

# CQ-TV

Issue 236 Mar 2012



**DATV AND 70CM  
2012 CONVENTION  
405 LINES ON COMPACTFLASH  
LIGHTWORKS REVIEW  
DATV IN PERU  
HOW I GOT INTO ATV  
CONSTRUCTIONAL MATTERS  
DIGILITE PART 3**

ISSN 1466-6790

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## Caption Contest

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

From the Sitcom Allo Allo:  
Leeszen I shall say thees only  
wonce! "DIGILITE" Pardon! "Shhh!  
DIGILITE" Mark, G0NMY

"He said he could not construct Digilite.  
You know what to do." Wes, G8KZN.

"Trevor: Sir, home guard reporting for  
duty, Sir." General Brown "stupid boy,  
the war's over." Dave, G8ADM



"I can't believe you can still fit into  
your old uniform. The only thing I have  
that still fits is my helmet." Don Hill,  
KE6BXT

"I heard our editor is looking for another  
job, take this and go have a word will  
you?" Chris, G1FEF

...and the winner is Wes, G8KZN  
Congratulations, a caption generator  
will be on its way shortly.

This months photo (from our 2008  
BiAGM) is below, comments please to:  
[editor@batc.org.uk](mailto:editor@batc.org.uk)



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## Contact Details

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

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

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

Finally, you can always write a letter.

## Deadlines

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

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

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



# Editors Preamble

Here we are then, another new year, I wonder what this one will bring? There have been a lot of changes over the past year within the batc:

The members portal for example, at: <https://www.batc.org.uk/>

Members now have a host of additional benefits accessible there, you can send and receive txt messages, download your membership certificate, get yourself a free email address, keep your personal details up to date, download high resolution copies of CQ-TV (whether you're a Cyber member or not), if you're into streaming you can now control all your streams functions there as well.

The list of member benefits has grown considerably, and will continue to grow. If you have any ideas for services you would like to see in the members area, please get in touch with me and I may well add it to the TODO list.

Another new thing to appear, is the publication of CQ-TV in alternative

formats compatible with tablets and smartphones. Our membership at the time of writing was 58% electronic, with 42% preferring a physical magazine, this has changed a lot in the past year and the trend looks to be continuing into 2012.

So what does this mean long term? Will this mean the demise of the paper CQ-TV? There have been discussions along these lines within the committee, as it stands the committee are roughly split down the middle in terms of opinion on this subject. The final say is of course up to you, the members and I would be interested to hear any opinions you may have...

Talking of CQ-TV I am still looking for some help with the editing, I was completely underwhelmed by your response from my Situations Vacant advert in the last CQ-TV: I had a grand total of ZERO enquiries !!

I am still looking for help here, if no-one is interested in taking over as editor, how about a co-editor? What I could really use is someone to lay out the articles as

they come in, so I can put the magazine together once a quarter. If you enjoy that sort of thing and have a bit of spare time please get in touch, the club will supply the software, all you have to do is layout the occasional article as they come in.

Another new service is the batc phone number: 01400 41 42 43 a really easy to remember number that you can send text messages to as well as call in on! I've had a few messages already, it's ideal for sending me caption contest entries for example, if you're out and about and suddenly think of one.

And of course, you now all have a personalised magazine, with your membership number printed on the inside rear cover, so no more emails asking "what's my membership number?"

We've also lost a service: We no longer accept credit card payments over the phone, it was costing us more to run, than the transactions we used it for!

That's a quick roundup of 2011 for you, now please enjoy CQ-TV236 and 2012

- Chris, G1FEF



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

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

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

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

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

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

# 2012 Convention and Biennial General Meeting

It's that time again and this year we want to make the BiAGM just one part of an exciting and stimulating ATV 2012 Convention.

The focus of the event will be a lecture program with up to 7 talks on Saturday afternoon and Sunday.

The main themes of the talks will be Digital ATV, in particular the Digilite project, and how to get going on 70cms DATV with talks on aerials, pre-amps and power amps for DATV.

There will be a BATC open forum panel discussion and the weekend will also include:

- A number of live demos / group presentations;
- The BATC 2012 BiAGM will be held on Sunday morning;
- Specialist traders selling RF and video bits;
- The BATC shop;
- BATC members table top sales;
- A "test it and fix it" area where you can bring things to be tested on professional test equipment.

## Date / timing:

The ATV Convention will be held on Saturday 6th (doors open at 12 noon and lectures start at 1:30pm) and Sunday 7th October (start at 10am - close at 4pm) with the BiAGM taking place at 11am on Sunday.

## Location

The ATV Convention will be held in Basingstoke, right in the centre of the current hot spot of UK DATV activity.

