all the components for the serialiser and modulator. I claim no technical acumen, I am simply your guide to the system as it exists today. I aim to explain why



you are doing something in terms that an analogue ATV-er can understand. There is nothing to fear in digital ATV and with this system you really do not have to become a 'nerd' to get started with digital ATV so do take the time to read through this article as it contains important documentation that the designer of the system has provided. The thrill of seeing your own homebuilt transmitter sending digital signals is as real as it was when you first marvelled at getting an analogue colour tv signal on-air.

DigiLite:
Every once in a while Amateur tv takes a step forward. From 405 to 625, from mono to colour and now we can move on to the next step, analogue to digital. Up to now anyone wanting to try to transmit digital has probably been discouraged by the cost. The SR Systems boards do an excellent job but are expensive and a home-brew version has been looked for by those wishing to keep the outlay to a reasonable level.



Separate boards version of G4EWJ serialiser built by G4KLB

Much of the original development work has come from a group of French amateurs including F4DAY. Whilst the name Poor Mans DATV(ref 2) seemed somewhat demeaning it did set Brian thinking about a solution to the real-time encoding problem.

Probably the biggest problem was the MPEG encoding, or more precisely real-time MPEG encoding. There is already software around that will encode the image into mpeg2 but it will tend to run on a file, convert it , then save it basis. This would create too much of a delay so for our purposes the encoding is done in hardware. The cheapest and easiest way out of this is to utilise the Connexant chip on the old WINTV PVR cards. These cards send a digital stream to the hard drive for use as a Personal Video Recorder. While the recording is in progress another program DigiLite Transmit is reading it immediately it is written on the HDD and sending it to the serialiser for further processing.
The original software was Linux freeware that had been adapted and required a number of different programs running to get the desired mpeg2 data stream which needed to be broken into and then changes like error correction etc. inserted and then re-assembled. By moving the software from Linux to Windows it has enabled a more user-friendly single program to be developed.
In future editions I will take you through the building and setup of the hardware and the installation and setup of the software with a single commercially produced printed circuit board (100mm x 70mm) available with lots of assistance in making the project. Much of this work has been achieved by Brian G4EWJ. Here is his brief guide to the system:

DigiLite System Outline
DigiLite is a system designed by radio amateurs to provide a lower cost method of transmitting live digital TV pictures (DATV). It is a derivative of the "Poor Man's DATV System" which many amateurs have contributed to over several years.

The system has 6 main parts:

• A Windows PC with a video capture card that uses an MPEG-2 compression chip.

• A recording program on the PC to save the data from the capture card onto hard disk.

• A program running on the PC to read the recorded data from hard disk, convert it to a form suitable for transmission and send it to a serialiser.
• A serialiser, which is a device that connects between a PC USB port and a modulator.

• A QPSK modulator.

• A program to configure the transmission parameters.

Windows PC:
If an older PC is available, which can be dedicated to DigiLite, this is ideal. A single core 1.8GHz processor with USB2.0 should be sufficient on a 'quiet' system.

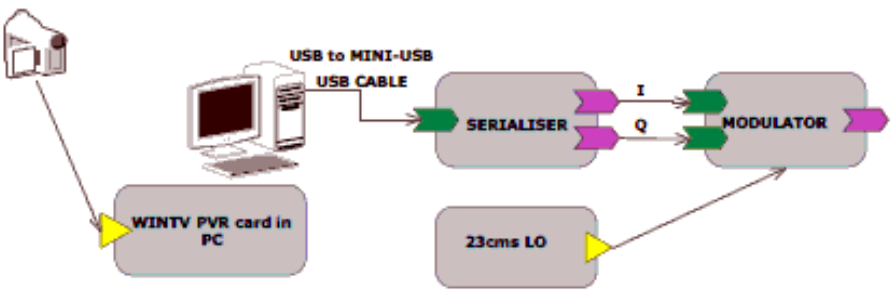
On a non-dedicated PC, if Windows gets busy doing other things, the conversion program may not get all the processing time it needs and that can cause an occasional glitch in transmission. The more powerful the PC, the less chance there is of this happening. DigiLite has been designed to use the Hauppauge PVRx50 PCI video capture cards. There is also a Hauppauge PVR USB2 external device that can be used with laptops. Other cards are being evaluated.

Recording program:
GBPVR is a free PVR (personal video recorder) program. Version 1.4.7 has been used the most, but it has been superseded by NextPVR, which is still being evaluated. GBPVR requires a certain standard of video graphics card to run, even if you do not actually want to watch the video on that PC. Older graphics cards may have problems. There are other more 'techy' ways of recording without using GBPVR in this case. Developments are continuing, to remove the need for a recording program and to interface with the PVR card directly.

Conversion program:
DigiLite Transmit is the program that reads the recorded data from hard disk immediately it has been written. The data is in Program Stream format, which is very similar to the format used on DVDs. The video and audio are extracted and converted into DVB-S transport stream format, which is the format used by European broadcasters to deliver standard definition programs via satellite. This means that a cheap FTA (free to air) satellite box may be used to receive the transmission.
Other data is placed in the transport stream such as date and time, channel name, program name and EPG info. The transport stream data is sent to the serialiser via a USB port.

Serialiser:
This is the device that connects to a high speed (480Mbps) USB 2.0 port and accepts the transport stream data from the PC. Two bits at a time (a symbol) are sent to the modulator at the symbol rate. The serialiser may optionally apply the FEC (aka Viterbi) forward error correction processing to the transport stream data, or this can be done on the PC. Doing the FEC on the serialiser reduces the data rate over the USB connection.

The serialiser has a second communication channel which is used to receive control information from DigiLite Transmit to set the required symbol rate and FEC. The serialiser can also be put into one of several test modes, to help set up the modulator. The serialiser has been used successfully at symbol rates between 125k and 6250k. Several symbol rates are preprogrammed into the system. Other symbol rates are possible, subject to the limits of the



multipliers and dividers in the serialiser CPU phase locked loop. The serialiser has an SD card socket for playing pre-recorded transport stream files. This function is still in development and is not available in the initial release. The serialiser CPU chip will need to be re-programmed to add new functions such as this.

Modulator:
QPSK stands for Quadrature Phase Shift Keying. The carrier can be in one of four states with each state defining two bits. The modulator must be provided with a signal source at the required transmission frequency. It filters the two digital signals (I and Q) from the serialiser and produces an output at the transmission frequency which can then be amplified and transmitted. The type of filtering used is known as 'Nyquist'.

Configuration:
DigiLite Config is the program that is used to set the symbol rate and FEC and also the channel name and program details. Settings are stored in the Windows registry, which DigiLite Transmit monitors continually to look for any changes in transmission parameters.

DigiLite Transmit User Guide

DigiLite Transmit is the program that reads the captured video from the PC hard disk in program stream format, converts it to transport stream format and sends it to the serialiser via a USB port.
It reads the transmission parameters stored by DigiLite Config in the Windows registry and displays these. It can detect a change in parameters and then usually needs to restart itself.

Finding a Captured Video File
DigiLite Transmit looks in three places for a growing .MPG file:

1. The folder that DigiLite Transmit resides in;

2. The folder where WinTV recordings are stored;

3. The folder where GBPVR recordings are stored.

WinTV and GBPVR are PVR (personal video recorder) programs.

DigiLite Transmit can determine the recording folder for both of these programs automatically, even if the folder is changed in their configurations. If another PVR program is being used, it should be configured to store recordings in the folder where DigiLite Transmit resides.

Status Messages

'Waiting for an active recording file'

DigiLite Transmit cannot find a growing .MPG file in the three places where it may look.

'Cannot open COMxx for DATA / CONTROL'

DigiLite Transmit cannot open the COM port. Check that the USB module is correctly configured and that the COM ports are set correctly in DigiLite Config.

User Control
Hit ESC to stop DigiLite Transmit.
Hit R to restart DigiLite Transmit.
Hit SPACE to reset the PCR Lag and Serialiser figures.

Normal Operation
When DigiLite Transmit finds a growing .MPG file, it opens the COM ports to the serialiser and starts normal operation. You should see the counters incrementing on the status line.

Input File
'Length' shows the size of the .MPG file which is being recorded. This should increase steadily.

'Avail' shows the amount of data at the end of the file which has yet to be processed by DigiLite Transmit. This should be around 100k or less, depending on symbol rate. If greater, try hitting R to restart and see if it improves. If 'Avail' keeps increasing, then the video bit rate set in the recording program is probably too high.

PCR Lag
The PCR is the clock which is embedded in the transport stream data. Each frame of video has a time at which it should be displayed, relative to the PCR. The lag figures show the instantaneous and Min / Max values of the relative difference and these vary with the amount of data that each frame contains.
The initial value is set by 'TS Delay' in DigiLite Config. Negative numbers mean that some data arrived at the receiver after the time at which it should have been displayed. This may cause a video glitch. This may happen occasionally, but if it happens continually, then the video bit rate in the recording program may be too high. If the 'Now' figure reaches one second, then DigiLite Transmit will restart itself. The figures may be reset by hitting SPACE.

Packets Out
'Total' is the running count of 204 byte packets sent to the serialiser. Multiply 'Total' by 204 and divide by the FEC to determine the total number of bytes transmitted.

'Pad' is the number of empty padding packets transmitted. The video bit rate is set to give 95% of the transport stream data and padding packets are inserted to maintain timing in the transport stream as the amount of data per frame goes up and down.

'Pad%' is the percentage of packets which are padding. 5% is the target. Anything lower and there is not enough leeway to cope with the varying data rate in the recorded file. Higher values are not a problem, but mean that some transmission bandwidth is being wasted. Low values may mean that the video bit rate in the recording program is too high.

Serialiser
The serialiser communicates back to DigiLite Transmit through the control port. The figures may be reset by hitting SPACE.

Boot
This the number of times that the serialiser has reported a reboot. This should never happen. If it does, it may be that the serialiser CPU is being over-clocked and cannot cope. Select 'FEC on PC' in DigiLite Config and see if it stops happening.

Re-sync
There must be no gaps in the transport stream, so if the serialiser runs out of data because of a pause in the data coming in from the USB port, the serialiser reports this back to DigiLite Transmit. This can happen occasionally if Windows gets very busy.
DigiLite Transmit restarts itself and the serialiser waits for its buffer to fill up again. This will cause a video glitch.

DigiLite Config User Guide

DigiLite Config is the program that sets the parameters for the transmission. It communicates through the Windows registry with DigiLite Transmit. Hovering over many fields will display some information.

First Run
The first time Config is run, there will be no settings stored, so default settings are shown. These settings are compatible with existing "Poor Man's DATV" serialisers that use a chip to apply the FEC 1/2.

For PMDATV serialisers, select the com port number for the FT245 USB chip from CONTROL Com Port and leave the DATA Com Port as NONE.

Communications
When the FT2232H USB module on the serialiser has been configured, it appears as two COM ports. The system will have assigned numbers to these and these numbers will stay the same whichever USB port is used on the PC.

To find which numbers have been assigned:

• Plug the serialiser into a USB port

• Start Windows Control Panel – accessible from the Start button, bottom left of the screen

• Select SYSTEM
• Select HARDWARE
• Select DEVICE MANAGER
• Click on the plus sign next to PORTS

There should be two ports described as "USB Serial Port". Make a note of them and close Control Panel and all its other windows.

If you are not sure which they are, unplug the serialiser from the USB port and they should disappear from the list.

• Click on the DATA COM Port box and select the number of the first port just noted.

• Click on the CONTROL Com Port box and select the number of the second port.

MPEG Input

Capture Device
Config calculates the bit rate which has to be set in the recording program. It is very important that the recording bit rate is set correctly or the system may not work properly. This bit rate varies with symbol rate and FEC. The HVR range of Hauppage captures cards, which are still being evaluated, need a slightly different calculation.

• Select the type of capture device in use: PVR or HVR

Input Method
Other ways of reading from the capture card are under development. For the moment leave this as Disk.

• Select Disk as the Input Method

Transport Stream
The transport stream is the name given to the data that is sent to the modulator. A symbol is 2 bits and the symbol rate is the number of symbols (in thousands) which are sent to the modulator every second.

Symbol Rate
• Select the required symbol rate from the list
Note that the Video bit rate field changes.
FEC
The Forward Error Correction, also known as Viterbi, adds extra bits to the transport stream to enable errors to be corrected at the receiver.

The higher the value of the fraction, the less error correction is added, allowing more video and audio data to be transmitted at any given symbol rate.

FEC 1/2 adds the most error correction.
• Select the required FEC rate from the list

Note that the Video bit rate field changes if the FEC changes.

FEC on PC / Serialiser
The FEC may be applied on the PC or on the serialiser. The advantage of applying the FEC on the serialiser is that it reduces the amount of data passing over the USB connection.

The saving reduces at the FEC fraction increases and there is not a lot of advantage selecting FEC on serialiser above 3/4.

At some symbol rates, the serialiser does have enough time to do the FEC and Config shows a warning message.

At some symbol rate and FEC combinations, the serialiser CPU is being over-clocked above its specification. Select FEC on PC if any problems are encountered.

• Select the required setting

TS Delay
There is a clock built into the transport stream (the PCR) and each frame of video contains the time at which it should be displayed, relative to this clock.

Frames naturally have to arrive at the receiver before their display time and the TS delay is the time at which the very first frame transmitted will arrive at the receiver before its display time.

In a 50Hz system, a frame is displayed every 40ms. If the data for every frame of data took exactly 40ms to transmit, then every frame would arrive at the receiver 200ms before its display time. The amount of data for each frame varies a great deal and although the output from the capture device is reasonably constant over long periods, it is not constant for short periods.

If the data for series of frames is taking longer than 40ms each to transmit, then they will arrive at the receiver closer to their display time. The TS Delay is a margin against frames arriving after their display time.

The TS Delay adds to the overall delay through the system. For 'quiet' talking-head shack shots, it may be possible to reduce it. For 'busy' shots, it may be necessary to increase it. There is scope for experimentation.

• Select the required TS Delay setting (0-500ms)

Buffer Delay
This sets the size of the USB output buffer on the PC.

The larger the value, the less chance of a transmission glitch if Windows gets busy. The smaller the value, the smaller the overall delay through the system.

• Select the required Buffer Delay setting (10-500ms)

Test Mode
• No Mod outputs suppressed carrier only at the nominal transmission frequency (NTF).

• LSB outputs a single carrier spaced symbol rate / 4 below the NTF.

• USB outputs a single carrier spaced symbol rate / 4 above the NTF.

• In Phase outputs two carriers spaced symbol rate / 2 above and below the NTF.

DigiLite Transmit must be running for test mode operation.

Channel Info

PIDs
The transport stream consists of a series of packets. Each packet has a packet id (PID).
Each component of a transport stream such as video, audio and program info is assigned a PID so that the receiver can extract just the parts it needs.

Generally these need not be changed from the defaults, but some receiving systems may require specific PIDs to be entered.

Some receivers will display a program even if the PIDs are changed after the program has been scanned into the receiver. Other receivers will not.

• Enter the required PID values (32-8190) without duplication

Channel Name

E.g. BBC1

The receiver may not register a change of channel name after the channel has been scanned.

Programme Name

E.g. Wimbledon Highlights

EPG Info

This appears when the Info or EPG buttons are pressed. E.g. Latest news from the courts.

Saving Settings

Click the SAVE button when it is red, to save the settings.

DigiLite Transmit will need to restart when most settings are changed and this will cause a glitch in transmission.