Basingstoke offers good motorway connections from London & South Coast (M3), from the Midlands & North (A34) and west via M4 and A34.

There are direct trains from London / South Coast / Southampton airport / Midlands / Manchester / Newcastle and Heathrow airport is just 45 minutes away.

## The Venue:

The ATV Convention will be hosted in the new Everest Community Academy which has a 150 seat lecture theatre and open area for our use.

<http://www.everest.hants.sch.uk/>

In order to cover the costs for the weekend there will be a small charge for attending the convention, £15 for the 2 days when registering online and £10 per day on the door.

Please note that attendance to the BiAGM will be free.

Free tea and coffee will be available all weekend and sandwiches, cakes and fruit will be available for purchase at lunchtime.

Hotels / Convention dinner A special BATC rate of £65 B&B (single) and £75 (double) has been arranged at the Apollo (4 star) hotel which is within 1 mile of the convention venue

<http://www.apollohotels.com>

Please ring the hotel reservations directly on 01256 796700 (not via the website) and quote BATC to get this rate.

It is intended to hold the ATV Convention dinner on Saturday evening at the Apollo – details to follow, but please indicate your interest when registering on the BATC website.

There are a number of other hotels within 2 / 3 miles of the venue including Travelodge, Premier Inn and Holiday Inn.

## Other things to do:

It is not intended to arrange an XYL program, however the Vyne National Trust house is just 3 miles away:

<http://www.nationaltrust.org.uk/vyne>

The Jane Austen museum is less than 30

minutes away

<http://www.janeaustens-house-museum.org.uk/>

The historic city of Winchester is 20 minutes away by train, Portsmouth historic dockyard and the New Forest are less than 1 hour away by train or car.

Basingstoke has a very good modern shopping centre

<http://www.festivalplace.co.uk/>

The Hampshire Transport Museum

<http://www3.hants.gov.uk/milestones>

and a Ten Pin bowling alley and Ice Rink:

<http://www.planetice.co.uk/arena/Basingstoke>

Other shopping is also available in Southampton (30 mins), Reading (20 mins) and London is only 50 mins away.

## Get involved!

For more information, visit the convention web page where you will be able to see updated information on the event and register your attendance.

This is your convention where you will be able to meet and exchange ideas with others involved in our exciting hobby. If you have any ideas you would like to see included, if you are willing to come and tell others about your experiences in ATV or have something you want to demonstrate please contact Noel G8GTZ.



# AVCHD

by Trevor Brown G8CJS

Every Christmas I film my grandchildren opening their Christmas presents and this year I thought I would go up market and use two cameras, the usual home video camera using mini DV tape and a Canon Powershot S95 which is really a pocket stills camera, but boasts HD movie filming.

I started with the two cameras side by side producing two pictures roughly the same and gave a big hand clap so I could sync up the two takes in the editor later. One camera I left locked off on a tripod as a static shot (Canon S95) the other I used hand held for closeups.

I synced both takes up in the editor using the hand clap, because I wanted to use only one sound track, although both cameras recorded sound from internal mic's.

The reason for this is picture tracks are often composed of camera cuts so cutting between camera's always looks visually OK, this does not apply to the sound track which is a blend of sound and multiple sources are always mixed not cut.

Did it work well yes and no, lip sync was ok when cutting to the mini DV and keeping the Canon sound track, but the picture quality change between the standard resolution mini DV and the superior Canon stills camera really hurt and I abandoned the DV cam pictures and just used the Canon pictures.

The disadvantage to the Canon stills camera is the battery only lasts 30 mins in continuous shooting and you cannot zoom the camera lens once in record but then it is a stills camera shooting moving pictures and costing just over £200 from Amazon

The Canon files are H264 with extensions of MOV and the current editing software including Lightworks will cope with them, but most of the modern cameras use AVCHD

The "AVCHD" is a new high definition (HD) digital video camera recorder format recording 1080i and 720p signals onto certain media by using highly efficient codec technologies. The "AVCHD" is jointly established by Panasonic, and Sony Corporation.

A look on the internet reveals AVCHD editing software as follows

- Pinnacle Studio 11 Ultimate version provides an end-to-end HD video editing workflow, including native HDV and AVCHD editing
- Apple iMovie '08 supports standard and high definition video, including DV, HDV, MPEG-2, MPEG-4, and now AVCHD. However, Apple currently lists only a few AVCHD camcorders as tested and supported.
- Ulead VideoStudio 11 Plus version supports HD formats including AVCHD and MPEG-2 H. It would not open individual AVCHD files, but it could import clips from a folder. VideoStudio was a bit sluggish when dealing with AVCHD files. It took seconds to switch between the editing steps.
- Sony Vegas Studio 8 Platinum supports HD video, including HDV capture and editing. It also supports AVCHD import and edit, but only from Sony camcorders.
- CyberLink PowerDirector 6 supports high-definition video editing, with the HDV format for capture, editing, and export back to tape.
- Nero Vision 4 supports HDV and AVCHD editing (part of the Nero 7 Ultra Edition Enhanced suite, it processed HDV files after renaming to .MPG, and played and scanned through AVCHD files.

No mention of Lightworks, but that was installed and was simple enough to try all you need is a clip fortunately there are three AVCHD clips available for download from [www.avchdclips.com](http://www.avchdclips.com)

Sample 1: Mountain Stream

Sample 2: Hawaiian Surf

Sample 3: Wood Fire

They all have m2ts extensions but the internet also says there are mts extensions around but as yet I have not found any. Lightworks unfortunately does not import the clips, but my copy of Speed Edit 2 does. It is produced by Newtek and is a very easy to use software application, but is not mainstream so does not show up on the various information pages on the internet.

AVCHD does produce some stunning pictures and is a highly compressed format allowing pictures to be stored on SD cards, if you are not interested in cutting pictures up please download the clips and see for yourself. Downside all heavily compressed files are heavy on CPU resources, whereas lightly compressed files are much larger and as such do not require as much speed from the CPU but do require faster hard discs

My humble PC with its 4 CPU's did stutter when I asked it to scrub an AVCHD file I hope some more RAM will fix it as the motherboard and CPU are less than 12 months old, but they were purchased at a time of DV cam pictures and the bar has moved up.

Last words from the internet:

AVCHD is a high-definition recording format designed by Sony and Panasonic that uses H.264 (conforming to H.264 while adding additional application-specific features and constraints).

AVC-Intra is an intraframe-only compression format, developed by Panasonic. For the uninitiated intra means it has frames inter means it does not have frames.

Useful Links

AVCHD Information - [www.avchd-info.org](http://www.avchd-info.org)

<http://www.reelseo.com/how-to-edit-avchd/#ixzz113VztNaR>



# Lightworks, A Review

by Trevor Brown G8CJS

When I first saw the free download for Lightworks NLE software for my PC, I thought all my Christmas's had come at once see:

<http://www.lightworksbeta.com/>

This is not a trial download the site gives assurances on support and states that you will always be able to download and use the latest version of Lightworks for free. It goes on to say their next milestone will be releasing the source code to any developer who wants to build upon what they have started.

In the meantime, they invite you to get familiar with Lightworks which is described as: "an Academy and Emmy award winning professional-grade editor with over 20 years of history in the film and broadcast industry. Having cut hundreds of films such as Pulp Fiction, The Departed, Centurion and Shutter Island, it includes a full feature set of editorial tools -- from advanced trimming and media management, to stereoscopic support and realtime effects including multiple secondary colour correctors. Lightworks has an advanced effects pipeline, utilising the power of your GPU. And with support for up to 2K workflows with realtime effects."

The full technical spec is impressive:

[http://www.lightworksbeta.com/index.php?option=com\\_content&view=article&id=108&Itemid=247](http://www.lightworksbeta.com/index.php?option=com_content&view=article&id=108&Itemid=247)

It includes MXF, Quicktime, AVI, RED R3D, DPX, Avid DNxHD, ProRes and many more formats, and states that transcoding files on import is something of the past. I hate editors that insist on transcoding everything to a common format before you can edit, thankfully they are disappearing