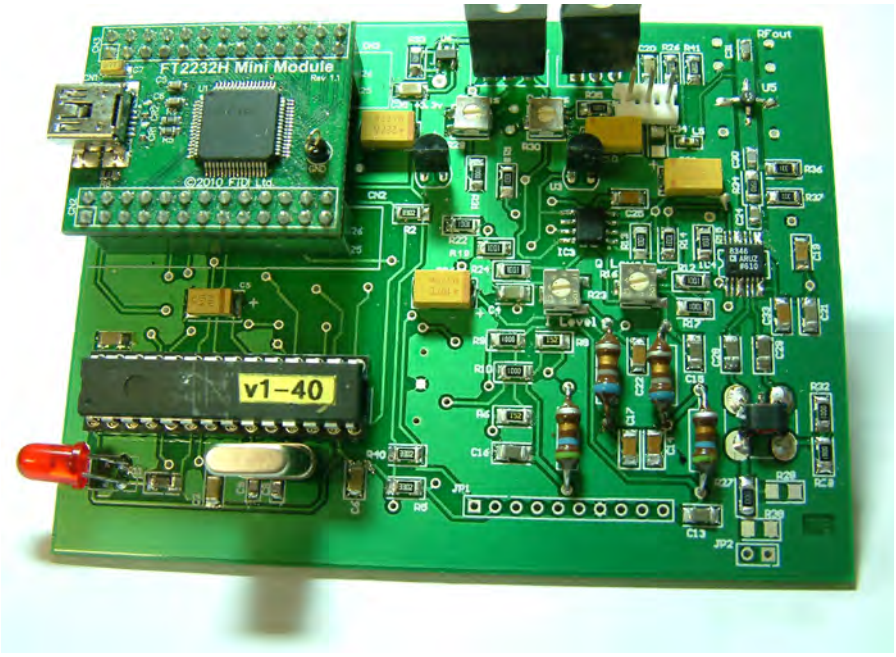
Windows Registry

For anyone interested search for DigiLite1

DigiLite Serialiser User Guide

The DigiLite Serialiser (see photo below) is the device that receives the transport stream data from a PC USB port and converts it into two bit streams (I and Q) for the modulator. Status indications and commands are transferred to / from the PC on a second channel. Do not insert the 28 pin dsPIC chip until the USB module has been configured.

Power Supply
Whilst the serialiser section of the card uses 3v taken from the USB 5v supply by the FT2232H sub-panel the modulator section requires 5v taken in turn from the 8v regulator that can be driven from 12v. Some sort of heatsink is advisable for these 78 series regulators.



LED Indications

Steady on / off at 1Hz
Normal operation
data is being received.

2 flashes every 2 seconds
Waiting for data
from the USB port.

3 flashes every 2 seconds
An invalid symbol rate
or FEC has been received.
Operation continues at
the previous settings.

6 flashes every 2 seconds
Test mode active.

10 Pin Header

This is optional. It is intended to allow in-circuit programming of the dsPIC333 or the connection of an SD card reader which is planned for the future for generating a recorded signal where no pc is available.

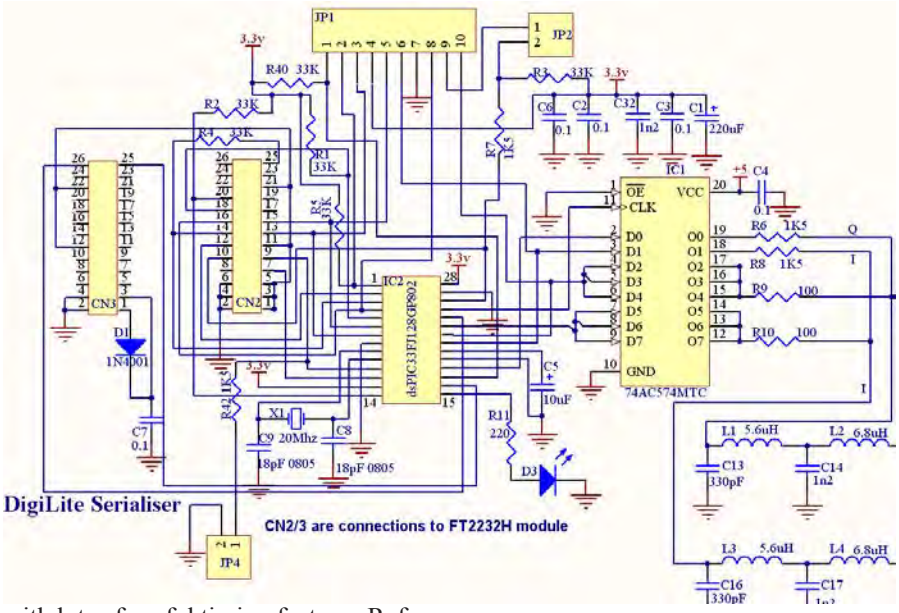
Brian Jordan G4EWJ

Description of the circuit diagram.

The serial data that is generated by the DigiLite Transmit program is taken from the USB2 socket on your pc and is connected via the Mini-USB socket on the FT2232H sub-panel at the edge of the serialiser board.It is mounted on two twin 13 pin sockets (headers)CN2/ CN3. This allows replacing of the USB sub-panel in the event of a fault or an upgrade.

The software and drivers for the FT2232H can be downloaded from the manufacturers website. Run the install program from the pc with the USB lead connected. Do not plug the dsPIC333 in until this software is installed.The dsPIC333 (IC2) is in a 28 pin narrow DIL socket. This allows for programming any software updates. As a future option there is a header for in-circuit serial programming in the future with a SMD version of the PIC chip. If a card reader is used later most of the connections required also are available at this header (JP1).

The dsPIC333 is an interesting device. It is designed specifically for handling digital data streams at up to 40MIPS



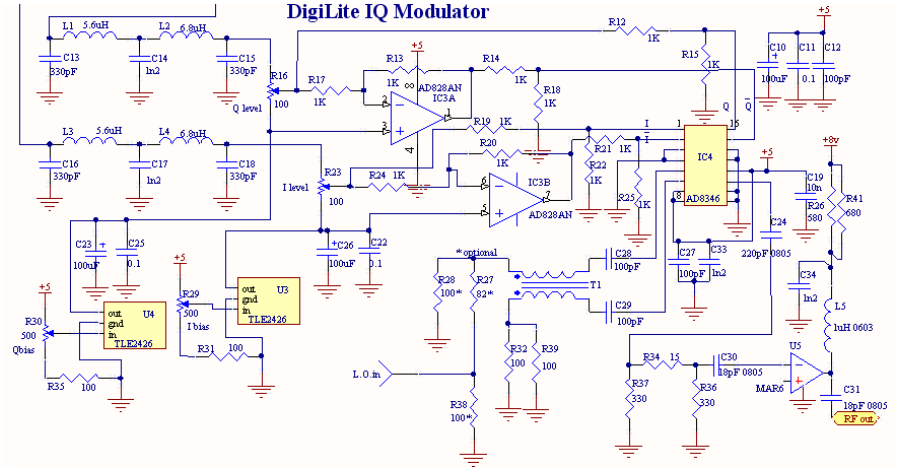
with lots of useful timing features.Refer to the manufacturers data sheet for more information.

The I and Q signals go to the 74AC574 latching flip-flops. The output of these eight latches are paralled to give four outputs ,I and Q and I* and Q* ensure accurate timing of I and Q phase components.Closely matched values of components here is important to ensure balance is maintained.

Then the signals pass to the Nyquist filters. A critical part of the modulator, the Nyquist filters, trim the skirts of the signal by filtering unwanted harmonics and reduce inter-symbol interference. Axial leaded inductors have been used here to ensure a high Q value, the smd versions tend to be lower Q, but for later versions G4EWJ is looking at a digital filter option which would require another chip adding to the board, a subpanel will be offerred if sucessful.

U3 and U4 are half dc rail regulators giving an accurate 1/2 voltage for the bias pots.This voltage is applied to the bottom end of the I and Q level pots giving the required (around 1.8v) dc offset for the inputs to modulator chip AD8346.

The modulator IC also requires a carrier of around -8dBm at the desired output frequency. This must be a good quality (low phase noise etc) signal. If you have less drive you may remove the attenuation at the input with resistors R27,R28,R38 currently set at about 12dB. The input can be capacitively coupled without the balun (with the other input AC grounded with 50R) but it is less efficient and can give poorer output waveforms.The -10dBm modulated output is AC coupled through C24 into a MMIC rf amplifier/buffer stage. Several further amplifying stages will be needed to get it to levels required for driving the PA stages, an interdigital filter would also be an advantage. Where 50 ohm resistors are specified it is assumed that two 100 ohms will be used in parallel



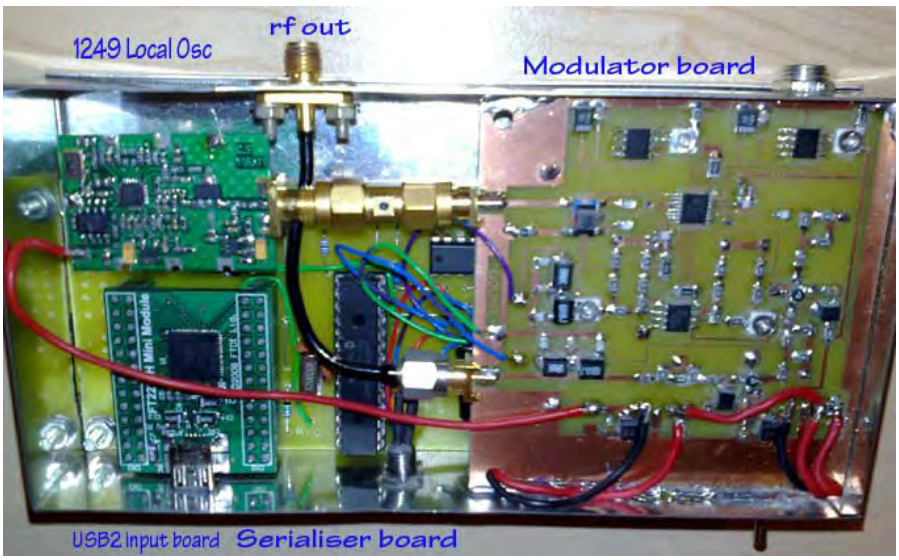
or even 'piggy-backed', this is easily achieved in smd.

What you will need:
Hardware:
A reasonably fast Windows XP, Vista or 7 computer with USB2 ports. A WINTV PVR PCI card with hardware MPEG2 encoder for your PC. (No longer available new so best purchased on Ebay or similar. Get the Hauppage disk when you buy one. Models PVR150,250 or 350 are fine. The PVR150 has phono sockets as well as S-Video inputs whereas the others only have the S-Video socket. The 350 will accept composite on the S-video socket)
A DigiLite Board.
A FT2232H sub-panel to handle the USB2 from the PC. A Local Oscillator running at the required final frequency e.g. 1249Mhz. An Rf amplifier to raise the digital Rf output level.

Software:
Drivers for the WINTV card.
Drivers for the FT2232H module.
The USB eeprom program for the FT2232H
The PVR recording programme GBPVR X2. Freeware. (Ref 5)
The PVR Config programme to set the parameters. Freeware. (Ref 5)
Software for the Serialiser PIC chip DigiLite Serialiser Hex file.(Ref 3)
(Or purchase a pre-programmed PIC chip from the BATC shop.)
DigiLite Transmit.(Ref 3)
DigiLite Config.(Ref 3)

Where to begin:
It is worthwhile getting your PVR card and program running first. Once you are recording your video on your PC you are ready to get your DigiLite board built and running.There is a freedownload of Hauppage drivers at their website.(Ref 4) Once you have the WinTV card in and drivers running you can download and install the GB-PVR program which allows you to record the incoming video from the WinTV card composite or S-Video input socket.(Ref 5)

The NextPVR version can run with DigiLite but you will probably need the WinTV PVR program installed first, this is only available free using the disk that came with the WinTV card, so when buying secondhand ensure that there is a disk with the card or you will have to buy a download version from Hauppage or use an earlier PVR. The earlier GBPVR versions 1.3.11 and 1.4.7 work well.



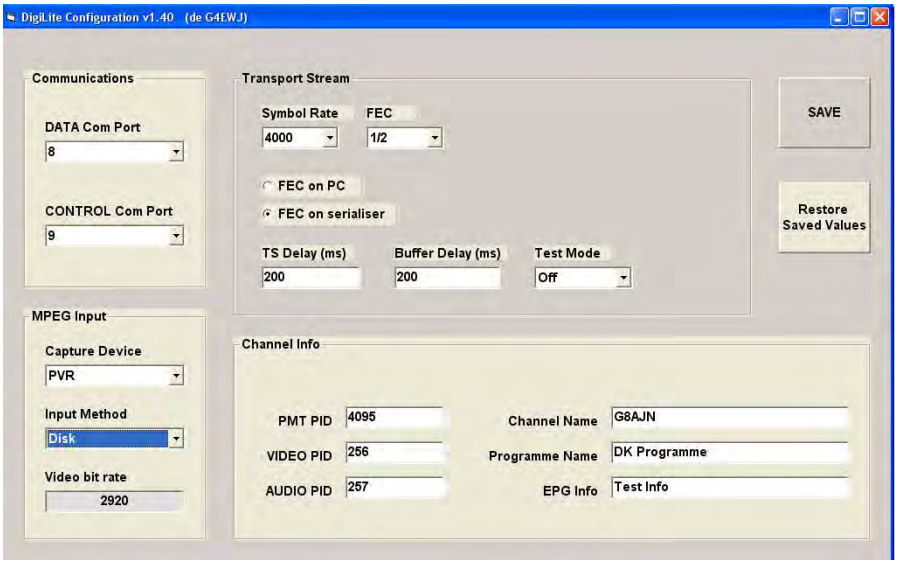
Separate boards version complete system built by G0UHY

Run the PVR Config program. Set the recording location to be either in the same folder as the DigiLite program or on whichever hard drive and folder you prefer. Full details will be given in the software download section.

GBPVR CONFIG:Follow the screen captures shown here to enter the required settings for the PVR program to use.

GBPVR Program:
Click to start the PVR program and select: Live TV. If unable to select LiveTV or the viewing screen is just blank or red then your setup for the WINTV card is not correct yet. You should be able to watch the incoming video from your S-Video or composite feed. If you get a red screen go back to the PVR config and ensure that the program is using the correct video input.

GBPVR Main Menu:
Go to the Recordings option.Choose Manual Recording from the sub-menu. If required change the start and stop times manually by highlighting the value and typing over it. Set it to start at (or even before) the current time. You should be able to record the video in an mpeg2 format.To monitor the recording go back to the main menu and select LiveTv and there will be an option to watch the recording as it happens. Do a brief recording then check it out with any mpeg playback program.It should have a .mpg tag not .ts Join the USB2.0 cable to the Serialiser board. If you havent yet installed the drivers for the USB FT2232H sub-panel do it now.(Remove the dsPIC333 chip first). Unplug the USB cable and re-insert the PIC chip. Reconect the USB cable and



the LED on the serialiser panel should flash 2 flashes at a time. You now need to read out the file (while it is still recording) via the PC's USB 2.0 port using the DigiLite Transmit program.

A full run-through of the software download and install will be in the next article complete with a full instructions on placing components on the smd board and getting digital ATV running without test gear.