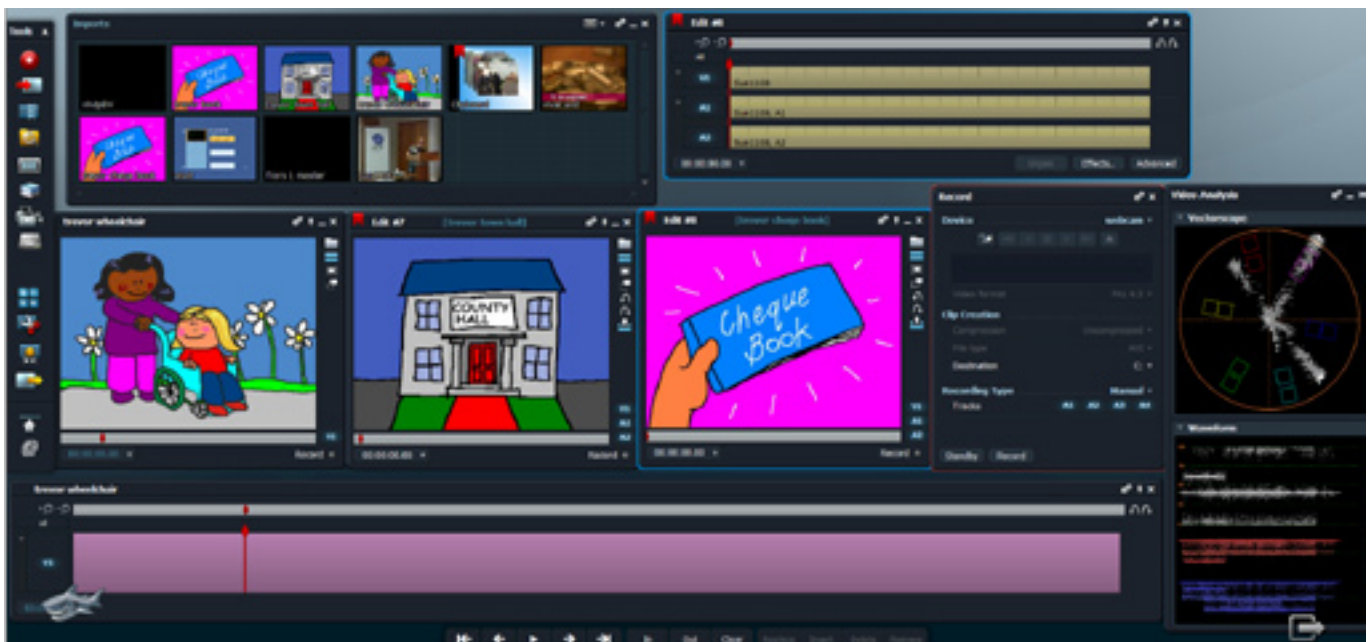
Never lose anything! Lightworks backs up every keystroke, NLE editors are prone to crashes some more than others, so what a blessing. Add to this Stereoscopic editing (I think that's got Mike's attention).

The codecs are impressive although some are an optional extra, but the charges for them should they be needed are reasonable.

The part of the technical spec that caught my attention was JKL trimming, import and export of AAF, OMF 1, OMF2 and Metadata. JKL refers to the keyboard keys for rev, play and rewind, a small thing but you would be surprised at the software that does not have these industry standard keys implemented.

EDL, OMF1, OMF2 and AAF are for making lists of the edit decisions, every editor makes a list, in fact that's all they do and then they update the various displays including the time line to fool you into thinking it has carried out your edit, but in reality it has only updated the edit or project list and will update the video file only when you render the project into a completed video. Edit lists are always in a format peculiar to the brand of editor; they often cannot be extracted in an industry standard format file. Why is this important, because it enables programmes to be recreated elsewhere by an online editor, as a way of splitting of the creative process from the technical process. The ability to extract these files in a common format is found only on high-end professional editing software.

Metadata is starting to appear more and is an imbedded file that contains format data about your video; this can be helpful for numerous reasons such as identifying the aspect ratio of the project, when burning a DVD, which is almost always another separate software package requiring information about your project and Metadata will carry this data without you having to answer questions again





Colour correctors are becoming more commonplace. Apple started the ball rolling when they took a £20K software application (Final Touch) and incorporated it into their editor Final Cut, which sells for just over £200, but for some strange reason they dropped it from version 10.

I am never sure when credits are claimed for kit, how much of the film was post produced on the said kit, or if it was it something sorted out between the sales team and the film producer over an expensive lunch. Feature films are cut on NLE, but somehow you still need film prints for the cinema, the process is called (DI) digital Intermediate, but not all films are made this way, the process of DI is still in its infancy presumable waiting to lose the "intermediate" and go for the full electronic cinema. So never get locked off on film credits for kit, unless you know the level of involvement the kit had in the making of the production.

So why give it away, in fact more than give it away ? they are hoping to make it open source and produce a MAC and Linux version.

Enough I was hooked and I hit the download button, and well it's a very professional desktop once you get there. There is a start menu to get through first, with standard questions about the format of the project you wish to create. I presume this is to set up metadata. Once through this menu, go for the third button down on the tool bar and you will be presented with a time line and monitor. All you need is to capture video, top red button should open the capture panel, or you may already have video clips on your computer hard drive, then how do you get them onto the time line ? After a morning of struggling I turned to You Tube, there are numerous videos that will take you through how to use this software. The first one was:

<http://www.youtube.com/watch?v=SK4ogYgnm4I>

There is no doubt that the gentleman presenting the clip, DV Dave can drive Lightworks, but the speed of his tutorial begs one to wonder if he auctions cars for a day job, still with frequent use of the pause button I found out how to import clips, (second button down on the tool bar). The clips you select from your hard-drive library then come up as a text list until you press start the button at the bottom of the import list,. It then took 3 mins before the 4GHz AVI I selected came up as an Icon, on my quad core PC, did I read native support for AVI, but then the downloaded version is a beta so is this a future feature or am I misunderstanding the concept of native support.

The next mystery was how do I get the clip onto the time line, my attempts failed so back to DV Dave; you drag it into the monitor. OK, I might have got there eventually, you can scrub the clip with a mouse click on the scrubber pointer and then drag it to the point you want to make changes, You can play or stop the clip with the space bar or use the icons at the bottom of the screen, but I could not control the scrubber with the JKL keys.

The cut, clear, in and out, buttons for manipulating the video within the time line are at the bottom of the screen. The effects buttons are on the bottom of the time line and should you complete your production then the advanced button in the bottom of the time line will reveal the render options, which in turn will lead you into a box to set aspect ratios and chose the file format you want to render your finished programme to, the choices are AVI, MXF and MOV, would have loved FLV here.

One of the things I did try was to import an FLV (the format we use for streamer files) and that was a No. The next file I tried was from my Canon S95 still camera which doubles as a Camcorder, the files would not import and although it recognise them it flagged them as HD

720p, but was unhappy with the 23.98 FPS which I cannot find a menu in the canon camera to change, 23.976 is supposed to be supported so I am at a loss on this.

One place it did score was MJPEGS which is the format recorded by the black magic card in the small mobile studio kit we use at AMSAT and BATC BGM's, previously these files had to be rendered to AVI files so they can be edited, editing is often only a top and tail and sometimes add a strap line, then they need rendering to AVI and re rendering to FLV in a third software package and then uploading via the internet, if I could lose one or more of these steps, by using this free software then I would indeed give it the thumbs up.

I did not find out how to export an AAF, but I could always go back to DV Dave, the operation of this NLE is not what I am used to, and any NLE can take quite a few hours to get on top of, there is a lot of help on the internet, in particular You Tube, and well the price is right. Am I going to put a couple of weeks aside to get on top of it? Well, I will give it some thought, but this would probably be the third NLE I have spent time learning to drive, and there are others I like better, but none at the price of Lightworks. If you don't have an NLE then why not download Lightworks and commit some time to learning it and see if you can put something together for the streamer Library.

To sum up, it was a little difficult to manipulate images in the time line, and it did not have the feel that other NLE editors do, would have liked to get to the bottom of JKL keys, but using the space bar for play and stop I could cope with, I would have liked the ability to create captions I loved the price and loved the fact it imported MJPEGS. I will try and find more time to get to better grips with it

**Text or Telephone us on:**  
**01400 41 42 43**

# The Digilite Project - Part 3

## ADDITIONS TO THE PARTS LIST:

There are several devices that are not part of the original parts list as they do not appear on the circuit diagram but which are needed to get the system running...

The USB interface sub-panel FT2232H that plugs into the board via the two dual 13 pin headers CN2 and CN3. This device has to be programmed. It is now available preprogrammed from the batc shop ready to plug in and use. Farnell part No:169-7465

The local oscillator giving an output of up to 10dBm at the required modulator output frequency.

The PIC 16F628A IC programmed for use in the G8BYI add-on preset tuning panel.

The above items are available from the batc shop.

The WinTv PVR150,250 PCI capture card. (Second-hand. No longer manufactured). The external PVR2 version will work but getting it installed can be very fussy.

## CONSTRUCTIONAL NOTES:

### Version 5.6 pcb only:

Scrape away the green protective coating for mounting the MMIC U5 depending on the shape of the device you are using, there are several alternative smd devices available.

A 100pF capacitor can be used to bypass the stage if you wish to amplify the Rf in a separate unit.

Do not mount the crystal too low to the board, it could short out the capacitors, it might be better to leave a few millimetres gap and if using a full height crystal use glue gun adhesive or similar to support it vertically. Spacing has been increased from version 5.7

Ensure the modification around R20 has been done (corrected from v 5.7).

Ensure that C20 is grounded at the lower end (corrected from v 5.7).

Add a 0.3uF (radial or axial) on the 12v DC input pin to ground (SMD added from v5.7).

Full details are on the batc forum or on the DigiLite website.

### All versions:

The 8v regulator can be used to run the local oscillator board if necessary, but it would be better to use a separate regulator. It is however well within the capabilities of the 8V regulator to run the entire system (About 150mA) you will have to mount it on a heat sink or on to the metal of the box you are fitting it into as it also supplies input to the 5v and 3.3v regulators to allow up to 16v dc input.

Early circuit diagrams show the earth return resistors on the bias pots R31, R35 as 100 ohms, they have been changed to 1k resistors to improve the range of the bias pots.