Ref 1 www.m0dts.co.uk

Ref 2 jf.fourcadier.pagesperso-orange.fr/television/exciter/exciter_e.htm

Ref 3 www.g8ajn.tv
Ref 4 www.hauppauge.co.uk/site/support/support_support.html

Ref 5 download.cnet.com/GB-PVR/3000-12565_4-81654.html

Ref 6 www.ftdichip.com/Drivers/VCP.htm

If you find any of the above links broken please visit either the CQTV website for updates or see the DigiLite pages at www.g8ajn.tv

And Finally
If you really cannot wait to get building and can etch and drill your own boards there is a complete diy system build using separate serialiser and modulator boards by G4EWJ and G0UHY at my website(ref 3). There will not be any components available at this site. You will also need a good quality signal source (Low phase noise PLL Local oscillator) for the required 23cms output frequency. These are available from a number of sources, again details are on my website. It is intended that BATC Shop will hold pcbs and pre-programmed dsPIC333 serialiser chips and some harder to source components. Because of the low level Rf out from the modulator some amplification will be required and ideally some filtering too prior to your PA.

Due to the time involved in writing these articles and building the DigiLite boards I cannot respond to individual emails. Please ask any questions at the BATC Forum where one of the developers of the project will be happy to help you.

More details will accompany the constructional article.

The Digilite Project - Part 2

THE HARDWARE

The whole concept of this project was not just to keep the cost of getting started on DATV down but to make it as manageable as possible to home-construct. Assuming you have purchased a single board version of the DigiLite or have etched your own two board version, here is a suggested constructional approach.

Hardware Checklist:

A reasonably fast Windows XP or 7 computer with USB2 ports.

A WINTV PVR PCI card with hardware MPEG2 encoder for your PC.

A DigiLite Board.

A FT2232H sub-panel for the serialiser.

A Local Oscillator running at the required final frequency e.g. 1249Mhz.

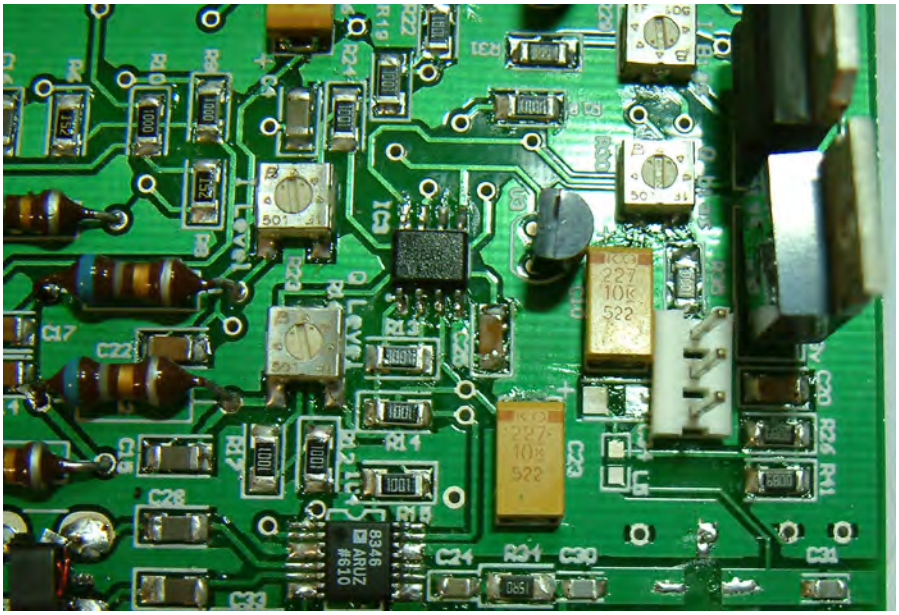
A small tipped soldering iron
Bench magnifier and lamp

There is sufficient output from the MMIC on the DigiLite board to feed to a satellite receiver which you can use for setting up the board.

The DigiLite software is the same for either the separate or single board versions. By starting with the serialiser section of the board you can get the USB panel installed and programmed and the dsPIC33F chip running with the once a second winking l.e.d confirming a data stream. Once that is OK you can concentrate on the more tightly packed modulator section.

Begin by soldering in all the smd integrated circuits. Of these the most tricky is the IC4 the modulator IC, AD8346. It is very narrow spacing between the legs, however with care and a magnifying lamp it is quite straightforward.

The DL board has been tinned ready for you to solder the chip, so with some very fine gauge solder place IC4 onto the board with the pin1 spot facing the preset pots and using a pointed tip soldering iron, solder pin 1 onto the board. Check the spacing on the other pins is OK and solder a pin on the other end of the IC to keep it in alignment.



Work your way round the IC soldering the single pins first, leaving those that are connected together on the board until last. If several pins get bridged by your soldering iron use solder-wick to soak up the excess solder and retry the soldering. If you are having a bridging problem allow the solder to cool down for a minute and then continue to remove the excess with Solder-wick. This will give time for the IC to cool down and avoid any risk of heat damage.

Do spend a little time checking with an ohm meter for any accidentally linked pins when the IC is in.

L5 is a low inductance coil and reduces the sidebands amplified by the MMIC. A small 0603 at 1uH it is necessary to decouple between it and R26/R41 with a capacitor of 1000pF or more.(1200pF is fine). R41 has been added across R26 to share the current drawn by the MMIC and avoid failure of this MMIC supply resistor.

The FT2232H USB sub-panel plugs into the two 26 pin header strips CN2 and CN3. Below this FT board, between the two headers, there are a few components and these should be fitted before the CN2/3 headers. The PIC chip IC2 has a 28 pin Narrow DIL socket, this may change in later panels to a solder-in smd and will be re-programmable via the 10 pin header JP1. This header can also be used to connect a SD card reader which will allow pre-recorded MPEG files to be replayed without the need for the usb/pc feed.

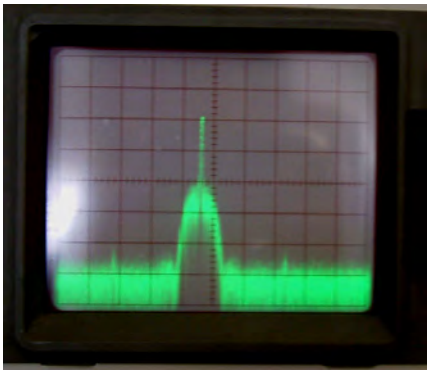
In earlier versions of the board the 5v USB DC line was used to generate the 3.3v line used by IC2. Later versions have their own 3v regulator to relieve the work load on the FT module.

Install the crystal,diodes,resistors (1% if possible) and capacitors. Fit up to C9 and R10. From here you can either set up the software for the serialiser and install GB-PVR, DigiLite Transmit etc. (ref 3) or move on and fit all the other components first.

The modulator section presents no other problems for construction, the oscillator input 1:1 balun, T1 is available from a couple of sources so the pads are intended to cope with either size. Being a 1:1balun, T1 can be fitted either way round as long as the wires connect the signal through, as you can see from the photograph the transformer has a location pin and in the prototype it was placed with that side facing the AD8346.

IC3 is a more standard pin spacing smd chip so is easier to work with. Fit all but the Nyquist filter coils, by fitting them last they can be kept low above the board avoiding components already fitted.

The Local Oscillator feeds in on JP2, the coaxial cable can be soldered directly onto the board if preferred. Keep unscreened wire to a minimum. You might need to alter the values of the 50R input attenuator R27,R28,R38 if your signal source is other than about +12dBm. If you can be sure you have about 6dBm to 10dBm local oscillator signal then the attenuator should be left out R28:o/c, R27:0R, R38:o/c Be warned : most problems with getting the modulator running properly has been due to too much local oscillator signal. If you suspect that this may a problem try doubling the amount of attenuation.



On our system we used a fixed frequency PLL sub-panel from Ultram Technologies (Ref 2). When ordering you will be asked to specify the output frequency you require. There is an article being prepared about a small add-on board to allow selection of 5 pre-set frequencies using this board.

The weak output from IC4 is lifted by MMIC MAR6 (U5) and buffered into the output socket. This 10 to 15dBm signal is too little to be of much use without further boosting. However it is fine to couple into the input of a satellite receiver, for example a Porty. A couple of amplifying stages will be needed to get to a similar level to that of a Comtech or other analogue transmitters/exciters.

You will be able to use your existing analogue PA and driver, but you will need to keep the drive levels down to stay in the linear portion of the PA. As the bandwidth of the digital signal is a quarter of that used by the analogue signal this will not be a problem, the digital signal will generally get into repeaters on much smaller power levels than analogue, indeed the lower the strength you can use to get a consistent signal in, the better the 'quality' of signal you are likely to be sending.

Hauppage PVR CARD

WIN TV CARD. There are a number of different models that you can use, the DigiLite software is arranged around these boards, but they must be a PCI card with an MPEG2 encoder chip on it, not one where encoding is done in software. There are at least three versions of the cards, the common types are the 150, 250 and 350.

WinTV Model Numbers (printed on tuner can) 23xxx or 25xxx are PVR 150. Model numbers 30xxx or 35xxx are PVR250. Model numbers 48xxx are PVR350. Model numbers 23xxx are PVR500(dual version).

Download the correct drivers for your version of the card from ref 1.

The Local Oscillator.
The L.O. Board used originally has a MMIC on it to lift its output to the +12dB region at 1249Mhz. This was more than the modulator wanted and we found that removing or bypassing the MMIC gave a more suitable output level and avoided the need for an attenuator on the input to the modulator entirely.

A separate 8v regulator was fitted to the screened L.O. can to allow connection to the same 12v DC supply as the DigiLite board but avoiding the need for a heatsink on the regulator. However there is sufficient capability in hand for most oscillators in the on-board 8v regulator if you are prepared to bolt it to a heat sink. More details about adapting the Local Oscillator in the next article.

THE SOFTWARE

There is quite a lot of software to download and install but happily it is a 'one-off' job only and once installed it is necessary to have just the PVR and DigiLite Transmit programs running to be sending digital pictures. I would recommend making a new folder on your PC into which you can download the various bits of software.

A checklist:

DigiLite Config

DigiLite Transmit

DigiLite Serialiser Hex (not needed if Eeprom IC2 is already programmed.)

FT2232H Drivers

FT2232H Flash program.(Computer needs Microsoft .NET Framework 3.5 installed)

GBPVR PVR program and Config

DigiLite Serialiser

A pdf of this section complete with screen shots is available at
www.g8ajn.tv/dlsoftware3.html

The USB panel

FT2232H.
This is the device that connects to a high speed (480Mbps) USB 2.0 port and accepts the transport stream data from the PC. Doing the FEC on the serialiser reduces the data rate over the USB connection. The serialiser has a second communication channel which is used to receive control information from DigiLite Transmit to set the required symbol rate and FEC. The serialiser has been used successfully at symbol rates between 1250k and 6250k. Several symbol rates are pre-programmed into the system.

The FT2232H sub-panel requires drivers and a program to run with the DigiLite software. Get these from Ref5. (CDM20814.exe) On the FTDI webpage,scroll down the FTDI page, select the Windows row from the table 'Currently Supported VCP Drivers: 'at the bottom half of the page. Click on 'Available as setup executable'.
You might prefer to go to the DigiLite website (ref 3) where the links are all available together and will be kept up to date.

If during the install you are asked for a floppy drive disk just change the drive letter and point it to your downloaded file. Download and run the FTProgv2.2 which is used to flash the EEprom on the panel. (You will need to have .NET 3.5 on your pc to run it though, but it is a free download from Microsoft and you will be prompted to download it).

FT2232H USB Module Installation

The FT2232H USB module has two input/output ports, either of which can be configured to be one of several device types. The factory configuration is two uarts (serial ports). For DigiLite, the first port needs to be configured as a FIFO (first in first out byte memory). Screen shots of this procedure can be found on the DigiLite web site.Ref 7

Preparation

• Do not insert the dsPIC chip until the FT2232H module has been configured.

• Download and unzip the FT2232H VCP (not D2XX) drivers from here:
http://www.ftdichip.com/Drivers/VCP.htm

• Download and unzip the FT2232H Configuration program (FT_PROG) from here:
http://www.ftdichip.com/Support/Utilities/FT_Prog_v2.4.zip

• With the FT2232H installed in a serialiser, connect it to a USB port on the PC.

• Give the location of the drivers if asked. You may need to do this several times until all the components of the FT2232H drivers have been installed.

Editing the Configuration

• With the FT2232H connected, run FT_PROG.

• FT_PROG needs Microsoft .Net Framework 3.5. You may be prompted to allow this to be installed if it is not already on your PC. It may be several 10s of MB.

• Make sure that the EEPROM tab at the top of the window is selected.

• Click DEVICES and then SCAN AND PARSE. The FT2232H should be detected. If there are other USB devices from the same manufacturer connected, click on the DEVICE line for each device in the left hand box until the FT2232H is found.

• In the left hand box, click USB Config Descriptor. In the right hand box, set Max Bus Power to 250mA.

• In the left hand box, click USB String Descriptors. In the right hand box, tick Serial Number Enabled. In the right hand box, untick Auto Generate Serial No. In the right hand box, set Serial Number to DATV.

• In the left hand box, click on the + sign next to Hardware Specific.

• In the left hand box, click on the + sign next to Port A.

• In the left hand box, click on Hardware on the next line down.
In the right hand box, select 245 FIFO.

• In the left hand box, click on Driver on the next line down.
In the right hand box, click on Virtual Com Port (if not already selected).

• In the left hand box, click on the + sign next to Port B.

• In the left hand box, click on Hardware on the next line down.
In the right hand box, select RS232 UART (if not already selected).

• In the left hand box, click on Driver. In the right hand box, click on Virtual Com Port (if not already set to this).

Programming the Configuration

• Near the top of the Window, click DEVICES and then click PROGRAM. A new window appears.

If more than one device is shown, make sure that only the FT2232H device is ticked. Look at the previous (main) window for the device number.
• Click PROGRAM
It should only take a few seconds and then Finished Programming should appear in the bottom left of this window.

• Close the programming window, close FT_PROG, disconnect the FT2232H and reconnect.

• Go back up to Editing the Configuration and check that Port A Hardware is set to 245 FIFO.

• Close FT_PROG.

Finding which COM ports have been assigned

Look in Windows Control Panel / System / Hardware / Device Manager / Ports. They should appear as USB Serial Port.

If you are not sure which are the FT2232H ports, unplug the FT2232H and reconnect to see which ports disappear and reappear.

After configuration, these port numbers will remain the same whichever USB port the FT2232H is connected to.

In DigiLite Config, enter the lower port number as the DATA port and the higher as the CONTROL port.

The Serialiser

Once the USB panel has been programmed, IC2, the dsPIC33F device, can be programmed. If you have had it programmed for you then you can insert the device in its socket and proceed to the next step. If not already done, then download DigiLite Serialiser Hexfile and program IC2 with a suitable PIC chip burner board. Details of programming the PIC 'in circuit' will be given in later articles When completed insert the chip into its socket and continue.

If you have not yet downloaded DigiLite Config and DigiLite Transmit from Ref3. get them now. Run the DL Config program. DigiLite Config is the program that you use to set the symbol rate and FEC and also the channel name and program details. Settings are stored in the Windows registry, which DigiLite Transmit monitors continually to look for any changes in transmission parameters. You should see a screen window with a number of different options. If you are not sure which settings to use, go for these:

Symbol Rate 4000,
FEC ½ ,
FEC on serialiser,
Test Mode :OFF,
Capture device: PVR,
Input Method : Disk,

The Video Bit Rate setting will alter itself with the different settings like Symbol Rate and FEC, 2920 is a typical value but whatever the value make a note of it as you will need to enter this value into the PVR configure program later on.

The COM PORTS will be those set by Windows and you can see them in your Windows Control Panel/ System / Hardware / Device Manager. Look for the Ports (COM & LPT1) heading, click the + to open the folder. Plug the USB2 cable into the FT2232H USB sub-panel and look to see which port numbers appear in this folder. Make a note of the two numbers then go to DigiLite Config and enter the numbers in the boxes in the left-hand corner of the window, lowest number at the top (Data COM Port) and the higher number at the bottom (CONTROL COM Port).

The other boxes like PID and Channel info are optional and you can enter your call-sign here if you wish. Of course you can always come back and change settings, even while Transmit is running. Details of the Test functions will be discussed later on.

PERSONAL VIDEO RECORDER

WIN TV PVR
Not all versions of the WinTV PVR work satisfactorily with DigiLite Transmit, but try a download of the WINTV6 (the current version) PVR (not just the drivers. The drivers are available free but unless you have a valid Hauppage CD in the drive you will have to pay to download the WinTV PVR).

If you have any GB-PVR files in your PC click the un-install GB-PVR option in Windows/ Control Panel/Add or Remove Programs.
Install the WinTV using the setup.exe file. With the WINTV program running Select the MENU button then Suite Manager.

Select Scan tab: set Scan UK : Cable: PAL_BGHIDK

Select Sources tab : Set
Input Sources : Composite Source
Video Format: Select PAL_BGHIDK
In Channel box enter a name e.g. Aux Video In

Select the MOVIES/MPEG tabs and set the location you want the temporary recordings to be placed in. e.g C:/ Temp
Set Quality to MPEG2 2.0Mb/Sec
Click the Red record button.

A small window should drop down showing the recording file name and timing. You should be able to see your video input in the WinTV window. You can now run DigiLite Transmit.

If you have any problem with WinTV PVR you can uninstall it and try GB_ PVR instead. If, after closing the WinTV window you are unable to restart it, use control+alt+delete and click the Processes tab and highlight WinTV.exe and click the End Process button.

GB_PVR

GBPVR is a free PVR (personal video recorder) program. The GBPVR X2 software works well with the DigiLite software. Versions 1.3.11 & 1.4.7 have been used successfully. Later versions like NextPVR seem only to work with later number WINTV boards. GBPVR requires a certain standard of video graphics card to run, even if you do not actually want to watch the video on that PC. Older graphics cards may have problems.

On the GBPVR download site, click the smaller green button marked 'DOWNLOAD 15.22MB'

GBPVR CONFIG

Follow the settings here for the GBPVR program to use. After finishing the Config setup then you can run the GBPVR program.

1. Start GBPVR Config
2. Click Capture Sources
3. Click Add
4. Make up a Source Name
5. Select Recording Source = Analog Recording Plugin
6. Select EPG Source = None
7. Select Channel Changer = No Channel Changer Required
8. Click Settings next to Recording Source
9. Under Capture Devices, tick Only show devices detected in this machine
The PVR250 / 350 may show extra cards. Select the one you have.
10. Select Country
11. Select Board Number = Capture Device #1
12. Select Source - normally Composite, External Tuner for phono input
13. Select Quality Profile Settings = Medium Quality
Set Medium Quality in GBPVR when making a recording later.
14. Click Edit
15. Select Video Resolution = NTSC 720x480 / PAL 720x576
16. Tick Constant
17. Set Bit Rate as given by DigiLite Config
18. Select Audio Bit Rate = 192
19. Select Audio Sample Rate = 48kHz
20. Click OK on all the GBPVR Config windows to exit from GBPVR Config
21. Start GBPVR Config again
22. Click Capture Sources
23. Click on the capture source you entered above and click Edit
24. Click Add
25. Make up a Channel Name
26. Set Channel Number = 1
27. Click OK
28. Click OK to close the Edit Recording Source window
29. Click Directories
30. The Recordings Directory can be left at the default, but if you have a second physical hard drive, it is beneficial to record to this. In this case, browse to the folder you would like to record to. GBPVR will add the folder 'Manual Recordings' to the folder you specify and record to there.
31. Click OK to exit from GBPVR Config

GBPVR Program:

Click to start the PVR program and select: Live TV. If unable to select LiveTV or the viewing screen is just blank or red then your setup for the WINTV card is not correct yet. You should be able to watch the incoming video from your S-Video or composite feed. If you get a red screen go back to the PVR Config and ensure that the program is using the correct video input.

You will need to ensure that you copy the four digit number shown in DigiLite Config Video Bit Rate box window and enter it into PVR Config Edit Capture Setting / Bit Rate .

Go to the Recordings option. Choose Manual Recording from the sub-menu. If required, change the start and stop times manually by highlighting the value and typing over it. Set it to start at (or even before) the current time. The GBPVR record start time will default to the next 10 minute boundary. You should be now be able to record the video in an mpeg2 format. The GBPVR icon goes green when recording.

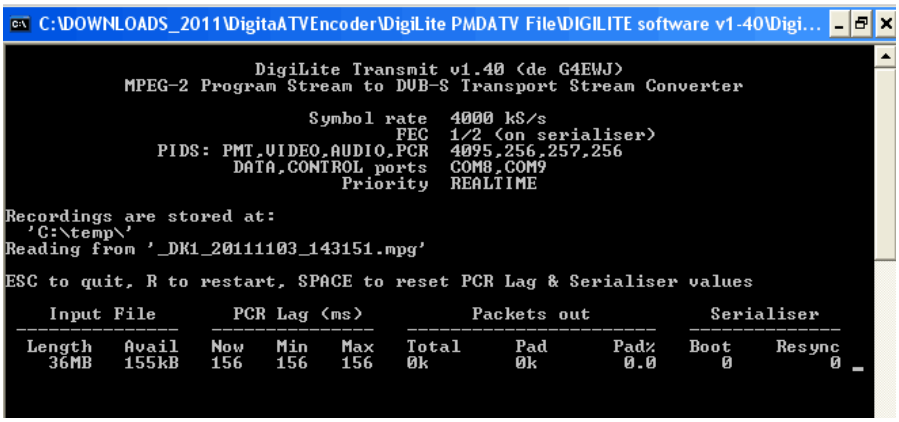
To monitor the recording go back to the main menu and select LiveTv and there will be an option to monitor the recording. You can minimise this window if preferred.

To stop or modify a recording, click on Pending. Never use the 'Stop / Restart Recording Service' items on the GBPVR menu.

DigiLite Transmit

DigiLite Transmit is the program that reads the recorded data from hard disk immediately it has been written. The data is in Program Stream format, which is very similar to the format used on DVDs. The video and audio are extracted and converted into DVB-S transport stream format, which is the format used by European broadcasters to deliver standard definition programs via satellite. This means that a cheap FTA (free to air) satellite box may be used to receive the transmission. Other data is placed in the transport stream such as date and time, channel name, program name and Electronic Program Guide (EPG) info. The transport stream data is sent to the serialiser via a USB port by DigiLite Transmit.

We now need to read out the file (while it is still recording) via the PC's usb2 port



using the DigiLite Transmit program. Ensure that the settings on the DigiLite CONFIG window are as described. (the usb port numbers will vary. With the serialiser plugged in, find yours in Windows/control Panel/Hardware/ Device Manager/System. Look under Ports). Close the Config window and click the DigiLite Transmit icon.

A DOS style window should appear and the program should have found the recording location and start to read it out. If you select other symbol rates and FECs, this value will change. Don't forget to clear out (i.e. delete) the old recording files in the folder where you temporarily store them now and then. You can do this from within GB-PVR or by Windows Explorer. After a lot of recordings and deletions a de-fragment of the hard drive might be wise.

So hopefully we now have a recording under way using the PVR and clicking on DL Transmit program with the USB cable connected the Led on the serialiser should change from a double flash sequence to a once a second flash. This tell us that all is well as far as the serialiser software is concerned and we can then move to the modulator and Local Oscillator setup.

Some initial DC voltage settings:

Ensure the regulators are working properly. With a dc supply of 12v the DigiLite board should draw about 150mA. The local oscillator described here draws 60mA. Sliders of I & Q Bias presets R29/R30 should be set to mid-way initially.(2.1v on sliders) Set I & Q Level presets R16/R23 to mid-way. (4v on sliders) Check IC4 pin 11 (output) for between 3.5 and 4v. Check for approx. 4v on output leg of MMIC.

If you have a different local oscillator and are not sure of its output level, Norman G3UXR has measured the output voltage generated using the simple power meter described in CQTV 187 page 43. With the MMIC not in circuit, the output voltage of the meter is about 0.025v . (Supply 8 volt . Load 50 ohm within power head). This is what you should be aiming for if you have a different local oscillator. The phase noise figure is critical on the local oscillator so ''any old signal' will not do. Phase noise of the Ultram board is -96dBc at 10kHz offset.

Fully screen the vco/local oscillator board. It can radiate quite a strong signal that could get indirectly into the modulator. Connect the Local Oscillator to JP2 by a short coax cable. Connect the output connector or cable to the capacitor C31-which if preferred can be a wire-ended capacitor rather than smd (between 12pf and 25pF) to a SMA socket or similar. If you are fitting a smd directly to the edge of the board it is advisable to solder the top and bottom earth planes to the body of the socket.

If you have a Spectrum Analyser you can use the test options in DL Config to switch on/off the upper or lower sidebands, modulated output or 'in phase'. Options are selected by clicking on the SAVE button. Set to OFF to resume normal use.

Below are three photos supplied by Rob M0DTS, left to right:
Lower Sideband Only;
Output after tweaking;
Upper Sideband Only

If you don't have a Spectrum Analyser you can use the on-screen signal meter of your satellite receiver to get very close to an ideal setup. Connect your receiver using a small 5cm aerial wire rather than a direct connection as there is a risk of damage from ac leakage.

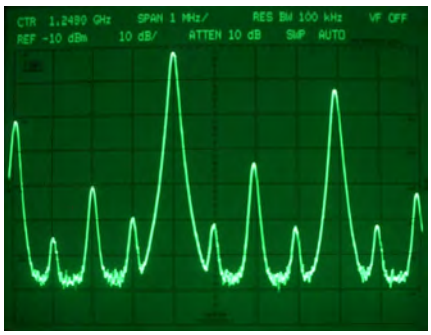
The picture to the right is of the Comag Porty/SL55 receiver where the strength and quality levels are shown. This was set up directly from build without a Spectrum Analyser using only this on-screen info screen. Before trying to tune in to the DigiLite signal ensure that the PVR is recording ok and that the DigiLite Transmit is finding the file to read out ok and that the LED on the board is winking once per second.

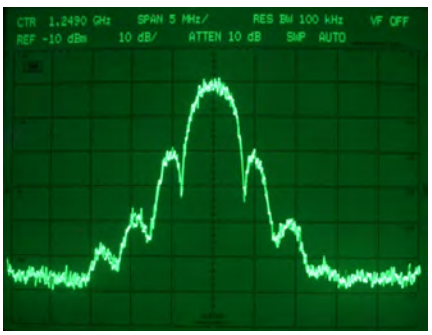
Initially you should be looking for a signal strength of at at least 60%.When you begin to set up your DigiLite you should set all the preset pots to mid-way. In some cases this will give you a usable digital signal, but assuming not, try turning the I Level (R23) a few degrees clockwise keeping an eye on the signal meter. You are looking for a quality reading to appear. Move to Q Level pot (R16) and turn that a few degrees clockwise. Continue to nudge the pots round until a signal appears. When it does you may try the other two pots the I and Q bias pots to give the highest quality reading.

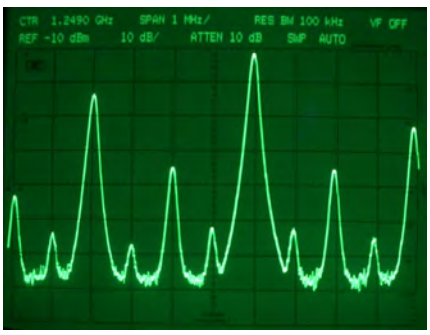
If after all this you still get no correct digital output you need to ensure that the Local Oscillator level is not too high or too low. Without test gear I would suggest setting pots back to mid-way and try bypassing the input attenuator if you are using one.

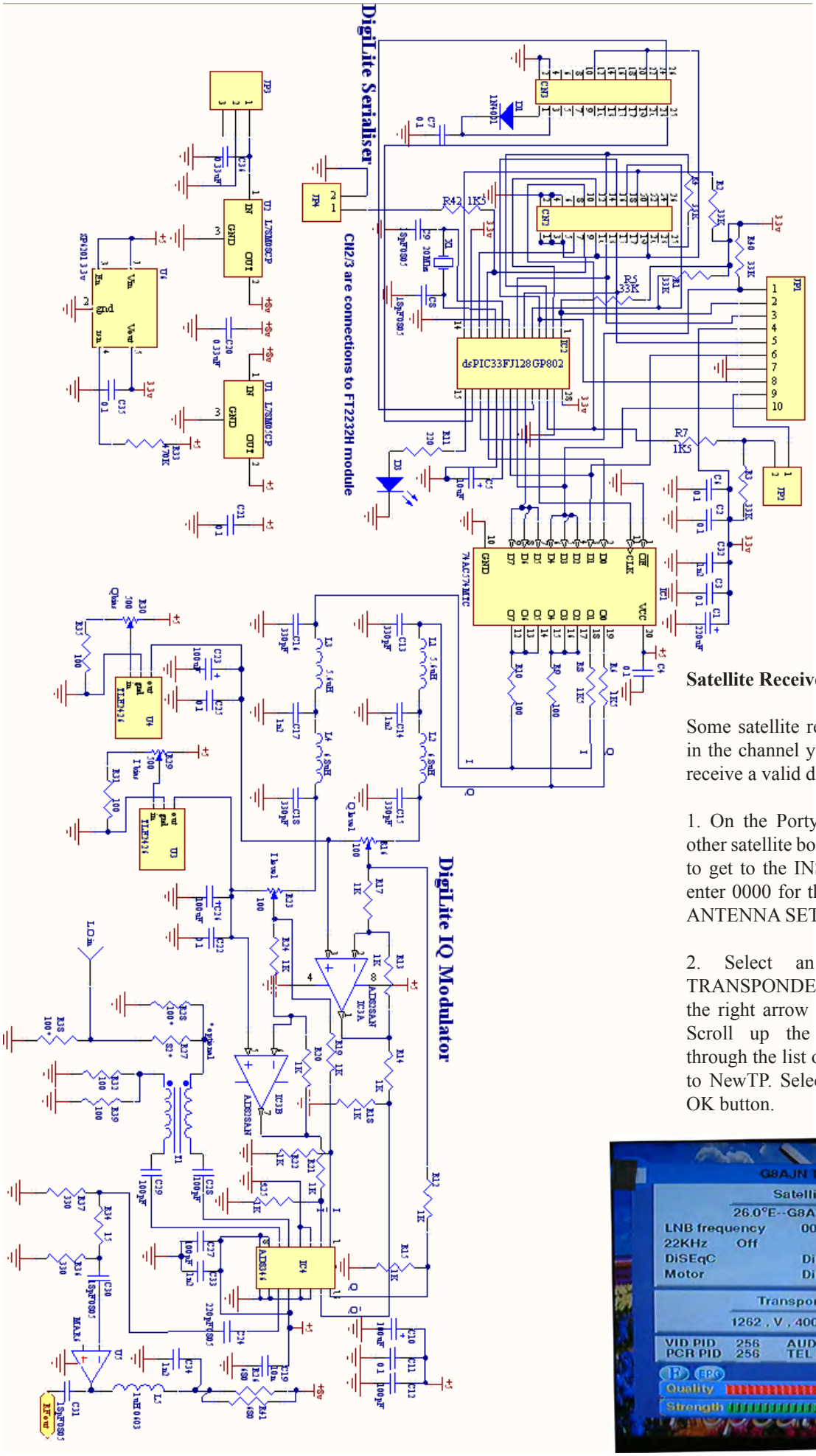
Maybe you could try various low value resistors across the input socket JP2 starting with 56 ohms and dropping to 10 ohms to see if too much signal is the problem.A series trimmer capacitor could be tried having a value of 2-20pF or similar.