If you do not wish to use the smd tantalum electrolytics, regular radial capacitors will work ok, just bend the ends of the legs into an 'L' shape to fit the solder pads. Support with glue gun adhesive etc.

All through-holes 'vias' are solder plated so soldering those components on the bottom side of the board is sufficient for a good connection without needing to solder the top connection.

JP1 is an optional header to allow for future options including SD card reader and In-circuit programming of the PIC chip. No need to fit it at this time.

The smaller headers (2 way and 3 way ) can be cut from a 10 way type.

The half-rail regulators U3/U4 have legs that are quite close together so care

should be taken not to s/c the tracks when fitting them. Spacing widened on later version boards.

The input balun can be fitted either way round as it is a 1:1 ratio.

Photographs of Spectrum Analyser displays of DigiLite outputs supplied by Rob M0DTS.

Getting the level of the local oscillator right is very important. Too much and it will break through the top of the output waveform and the decoder will not accept the signal. When you first switch on your completed board you may get a mess of carriers and unwanted signals as seen in the photo but careful balancing of the Upper and the Lower Sidebands to get them equal (you can switch them off/on with the DigiLite Transmit programme if it helps) using the four presets as described before you should end up with a digital signal that will give good results on commercial receivers at 4Ms/s.



Get the 'shoulders' balanced and then check the signal out on your satellite receiver. You probably will end up tweaking the pots to get a high 'quality' reading on the OSG anyway, so with patience you can manage a good quality signal without a spectrum analyser.

## INITIAL CHECKLIST

Start WinTV7 or GB-PVR , set it to record. Open Windows Explorer and look on the main C: drive under Temp folder. Look for recordings by the WinTv or GB-PVR programmes. Check out previous attempts to record by double-clicking the file and see that they replay as mpeg files ok.

Run the DigiLite Config programme. Ensure that the COM port numbers are the same as those on the Control Panel/ Devices list. Close the programme. Click the DigiLite Transmit programme. Ensure that the Transmit is running correctly and that there is a line of changing data on the 'Command Prompt' screen as the stream is sent to the serialiser.

The LED on the serialiser should be winking in an equal on-off every second. Connect the output of the DigiLite into the aerial connector of your satellite box (watch out for the dc on the cable!) Loose coupling should be fine.

Ensure that the signal strength on the info screen is at least 60%. Adjust the four presets as previously described, very small, slow movements watch the info screen on your satellite receiver / tv there should eventually be a flash of picture or better still a quality reading as well.

### Who needs a Spectrum Analyser anyway?

I have been involved in getting a couple of boards running locally for guys without Spectrum Analysers . In all cases when the dc levels appear to be correct and wiring/soldering errors have been eliminated, the fault is TOO MUCH LOCAL OSCILLATOR signal, sometimes induced into the board from the poorly screened local oscillator can and cable. Keep it short, keep it grounded and seal the screening can on the oscillator as if it was gas rather than signal that was trying to escape!

If you are not using the Ultram VCO board make sure that the phase noise figure is good enough for digital modulation. If you are using the Ultram, take the local oscillator output from the input to the MMIC on the VCO board. If preferred you can remove the MMIC entirely.

There is sufficient signal from the VCO chip to operate the modulator chip via the balun but may need the three attenuator resistors on the input of DigiLite board removed and R27 (82ohm) replaced with a 0 ohm resistor to couple the local oscillator signal to the balun.

Hook the output of the DigiLite board to the aerial socket of the satellite receiver (watch the dc line to the lnb!) and aim to get at least 60% signal level. If you wish you might try in-line attenuators on the local oscillator feed. Don't use homemade attenuator boards for the reasons given above. Here is my preferred method of initial setup:

Set all four pots to mid-way.

Gently and slowly edge one of the 'level' pots watching the satellite box info display. It takes a moment or two for the quality reading to kick in. Once it has, move to the other pot and aim to raise the level of the quality reading until the level drops back down again.

If no Quality reading leave the 'level' pots at centre travel and adjust the two bias pots a small nudge clockwise and repeat the settings described above of the level pots. The dc readings on the level pots are also affected by the dc coming out of the 74AC574 IC1. Check the 3v line is within tolerance. Check voltages on the output pins of IC1. Always read IC voltages on the IC pins not on nearby components.

The small amount of bandwidth used by the digital signal means that by dropping to just 2Ms/s it is possible to squeeze a colour tv signal into the 70cm band. It requires a slightly different version of the modulator chip and changes to the filter coils otherwise it is the same circuit and board. Here is more information from Malcolm who has successfully built one.