Clearly there are many possible constructional errors that might be stopping it running correctly, make sure that smd components are 'square' onto their solder pads, ICs are correctly placed and do an ohms check between the pins of IC4 ensuring that only the desired pins are bridged.









Satellite Receiver:

Some satellite receivers will only lock in the channel you are using once they receive a valid digital signal.

1. On the Porty (and probably most other satellite boxes too) use the MENU to get to the INSTALLATION MENU enter 0000 for the password and select ANTENNA SETTING option.

2. Select an unwanted satellite TRANSPONDER highlight it and click the right arrow on the remote control. Scroll up the right hand window through the list of settings until you get to NewTP. Select that by pressing the OK button.

3. A sub-window will appear and there you can enter the settings for your DigiLite signal. Because of the I.F. used by a LNB when receiving via a dish, you need to add 10,000 to your required frequency. For example, if your DigiLite Local Oscillator is running on 1249Mhz you would enter 11249 for the FREQUENCY. Move down to the SYMBOL RATE and enter the 4000 (for 4Ms/s) or whatever you have set in the CONFIG programs.

4. For the FEC settings I advise selecting AUTO but you can set a specific error correction rate if preferred or if AUTO is not an option on your receiver.

5. The Polarity is not relevant as we are not using a LNB.Click OK to close the window.

6. In the left hand window move down to highlight the LNB FREQUENCY. Use the right arrow to get to the right-hand window and scroll up or down to find User Define.Click OK and set it to 10000. Click OK when prompted to store the changes.

7. Other settings are not relevant so scroll down to Start Search , use the right arrow to select Transponder and click OK.

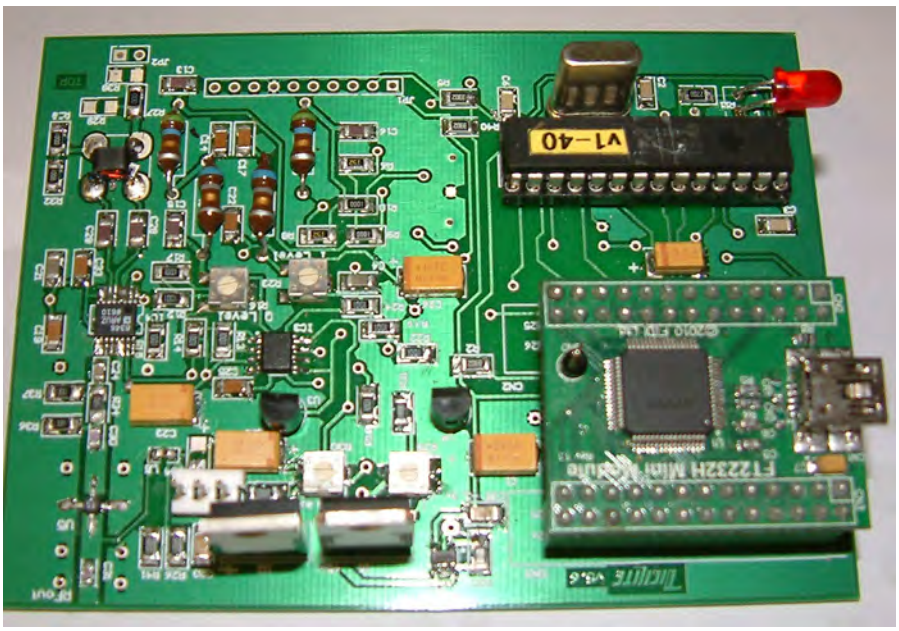
8. Whatever your receiver the same basic settings will apply, place a 1 in front of the required frequency and set the Data Rate and FEC, and a LNB offset of 10000.

Once all these settings are made and assuming you have added whatever amplification you require to get sufficent drive for your PA it is really simple to get running.

To get on-air:

Start your PVR program either WinTV or GBPVR (your can record four hours comfortably on a hard drive so you can leave it running even if you are not actually on-air all that time, you can just delete the file when you have finished). Set the PVR program to record. Run the DLTransmit program. (minimise the windows once running to clear your screen area)

Marvel at the noise-free transmitted pictures. Thats it!



Check the BATC Forum for other suggestions and specific help.
The concluding section will describe setting up the output, a small add-on PIC board designed by G8BYI that allows the Ultram Technologies Local Oscillator to be switched to one of five preset frequencies and we will be discussing possible future upgrades and developments.

Parts List.
Due to ever-changing availability of parts and their part numbers frequently changing I have decided to keep an electronic version on-line to allow regular updates to be incorporated.. Please download a pdf from the DigiLite website.

Check for availablity of major items at the BATC Shop first.

Ref 1: www.hauppauge.co.uk/site/support/support_support.html

Ref 2: Ultram Technologies (Ebay : search for Phase- Locked Oscillators)

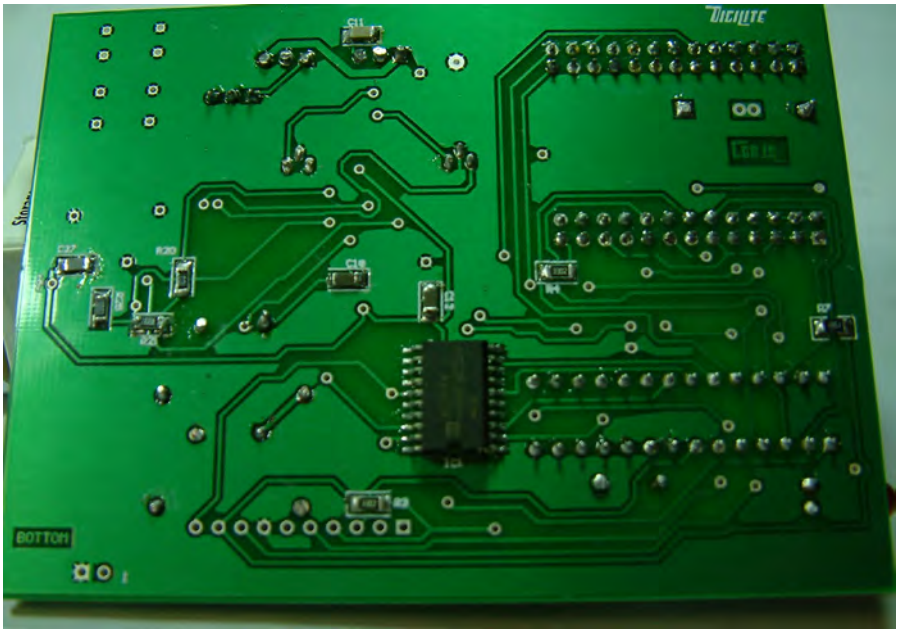
Ref 3: www.g8ajn.tv

Ref 4: download.cnet.com/GB-PVR/3000-12565_4-81654.html

Ref 5: www.ftdichip.com/Drivers/VCP.htm

Ref 6: www.ftdichip.com/Support/Utilities.htm

Ref 7: www.g8ajn.tv/dlsoftware3.html



Contest News

International ATV Contest

I have just submitted the UK logs to the IARU for the International ATV Contest. Here are the UK results:

70cm

Pos	Call	Locator	QSOs	Points	Best DX	QTH	QRB
1	G8ADM	IO91TO	1	138	G8LES	IO941LD	69
2	M0DTS/P	IO94LK	1	94	G1LPS	IO94EQ	47

23cm

Pos	Call	Locator	QSOs	Points	Best DX	QTH	QRB
1	M0DTS/P	IO94LI	3	1012	G7AVU	IO93OJ	108
2=	G0AZQ	IO94TA	1	188	G4TNX/P	IO93SO	47
2=	M0DTS/P	IO94LK	1	188	G1LPS	IO94EQ	47

13 cm

Pos	Call	Locator	QSOs	Points	Best DX	QTH	QRB
1	M0DTS/P	IO94LI	1	460	G4TNX/P	IO93WH	92
2	M0DTS/P	IO94LK	1	235	G1LPS	IO94EQ	47

3 cm

Pos	Call	Locator	QSOs	Points	Best DX	QTH	QRB
1	M0DTS/P	IO94LK	1	235	G1LPS	IO94EQ	47

And the UK rankings:

Pos	Call	Locator	70 cm	23 cm	13 cm	3 cm	Total
1	M0DTS/P	IO94LI		1012	460		1472
2	M0DTS/P	IO94LK	94	188	235	235	752
3	G0AZQ	IO94TA		188			188
4	G8ADM	IO91TO	138				138

Congratulations to Rob M0DTS on winning from each of the portable locations that he operated from. In addition to the stations who submitted entries, the following stations were active: G8LES, G1LPS, G7AVU, and G4TNX/P.

Repeater Contest

Don't forget the December repeater contest. No need to go out portable – just turn on the equipment and get on the air!

Contact

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

Contest Calendar

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

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

The care and feeding of MOSFET RF power amplifier modules – Part 2

by J.D. Ingham, ZL2TAR

Introduction

The performance of a RA18H1213G Class C MOSFET module (18 Watts RF output at 1240 to 1300 MHz), when operated in linear amplifier mode, was described in CQ-TV 234.

This time we summarise the test results of four Class C MOSFET modules, when operated in linear mode:

RA30H4047M (30 Watts CW/FM RF output at 400 to 470 MHz)
RA60H4047M1 (60 Watts CW/FM RF output at 400 to 470 MHz)
RA20H8994M (20 Watts CW/FM RF output at 890 to 940 MHz)
RA18H1213G (18 Watts CW/FM RF output at 1240 to 1300 MHz)

and of three Bipolar modules, designed for linear mode operation:

M57716 (20 Watts Linear RF output at 435 MHz)
M67715 (2 Watts Linear RF output at 1284 MHz)
M57762 (10 Watts Linear RF output at 1284 MHz)

In most cases, the RF output, at the -1 dB compression point in linear mode, equalled or exceeded the manufacturer's claimed minimum output in Class C CW/FM service. The only exception was the RA60H4047M1, which departed from acceptable linearity at 43 Watts output, compared with the claimed minimum saturated CW/FM output of 60 Watts.

From first principles, the RF output in Class AB or Class B Linear service should be somewhat lower than the RF output in Class C CW/FM service.

Caution

Most of the performance measurements, given in this series of articles, are based on only one sample of each type of module. Some performance variation should be expected between individual modules of each type, requiring module by module optimisation of the quiescent current, as described in CQ-TV 234. The tabulated performance of the M57716 is the median value of measurements on six modules.

Measuring Module Linearity

The measurement of amplifier phase and amplitude linearity is simple and quick on a factory production line, using an expensive Vector Network Analyser.

Amplitude linearity measurement is possible in the home laboratory, but is tedious and slow: the drive power is varied in 1 dB steps, the corresponding output power is noted, and the output versus input is plotted on a graph. Divergence from a straight line indicates non-linearity. Near maximum output, divergence of 1 dB is often refered to as the -1 dB (amplitude) compression point.

During the home laboratory tests, described in CQ-TV 234, the linearity was measured at each bias setting, in order to select the optimum bias.

Phase linearity measurement is seldom attempted in the home laboratory, but the module manufacturer advises that it is a significant source of signal distortion as the -1 dB compression point is approached.

The test setup is shown in the block diagram below.

Left to right:

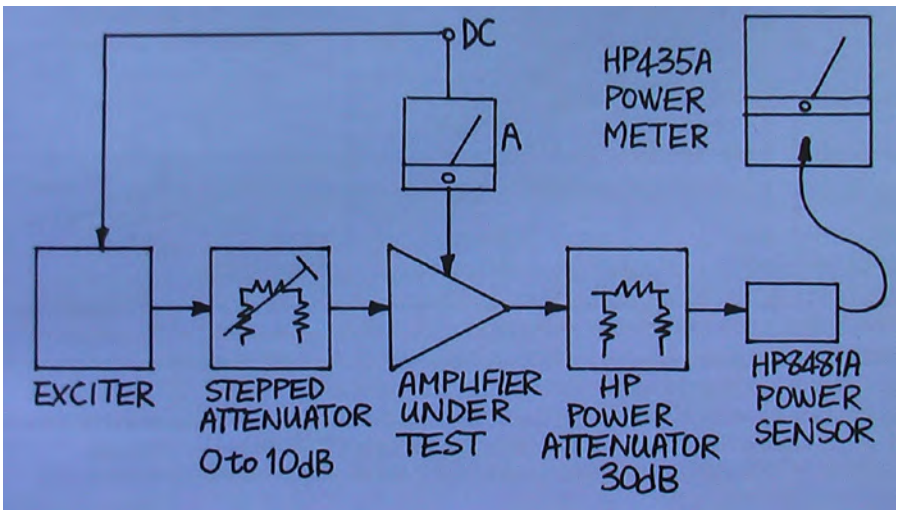
SR Systems DVB-S MiniMod, set to CW output, with a 0 to -10 dB stepped attenuator attached to its output.

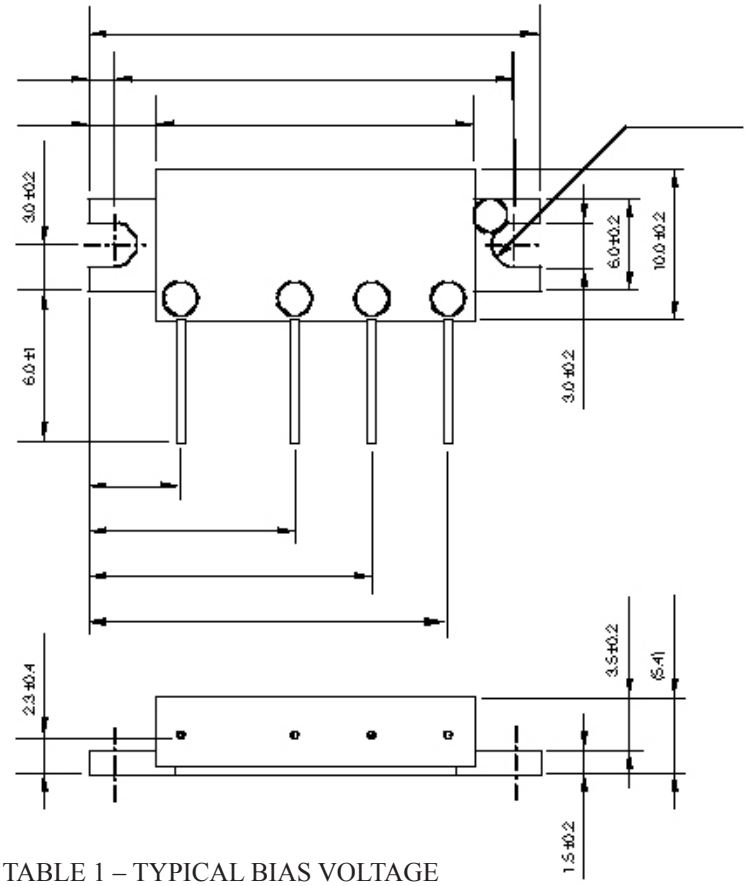
This is followed by the power amplifier module under test, a precision HP 30 dB power attenuator, a HP RF power sensor and HP power meter.

The Results– Table 1 and Table 2

A comparison of the Quiescent Current in Table 1 and the current at maximum output (Table 2) shows that the Mitsubishi Bipolar modules (type numbers starting in M) have proportionally lower quiescent currents, and can be considered to be operating in Class B.

The Mitsubishi MOSFET modules (type numbers starting in RA) have higher optimum quiescent currents, and can be considered to be operating in Class AB. This is one factor responsible for the lower DC to RF Power conversion efficiency of the MOSFET modules, when operating in linear mode.





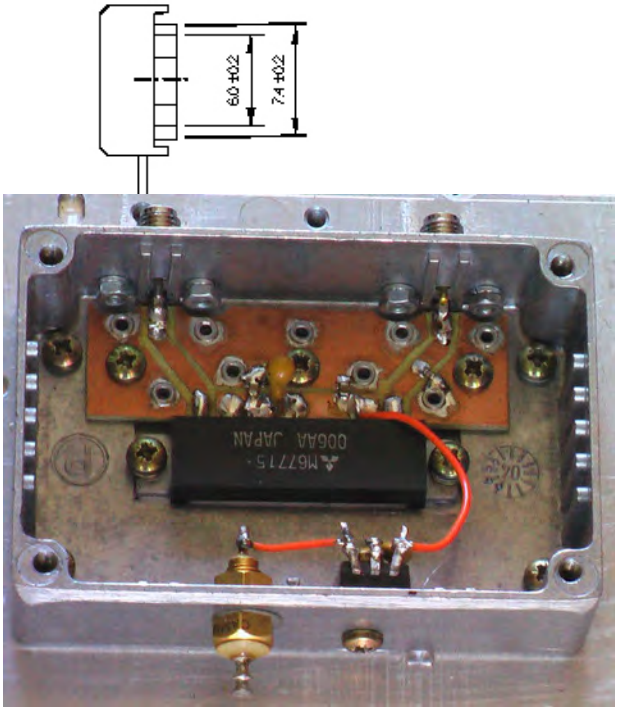


TABLE 1 – TYPICAL BIAS VOLTAGE
AND QUIESCENT CURRENT IN LINEAR MODE

TEST FREQ	MODULE TYPE	BIAS VOLTAGE	QUIESCENT CURRENT FOR OPTIMUM LINEARITY
435 MHz	RA30H4047M	4.9 V	1.1 A
435 MHz	RA60H4047M1	3.7 V	1.25 A
435 MHz	M57716	9.0 V	0.3 A (not adjustable)
925 MHz	RA20H8994M	4.1 V	0.9 A
1284 MHz	M67715	9.0 V	0.2 A (not adjustable)
1284 MHz	M57762	9.0 V	0.6 A (not adjustable)
1284 MHz	RA18H1213G	4.0 V	0.9 A

TABLE 2 – TYPICAL CW RF INPUT/OUTPUT
AND DRAIN/COLLECTOR CURRENT IN LINEAR MODE

TEST FREQ	MODULE TYPE NUMBER	SMALL SIGNAL GAIN	INPUT POWER AT -1 dB COMPRESSION POINT	OUTPUT POWER AT -1 dB OURPUT COMPRESSION POINT	DRAIN/COLLECTOR CURRENT AT -1 dB OUTPUT COMPRESSION POINT
435 MHz	M57716	31.0 dB	22.5 mW	22.5 W	3.75 A
435 MHz	RA30H4047M	44.6 dB	1.3 mW	30 W	5.0 A
435 MHz	RA60H4047M1	32.0 dB	34 mW	43 W	7.9 A
925 MHz	RA20H8994M	35.5 dB	7 mW	20 W	4.8 A
1284 MHz	M67715	29.0 dB	3.6 mW	2.3 W	0.8 A
1284 MHz	M57762	20.2 dB	120 mW	12.5 W	3.5 A
1284 MHz	RA18H1213G	25.1 dB	68 mW	22 W	7.2 A

New batc telephone number

01400 41 42 43

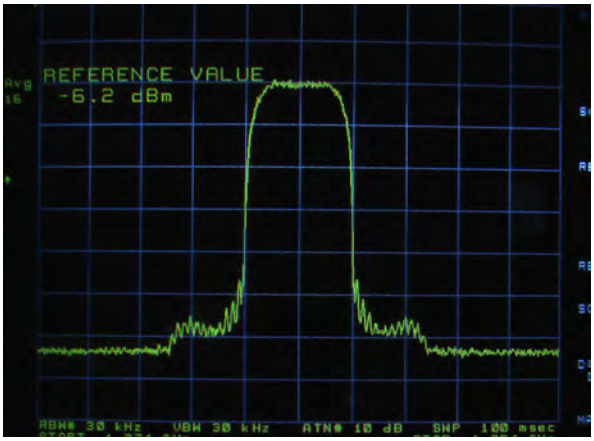
Next Time

Next time, we will compare the spectrum at the input and output of a power amplifier.

For example, the photograph shows the spectrum at the output of the SR-Systems DVB-S MiniMod when adjusted as follows:

Horizontal scale: 2 MHz per division
Vertical scale: 10 dB per division
Centre frequency: 1284 MHz
Symbol rate: 2950 kSymb/s
FEC: 3/4

The theoretical RF bandwidth is 3.982 MHz



The Wonder of Woonsocket

Dicky Howett visits The Museum of Broadcast Technology

So where the heck is Woonsocket? Well, it's in the US of A somehere near Providence and Rhode Island. Woonsocket is a smallish town, not unlike Billericay in Essex, but with a 'Bailey And Loan' building, purchased and gifted to the Museum to house an ever expanding collection of ex-broadcast technology. I travelled down from Boston (holiday time a year or two ago) and my genial hosts for the day were Paul Beck and Jay Ballard of ABC TV (NY)

While the actual Museum facilities are not yet open to the public, construction plans are proceeding apace, and an array of technology exhibits are being planned and developed for display on two floors. (15,000sq ft). The Museum's first floor will be dedicated primarily to videotape systems. It also will feature an early television control area and audio/radio control area.

The second floor will feature a wide variety of vintage television cameras and related production equipment displayed in an operational studio setting with sets, live production elements and techniques typical of the early TV era.

An RCA TK11A 3" inch image orthicon camera sitting on a PD1 pedestal. Very mechanical and very heavy

Dicky is presented with a much needed Houston Fearless pan bar from Woonsocket. 3,5000 miles to collect it

As the Museum's curator and archivist Paul Beck is a driving force for the MBT as well as a dedicated and well-informed technology collector of many years. Paul worked 10 years in broadcast television, 8 years in corporate television, and another 25 years in the higher education communication & broadcast community. Paul brings a broad and detailed perspective of technology history to the museum and its work that stems from his many years as an accomplished technologist in the industry.

Paul has also pioneered several novel methods and techniques for the handling, recovery and re-mastering of old small-format videotapes and for transferring early video programs to modern digital formats. He has also developed an optical wet-gate transfer process for 8mm, Super 8mm and 16mm films. Beck also serves as Film & Video Archivist for the New Haven Railroad Historical and Technical Association, producing many new DVD's that feature the images and history of a bygone era.

A Little Shaver. So called Norelco 'portable' from the 1970s. Not so light tho'

The Museum's Advisors are:
Jay Ballard
Henry Berman
Bobby Ellerbee
Pete Fasciano, (Webmaster)
Herb Ohlandt
Chuck Pharis

Contact information:
Museum of Broadcast Technology
144 Main Street
Woonsocket, RI 02895
maindesk@wmbt.org

Bundles of Kliegl Scoop lights and the odd hanging Mole

A TK 42 colour camera sans lens. Three 1" inch Vidicons and a 4 ½" inch Image Orthicon tube combined. Not a happy mix. 'Muddy' flesh tones apparently

A TK41C missing a few 'eyes'

Random Norelcos and Ikegamis. The museum seems rather short on Pye, Marconi and EMI cameras. (ie: to date, none at all)

A TK 60 with it's sides exposed and a Zoomar.

VT machines. (video grab)

Dicky manhandles a TK41C. This 3-tube Image Orthicon camera type, (christened 'The Coffin' because it was wider at the rear than the front) was capable of producing, under the right conditions, very pleasant colour pictures.

A Norelco (Philips) PC 60 ex-CBS News. Note that the camera's 'grab' handle is tubular. Later models had one piece body panel 'grab' oblongs. The things you learn…..

Letters to the Editor

Hello Chris,

Many years ago, I bought from the BATC, the PCBs for Peter Delaney's SPG design in CQ-TV 174, April 1966. For various reasons it wasn't built at the time. I have now decided to build it but I'm having some difficulty locating the Toko inductors it uses. I would appreciate it if you could put a request for the components in the next CQ-TV. The items I require are:

H287LSKS10570 (Circuit Ref: DL1)
H314BNKS2612 (Circuit Ref: L8)
H286BAIS4963DAD (Circuit Ref: L9)
A119ANST1040Z (Circuit Ref: L11)
10RB181LY823J (Circuit Ref: L12)

I did put a request on the BATC Forum but have absolutely no replies!

Many thanks. Dave, G8TVW (QTHR).

It is with great sadness I have to report that Ron Vansittart G6GHP passed away on Friday 9th September 2011.

Ron lived life to the full, and spent much of his time abroad in the USA and more recently in Spain.

From time to time, he came back home to his Margate QTH in the UK, and his return was always eagerly awaited. He was an active ATVer on all bands from 70cms to 3cms and operated regularly on both Analogue and Digital TV. Ron's considerable technical knowledge and expertise was always evident. He set up a complex system of linking and routing of ATV stations able to access the system from Essex and Kent.

He recently became involved in the Red Sands Fort project. Only these last few weeks Ron had been out to the old Wartime Forts in the Thames Estuary, to install equipment for ATV and a wind turbine for essential power.

When he was in the UK, and able to participate, Ron took part in many ATV Contests. He was also involved in the early years of The Kent Television Group and ATV Repeater GB3KT.

Ron died at the age of 64 following complications after a routine operation. Ron was a very personal friend to me, always very generous and helpful, and will be deeply missed by all who new him. Condolences to his wife Julie and Family.

Nick G4IMO

TVA 162

AGAF stand at HAM RADIO 2011 (Klaus, DL4KCK)

This year our crew in Friedrichshafen was down on last year, as Heinz, DC6MR, came along without "secretary" and Uwe, DJ8Dw, stayed at home with his poorly wife. All TV-AMATEUR magazines brought in fresh from the printers went out before Sunday, but many foreign members were glad to pay their annual dues on-site without postal complications. 47 visitors signed our guestbook along with some new members. Darren, G7LWT wanted to see the latest DATV board from Wuppertal. Without Uwe no chance, but he gave an excellent hint to new DATV software analyzer named "Tutioune" by F6ZDP. It uses a cheap DVB-S2 PC card by TechnoTrend as a DATV receiver und shows many on-screen parameters like BER and Constellation, that would normally need expensive professional equipment.
www.vivadatv.org/page.php?p=tutioune-en

Board member Rainer, DM2CMB, showed off his 2. edition book "RF measurements with network analyzer FA-NWT" from "Funkamateur-Verlag" Berlin. Along with many german DARC personell the president of OEVSV (Austria), Michael OE3MZC (AGAF member), visited our stand and suggested the installation of 70 cm band DATV inputs with 2 MHz bandwidth at HAMNET nodes (austrian and german wideband digital backbone net working on 6 cm). This should better connect both groups of Packet-Radio/HAMNET and ATV specialists as well as activate our 70 cm band and demonstrate the state of the art in Ham Radio.

Like last year Klaus, DL4KCK, ran videos showing earlier DATV tests around Lake Constance on a big TV, but also autostereoscopic (glasses-free) 3D on a parallax barrier TFT monitor. Additionally the visitors were able to punch into their own face (virtually) by help of his NuView-3D-adapter equipped video camera besides the monitor. In another stand at hall A1 the Munic ATV working group showed off modules and videos of their ATV repeater DB0QI (their weekly ATV news magazine is also shown on the Astra 19 degr. east channel "Dr.Dish-TV"). Maybe next year there will be shown a live video link to "Zugspitze" ATV repeater (2962 m ASL).

At the annual meeting of AGAF members in the fairground the board was re-elected. Colour-print of TV-AMATEUR can go on some time thanks to a new printer´s, but postal shipping of magazines to foreign members is very costly. Therefore preferably many members should change to cyber membership and get the electronic version. Uwe, DJ8DW, wants more younger members for the board (most attendants were over 60...). Urs, HB9DIO, reported from a public amateur radio demonstration with ATV in Bern and about plans to link the "Zugspitze" ATV repeater OE7XZR to swiss ATV repeaters.

Holy planking

Dicky Howett's in church again, this time to record for local posterity, the replacement of the suspended wooden floor of his local 900-year old church. It's all coming up (there are holes and large cracks in the planks and the congregation is in danger of disappearing down them).

Dicky will follow the progress (holes willing) using his trusty Sony BVW 300 Betacamera. The old wooden flooring, which will be supplanted by a nice flagstone one, is about 150 years old and local historians are curious to see what may have slipped through the cracks in the intervening years.

No bodies are expected but perhaps the odd gold ring or silver half crown? Dicky's initial filming (using a few strategically placed and artistically arranged red heads) covered the church interior as it exists, concentrating on the old floor areas and general holy ambience. The time scale for all this filming and restoration will be approximately 6 months, unless of course, something unexpected is unearthed.....

A Frequency Standard you can have at home

by Steve Anderson

Some time ago I bought a new frequency counter which although it had a good accuracy and stability specification I wanted better. It has an external 10MHz reference input for greater precision. I found a source of reasonably priced GPSDOs from James Miller in the UK, www.jrmiller.demon.co.uk.

This is really a sub-assembly comprising of a Rockwell Jupiter GPS receiver, an ovenised 10MHz oscillator, interface board and a regulator all in a die-cast box. The version I purchased is shown in the topright photo; it has been updated since but is basically the same. GPS receivers branded Conexant and Navman can also be used.

All one needs to do is plug in a GPS antenna, and apply 12V at about 1A. After a few minutes the oscillator is up to temperature and the PLL locks it to the 10kHz output of the receiver and the current consumption drops to less than 400mA. It outputs a 10MHz sine wave at 13dbm on a BNC connector at 50 ohms this can be changed to 75 ohms or (HC)TTL upon order, there is also a one-pulse-per-second signal and NMEA data both at RS232 standard. The unit can also be programmed via the same port. In my case I didn't need to do that and use it as supplied.