### RUNNING DIGILITE ON 70CM by Malcolm G0UHY

I have managed to construct a version of the DigiLite for use on the 70cm band. I'm using the same serialiser and modulator circuit. Although some people have managed to get the modulator to work on 70cm using the AD8346 chip, it is not really intended to run at that frequency. I have therefore replaced the AD8346 with an AD8345 which is identical physically but is intended to run at lower frequencies.

The Nyquist filter also needs to be modified to allow the transmitter to operate at 2Ms/s and keep the required bandwidth down. Change the Nyquist filter values to 1.2nF/33uH/3.9nF/27uH/1.2nF

The VCO used in this design is a synthesiser kit sold by SDR kits. The good thing about this is it is easily tuned over the 70cm band and comes with an LCD display. Memories and separate VFOs are also provided making operation and frequency changing simple.

The O/P from the DigiLite is quite low and I'm using a separate "brick" PA which gives about 60W out. The unit is still small, even with a suitable heatsink, making it ideal for portable use with a laptop. On the receive side I'm using a converted commercial upconverter available from e Bay (details on Rob, MODTS's site ) and a standard digital satellite receiver.





## Here is further information on using DigiLite on 70cms from G8BYI:

To set up PVR for 2MS/s, go into GBPVR's Config utility and edit the settings for Custom1 Quality.

Video Resolution PAL 352/576 : Bit Rate 1500 Constant : Audio Bit Rate 192 : Audio Sample Rate 48kHz Save and exit.

1500 is actually too fast for 2MS/s, but GBPVR won't allow a lower setting. To get around this, you need to find GBPVR's install directory and edit DIRECT.INI

Look for the section [SETUP-Custom1 Quality]. Change the Bit Rate to 1350. Save and exit.

Having done this, if you try to edit the Custom1 Quality settings with GBPVR, Config will crash. A full-function tuning board with LCD will be described in a future edition of CQTV. If you want to use the DigiLite as a mobile unit you will need a laptop pc and an external WinTV PVR2 capture unit.

The BATC Shop now stocks the 437MHz Ultram board.

## DIGILITE THE FUTURE:

Brian G4EWJ is looking into improving (narrowing) the transmitted signal bandwidth by improved digital filtering. This might be achieved with a small add-on board.

Using the transport stream directly from the Win TV card it might be possible to avoid the need to use a hard drive. As future improvements come along, In-Circuit Programming of the PIC chip IC2 will mean that a smaller smd version can be used and no socket will be required.

The local oscillator and controller could be mounted on the same board. A fully tunable VCO controller with LCD display by Richard G8BYI and will appear as a separate CQ-TV article shortly.

This is an evolving system but has the benefit of being very manageable for the home constructor and with the help

available on the BATC Forum DigiLite pages there is no excuse for anyone not tackling and discovering digital ATV.

Thanks to the BATC shop all the difficult to source parts are now easily available and the cost is a fraction of that of commercial encoding systems.

Soldering in the tricky IC3 modulator chip may put some people off and it is envisaged that some pcbs with the chips already fitted could be made available if there is enough demand.

The Project is a real team effort and there are a number of very generous people who have donated their time, hardware and software designs to enable me to assemble all this information for your benefit. Thanks in particular to Brian G4EWJ, Rob M0DTS, Malcolm G0UHY and Richard G8BYI but also to many others who have passed on their suggestions and improvements to enable the Project to get to this stage.

I repeat that I have only assembled the information others have provided and squeezed it into one printed circuit board. I take no credit for anything else herein. Please respect the individual rights of the software providers when you download it and please do not alter it and publish it elsewhere without the agreement of the authors. Having said that we encourage you to move the project on. If you have some bright ideas on how it can be improved let us all know via the batc forum. Do tell us how you get on with your digital ATV build.

Of course if you have any problems building your DigiLite the guys will all be there to help you sort it out. On behalf of all the DigiLite Project Team, we hope you enjoy experimenting with Digital ATV.

Dave Kenward G8AJN

## SIMPLE TUNING ADD-ON by Richard G8BYI:

Here is a very useful add-on for the Ultram Tech local oscillator used with the DigiLite board. The original oscillator is a single frequency device, but by replacing the on-board 8pin PIC with this simple unit you can select one of

five preset channels using a single press button switch. The on-board regulator allows it to run from 8 to 18 volts dc.

## ADAPTING THE ULTRAM LOCAL OSCILLATOR

The Local Oscillator used in our version uses a low cost commercially made board by Ultram Technologies which uses a digitally controlled oscillator/ pll IC ADF4360 to generate the required output frequency. The parameters for the oscillator are applied at switch-on by the 8pin PIC chip 12F629.

In order to keep the costs to a minimum the Ultram Tech. board comes preset to a single frequency chosen by the purchaser. It is not fitted in any casing and has no output connector fitted.