Binary output can be selected as well. Ultimate stability and accuracy is reached after 24 hours, but it's useable after one hour, I leave it on 24 hours, the figures that follow are for the current version not the Isotemp version shown above…

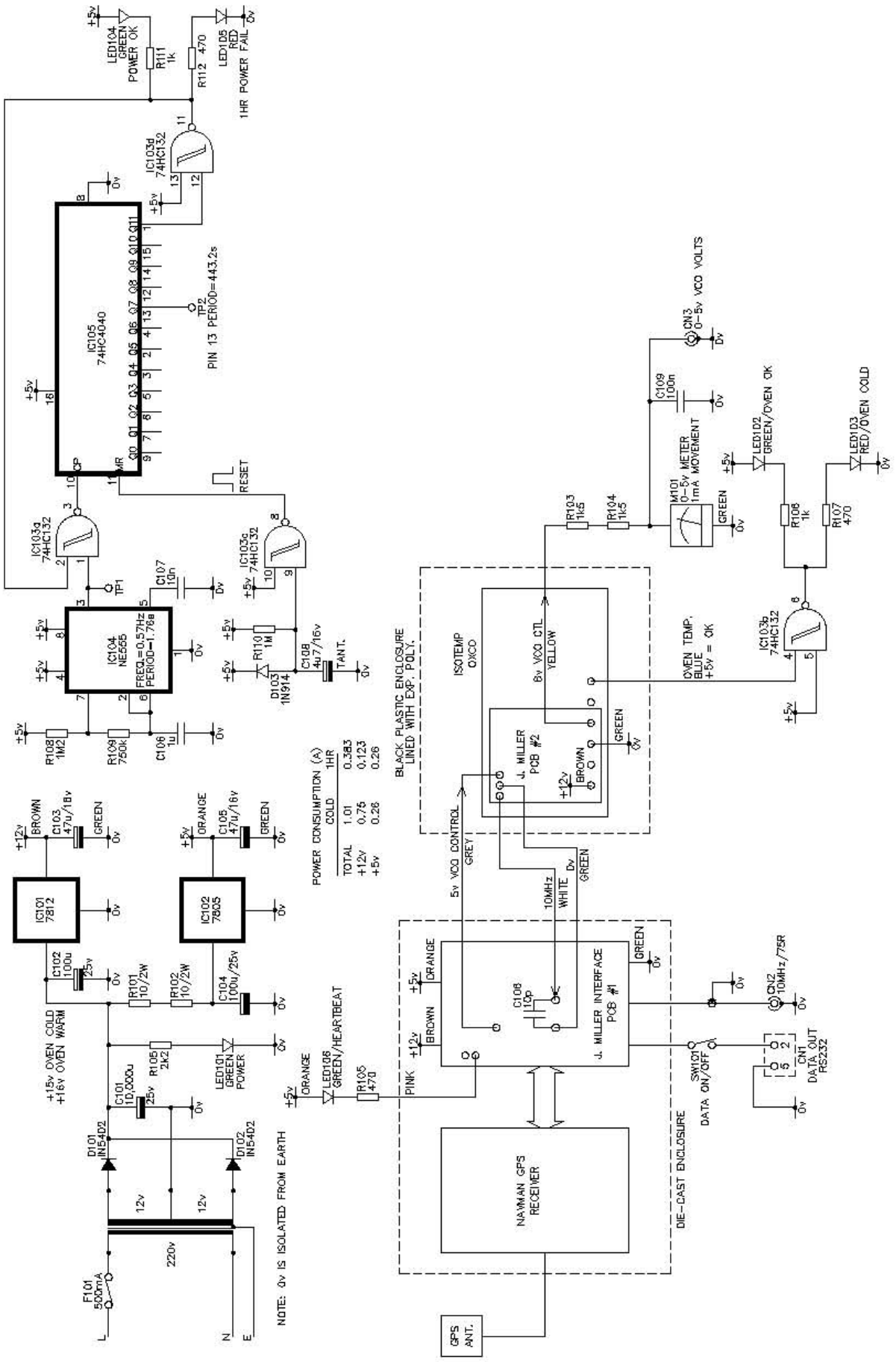
1s < 1x10-12 1000s < 2x10-12
10s < 3x10-12 10000s < 3x10-13
100s < 5x10-12 1 day < 5x10-14

Once it has settled down the unit is dissipating around five watts which means that this small die-cast box in my normal ambient temperature of 30°C runs warm.

I wanted to place it in the roof void of the house where it regularly gets up to over 55°C. This I felt would exceed the receiver's temperature limit. So I split the unit in two and relocated the oscillator into its own thermally insulated enclosure and the +5V regulator was moved to an old Pentium II heatsink which resulted in a dissipation in the die-cast box of just over 1W. The temperature rise was now hardly noticeable. In European climates this should not be necessary. This was fitted into a case with a conventional power supply to provide the +12V and +5V voltages. The current version uses less power largely negating the requirement for this modification. The current version is shown right with my implementation of the Isotemp version below.

I added three other refinements, a meter just to keep an eye on the OCXO control voltage and a power outage indicator. Once the PLL is locked the reading on the meter never moves: never. I also added a one hour outage indicator as we have many outages here, generally short but worth waiting that hour for things to settle down again. As I didn't plan to use the programming input I didn't wire that up, likewise the 1 PPS output. The completed unit is shown to the left; my wiring standards are not as good as others so please excuse me.

The unit had only just been turned on so both the red Oven Temperature and the One Hour Outage indicators are on. The top one is power, the bottom one the 'Heartbeat'. The unit has been in use for well over a year now with no problems at all. Since the picture above was taken the front panel indicators and meter have been duplicated so they're visible in the workshop whilst the unit itself lives in the roof void.


LED104 GREEN POWER OK
R111 1k
R112 470
LED105 RED 1HR POWER FAIL
IC103d 74HC132
IC105 74HC4040
PIN 13 PERIOD=443.2s
RESET
IC103a 74HC132
IC103c 74HC132
IC104 NE555
FREQ=0.57Hz PERIOD=1.78s
C107 10n
R110 1M
C108 4u7/16v TANT.
D103 1N914
R108 1M2
R109 750k
C106 1u
IC101 7812
IC102 7805
C103 47u/16v
C105 47u/16v
C102 100u 25v
C104 100u/25v
R101 10/2W
R102 10/2W
C101 10,000u 25v
R105 2K2
LED101 GREEN POWER
D101 IN5402
D102 IN5402
F101 500mA
+15v OVEN COLD
+16v OVEN WARM
12v
220v
L
N
E
NOTE: 0v IS ISOLATED FROM EARTH
POWER CONSUMPTION (A)
COLD 1HR
TOTAL 1.01 0.383
+12v 0.75 0.123
+5v 0.26 0.26
LED106 GREEN/HEARTBEAT
R106 470
BLACK PLASTIC ENCLOSURE LINED WITH EXP. POLY.
ISOTEMP OXCO
6v VCO CTL YELLOW
J. MILLER PCB #2
5v VCO CONTROL GREY
10MHz WHITE
5v GREEN
C108 10p
J. MILLER INTERFACE PCB #1
NAVMAN GPS RECEIVER
DIE-CAST ENCLOSURE
GPS ANT.
SW101 DATA ON/OFF
CN1 DATA OUT RS232
CN2 10MHz/75R
CN3 0-5v VCO VOLTS
C109 100n
M101 0-5v 1mA METER MOVEMENT
R103 1k5
R104 1k5
LED102 GREEN/OVEN OK
LED103 RED/OVEN COLD
R106 1k
R107 470
IC103b 74HC132
OVEN TEMP: BLUE +5v = OK

AMSAT 2011

by Peter Blakeborough G3PYB

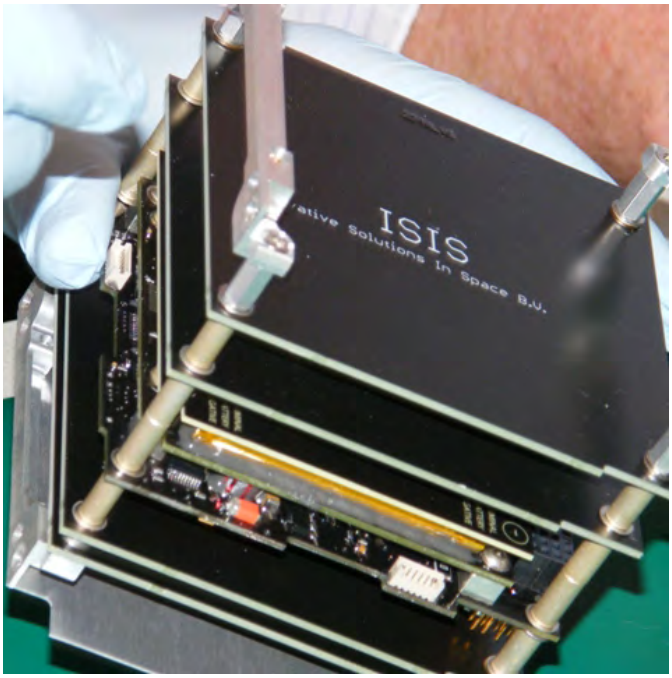
The event was a rig on Friday evening and ready to go live by 9.00am at the latest. The rig was for three cameras, one a good ped/tripod with at least 20:1 lens, auto iris, a fixed wide angle camera on the room, a digital 2.3G radio camera for close-ups and Q&A.

Audio was a derived balanced feed of the auditorium PA so we could use the hotels radio mic, pole mic on a cable, small mixer to trim levels, PPM and feed into the HD recorder and direct to the streamer dongle and PC. With two outputs to trim levels separately.

We ran for almost two 9 to 5 days and tried to rotate the crew jobs as it get squite tiring . The crew this time was Ivo PA1IVO, Lars OE3HWM/PA9N, John G0HAT, Peter G3PYB, Graham G3VZV and on this occasion Chris who organised the hotel WEB feed.

IVO manned the vision mixer most of the time and did an excellent job, you have to be quite quick on the presenters changeover to make sure there is a smooth start into the next item, preferably with a caption start. Ivo is an expert on the AMSAT field so anticipating shots from the material is real plus.

As usual the presenters audio level needed riding all the time. Getting to the people on the Q&A in time was sometimes difficult. But the boom mic generally gave better results.



From an A/V point of view the two days went well, the same cannot be said of the hotel WEB feed even though we were after the fire wall PC. We found that at times the whole hotel only had about 300KBit on the up link, sometimes a little more but very variable, an occasionally less than 100KBit. Even when we had 250KBit the audio would stutter but the video would be ok. Despite all manner of test it could not be resolved. This meant we had to reconfigure for 100Kbit plus mono audio when on the hotel feed. 3G was available through the good offices of Graham and Trevor M5AKA, when we lost the hotel feed we ran on 3G but this is an expensive option for 2 days of OB. We changed back and for the on several occasions trying each time to let the viewers know what was going on. On 3G we could send at 600KBit.

Apart from the streamer network feed all the equipment ran well. The take up on the streamer topped about 150 for a large part of the time.

The quality of the presentation was first class, and a good range of topics. I thought Interplanetary Internet was most interesting and has ramifications for any Internet traffic with discontinuous traffic, not necessarily between planets, have look when the talk is on the archive. Similarly the “who’s watching earth from space” had a much wider connotation for public surveillance in general, with most interesting graphs of activity.

The weak link in the “show” was the internet yet again.

Last but not least when we de-rigged and went home, the material went North to Trevor. For those of you who have edited material you will know the task to process two days worth of recording is immense. Thanks TB and to all those who made an excellent recording crew.

Tony Sale 1931 - 2011

Some of our older members may remember Tony Sale, who was a member in the early days of the BATC. My acquaintance goes back even further as we were at in the same boarding house at school together in the late 1940s.

Tony was a couple of years ahead of me and had built a robot, largely from Meccano, which was radio controlled. This must have been the second of a long line of "Georges". I can remember "George" clanking up and down the corridor.

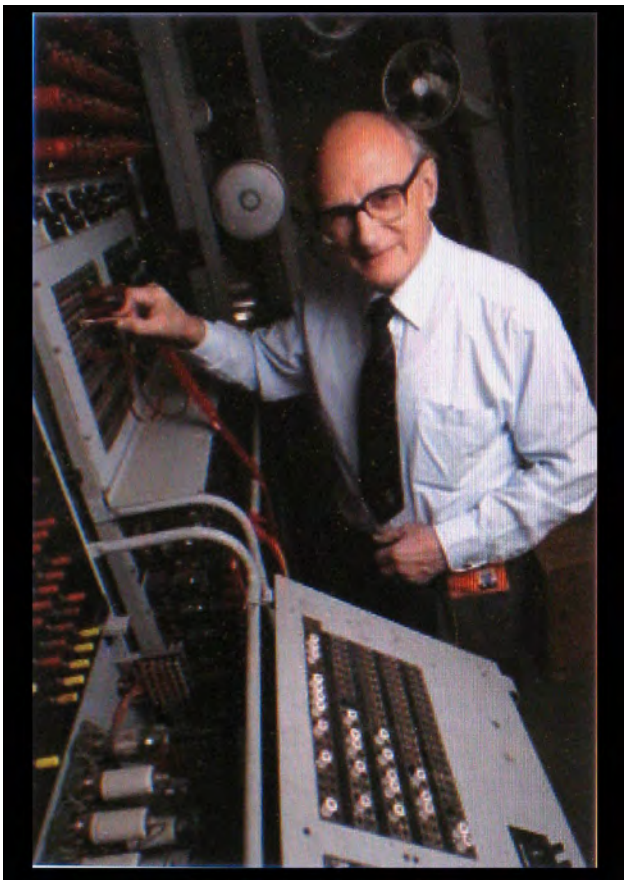
Because of Tony's skill, and my budding interest in electronics, I suppose he was my mentor, but the term was not much used then. Anyway, I think I owe Tony the example to go on to make electronics my life. He introduced me to the concept of ¼ wave lines to measure the frequency of an oscillator. We were using ex-government equipment as a source of components.

Tony left school and took a short term commission in the RAF, based mainly at RAF Debden. After a time at Marconi Research at Baddow, where he probably met Mike Barlow, he joined MI5, working as an assistant to Peter Wright of "Spy Catcher" fame; the book Mrs Thatcher did not want us to read. I got mine from the USA! He was helping Wright with some interesting radio tracking techniques, and is mentioned in "Spy Catcher".

Tony joined the British Computer Society, and later joined the Science Museum as a Senior Curator, working on restoring some early computers.

This started his association with Bletchley Park in the early 1990s.

From this he started the rebuild of "Colossus". This machine, probably the first computer in the world, was designed and built at the PO Research Department at Dollis Hill in 1943 for de-crypting the ever more complicated German Enigma codes. It used hundreds of Mazda octal-based valves, based in numerous 19" racks. The original was thrown down a mineshaft after the war, allegedly on Churchill's orders. Luckily, some information was around, and Tony managed over time to acquire the material for a re-build.



Looking round the Freeview channels recently, as you do, I stumbled on Tony talking about Enigma de-crypts on a programme called "Secrets of World War II" on Yesterday [Freeview Ch. 12]. He was a technical consultant for the film "Enigma" which came out in 2001.

Some of you will remember BATC BGMs held at Bletchley Park, and may have visited some of the exhibits there.

The "Colossus" rebuild was successful and forms the prime part of the Bletchley Park display. The picture shows Tony plugging up Colossus, while in the bottom left hand corner, some of the vast number of Mazda octal valves can be seen [SP41/SP61].

Tony was awarded several Honorary Doctorates for his work. He was a fine engineer, with an amazing record of achievement. We owe him a lot. Our sympathy is extended to his wife Margaret, and his children.

!!! 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

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Bare PCB	£15
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VCO Module 437MHz	£32
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Balun (T1)	£3

Situations Vacant

The much sought after and coveted position of Editor for your magazine has become available. If you think you have what it takes to fill this demanding and challenging position please get in touch.

Prior experience is desirable, but not essential as training and mentoring will be provided by the current editor. Candidates must show a keen interest in ATV and a positive attitude towards the future of the batc. The successful candidate will have demonstrated a pro-active and creative approach to production of our magazine.

If you do not feel you are ready to take on the full responsibility of this high powered role, we are willing to consider taking on an assistant editor instead.

Actually, scrap the above: I just need someone to take over or at least help, so I can concentrate on writing software for the batc. Drop me an email or give me a call if you're interested. Thanks, Chris *editor@batc.org.uk or telephone 01400 41 42 43*

Turning back the pages

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

CQTV 49 appeared soon after the 1962 BATC Convention, held at the Conway Hall in London on September 8th. Nearly 200 members had attended the event, which included displays of all aspects of amateur television. The cameras on show included vidicon examples made by Bob Tebbutt and by Grant Dixon and 3" image orthicon cameras made by Terry Lane and by Jim Brett, and a 4½" version made by Martin Lilley. The editor commented that "it is obvious that image orthicon camera equipment demands too much physical effort to be taken to many demonstrations".

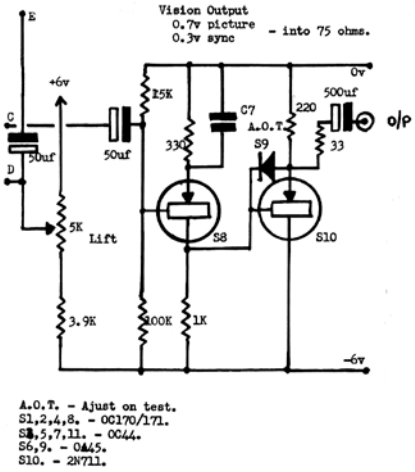
Transmitters exhibited included Jeremy Royle's high power one, which had recently sent atv signals over a 200 mile path, and the transmitter that Ian Waters had been using in 'Matilda' the BATC OB unit based on an old taxi. The lecture programme had included talks on 'Colour Television' by the President, Boris Townsend; 70cm Techniques', by Ian Waters; and 'Transistors in Pulse and Television Circuits' by Mike Cox.

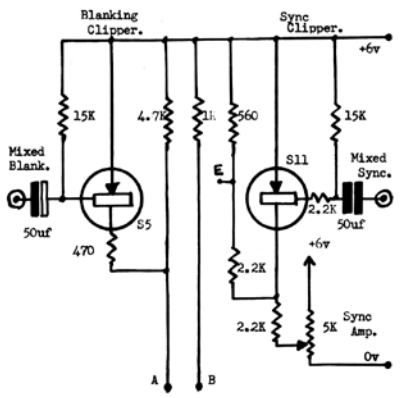
The General Meeting, held as part of the Convention, had approved a Club Constitution, and had elected a new Chairman - John Ware. John had had a lond standing interest in television, having built his first 30 line receiver in 1933. He was involved professionally as well, having received a Television Society award for the design of a colour receiver (on the NTSC system) in 1959 - the year he had joined BATC. His predecessor, Grant Dixon, was also co-opted to the committee.

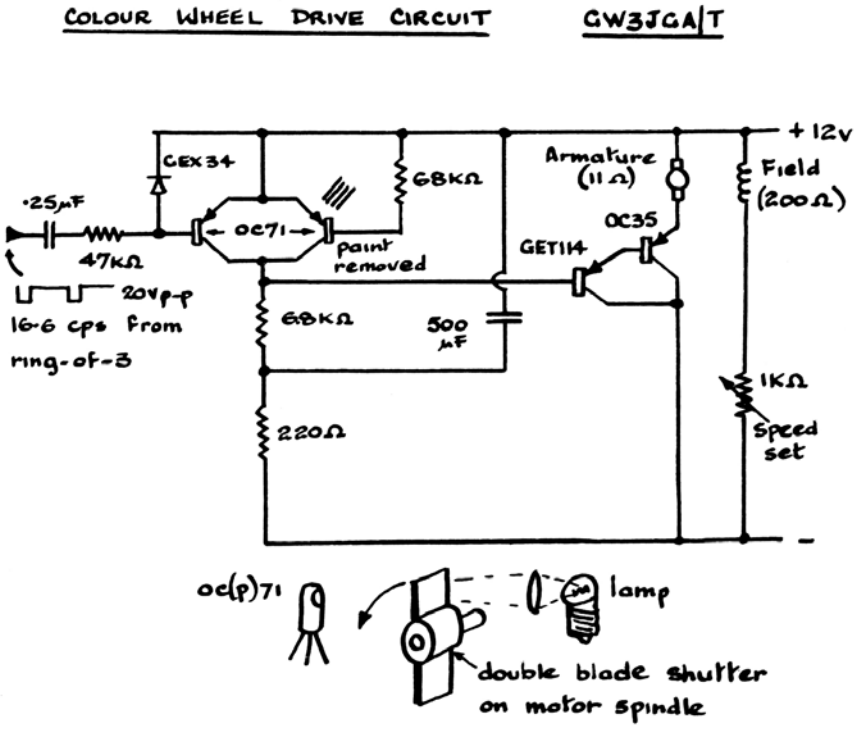
The technical articles included a 'Colour Wheel Drive Circuit' by John Lawrence, and 'A Vision Processing Amplifier', by Michael Cox (interesting that they are still 2 of the (relatively few) regular contributors of the technical articles in CQTV), whilst M B Brown contributed details of 'A Transistor RF Unit'.

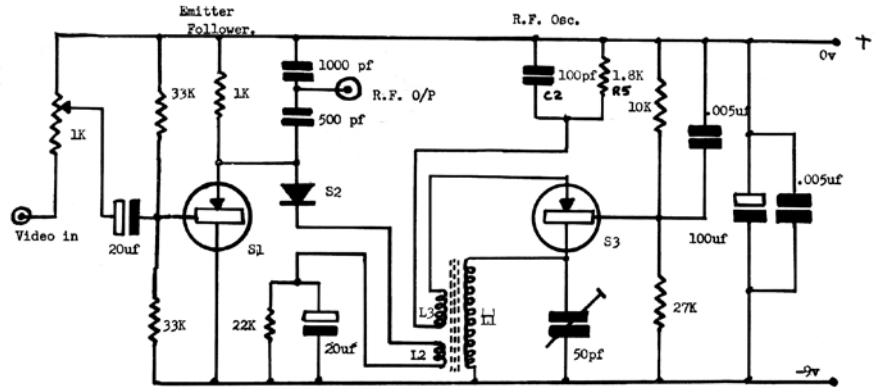
The colour system, as mentioned last time, was based on a projection crt. This was viewed through a 7" 6 section, 3 colour disc that was driven at 500 rpm by a 24 volt motor. This was phase locked by a signal detected by the photo-transistor being compared to a field sync derived pulse. The 'proper' photo transistor was an OCP71 - but an effective version could be made by removing the black paint from a 'standard' OC71!

The vision processing circuit was another of Mike Cox's transistorised designs, and was intended to be in the camera control unit, receiving the signal from a camera head amplifier. The function of each stage is noted on the diagram. The notes included how to set it up, and also advised that low impedance supplies would be needed to ensure stability of the circuit. The layout would need to be done carefully, and decoupling capacitors from the power supply lines to ground were recommended (these days, such would be 'standard practice'.) Stabilisation consisted of a pair of 6 volt zener diodes, and the original was assembled on Veroboard - at the time, both were relatively 'new' components.



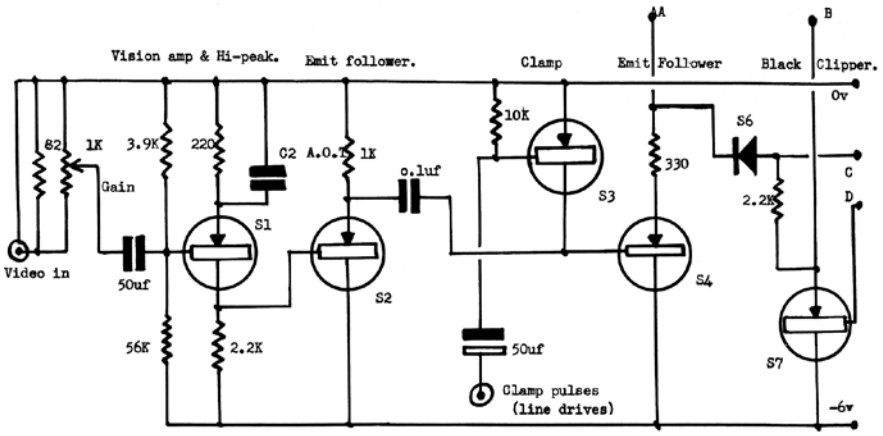






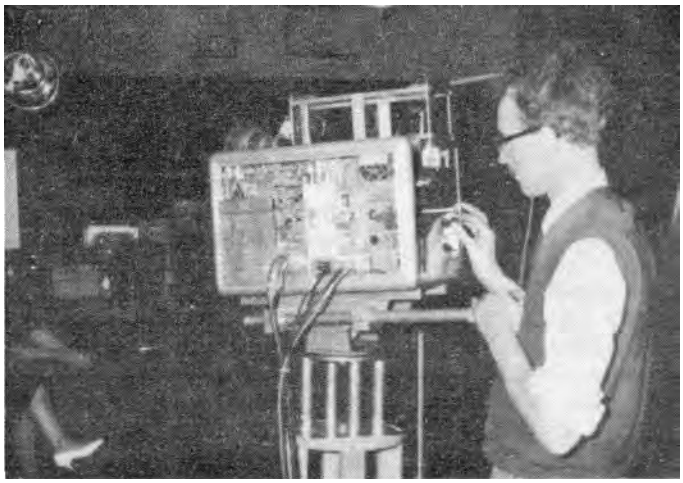
M Brown's rf unit was based around a pair of OC170 transistors and an OA47 diode, and modulated the video onto an rf carrier, so that an unmodified domestic tv could be used to display the picture. The advantage of this design was that it would fit into a small diecast box, being powered by a 9V battery.

A useful note also appeared from Arthur Critchley, on how amateurs could make their own printed circuit boards. The technique used thinned down matt black cellulose paint as a mask - applied in the way that etch resist pens would be when they later became available. The etching was done in a "solution of Ferric Chloride FeCl3 - obtained from the local chemist and dissolved in 6 parts water to 1 of FeCl3 by weight. Leave in solution about ½ hour. After etching wash well in clean water". (It is doubtful if any 'local chemist' would supply the FeCl3 now, and the 'instructions' would be littered with comments about 'Health and Safety' - and suitable containers - no doubt with lids would be specified !)



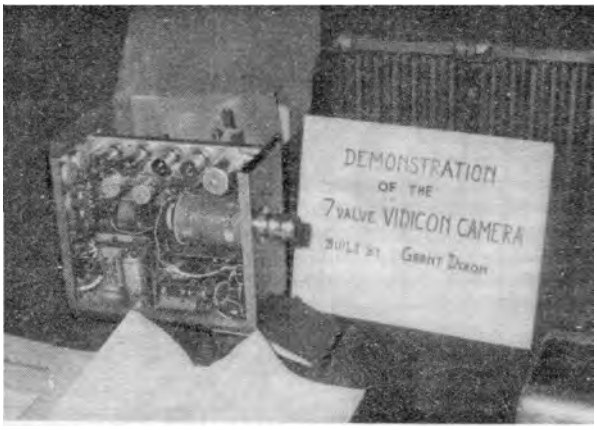
The 'What the other Chap is Doing' column included the usual range of news, including from Dennis Wheaton, at the foot of the Blue Mountains west of Sydney in Australia.. He enquired if BATC had heard the one about the nuclear scientist who put a potato in a reactor and finished up with fission chips.

Terry Lane (Right) 3 inch IO Camera

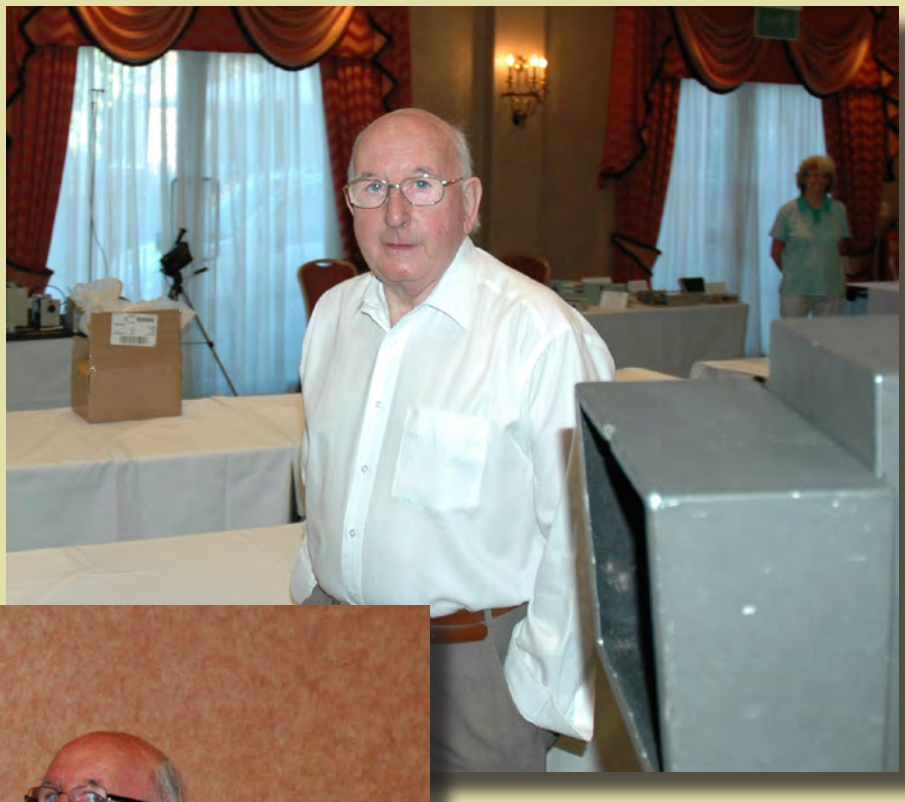


Bob Tebbutt

Grant Dixons Vidicon Camera



Bob Robson. GW8AGI
1930 – 2011



I am sad to report on the passing away of Bob Robson on September 19th.

Bob was involved in amateur television for several decades and in later years was a Committee member of the BATC. He was very much a home experimenter and I will always remember his magical ability to make wonderful looking circuit boards then mount them into the most inappropriate boxes with sticky tape and odd sized screws. His objective was always to make things work rather than make them look good, he was very successful at both.

I first met Bob on 2m when he complained I was causing interference on his stereo system. Thankfully the problem was at his end but it served as an introduction to a friendship that lasted nearly 30 years.

Together we featured in the "Bob & Brian Broadcasting" production which aired on national TV in 1996 and is archived on the BATC streamer site. He was active to the end, although illness prevented him from using his ATV station, he still kept in contact from his hospital bed through his laptop and wireless 'dongle'.

He will be missed by the considerable number of people through his association with BATC and other local societies he was involved in. He leaves behind his wife 'Betty' and children, our sympathies go to them.

Brian Kelly. GW6BWX

Return address: Fern House, Church Road, Harby, NG23 7ED