Richard G8BYI has designed an add-on board which replaces the 8-pin PIC chip with a larger device PIC16F628 mounted on a small SMD single-sided add-on board. The benefit of using this is to get 5 preset frequencies which can be stepped through with a press-button. By using LEDs as indicators and a single press-button switch the cost is minimal.



The five common frequencies are 1244, 1248, 1249, 1262, 1280 built into the software but they can be replaced by re-programming if other frequencies are required. If you get a local oscillator board and wish to use the 5 channel add-on you will need to remove the 8 pin PIC chip and connect the 3 wires from the add-on board connector JP1 to the pins as shown.

pin 1 to oscillator board ground.

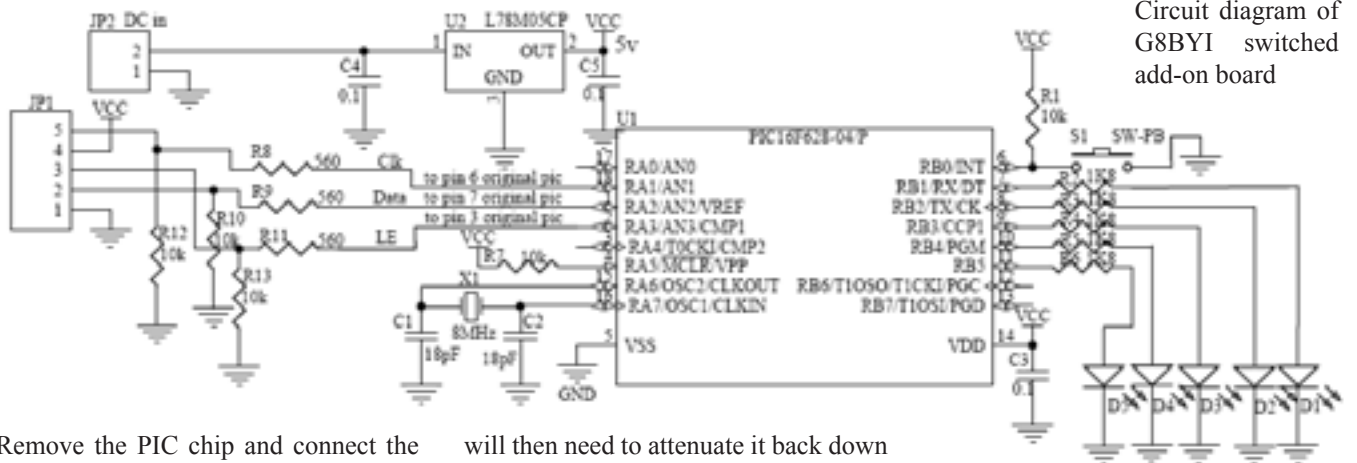
pin 2 to osc board pin 7 (Data)

pin 3 to osc board pin 3 (LE)

pin 4 +5v connection. Not needed.

pin 5 to osc board pin 6 (Clock)

The connector can be omitted and the boards can be wired direct if preferred.



Circuit diagram of G8BYI switched add-on board

Remove the PIC chip and connect the three wires from the new PIC board to pads 3,6,7. The DC HT (Max 9 volt) connects to the tab at top right of the picture. For the DigiLite board the extra gain of the MMIC is not required so the output should be taken after the coupling capacitor on the input to the MMIC. The full output might be useful for other projects. It would be best to run the three wires in via feedthrough capacitors, but keep the wires short as possible, I have used ribbon cable about 3 inches long without problems, so its up to you.

Thanks to Richard G8BYI for permission to use his circuit and software.

Download the latest version of the software at <http://www.g8ajn.tv/dlither3.html>

The preset channels can be changed in software to suit other countries. An alternative selection has now been programmed by Richard to suit the USA channels. There is no need to use the extra gain from the MMIC as you

will then need to attenuate it back down again at the input to the DigiLite board. Take your output connection from the input side of the MMIC (see photo ) and remove any attenuation on the input to the DigiLite board. The MMIC can be removed if preferred. I would leave it in as it can be used to provide a useful 23cms signal source for other projects. If you need to increase the attenuation on the DigiLite board input, try R27=56 and R28 and R38=270 (about 20dB) modifying the Ultram VCO board

#### HELP! MY DIGILITE DOES NOT WORK!

The best approach to fault-finding is to check the separate areas of the DigiLite and follow the signal path in each area.

THE DATA : Is the WinTv recording onto your hard drive ok? Find the file you have recorded and click on it to run it as a mpeg2 video file. It should run on your pc with your installed viewer program eg Windows Media Player.

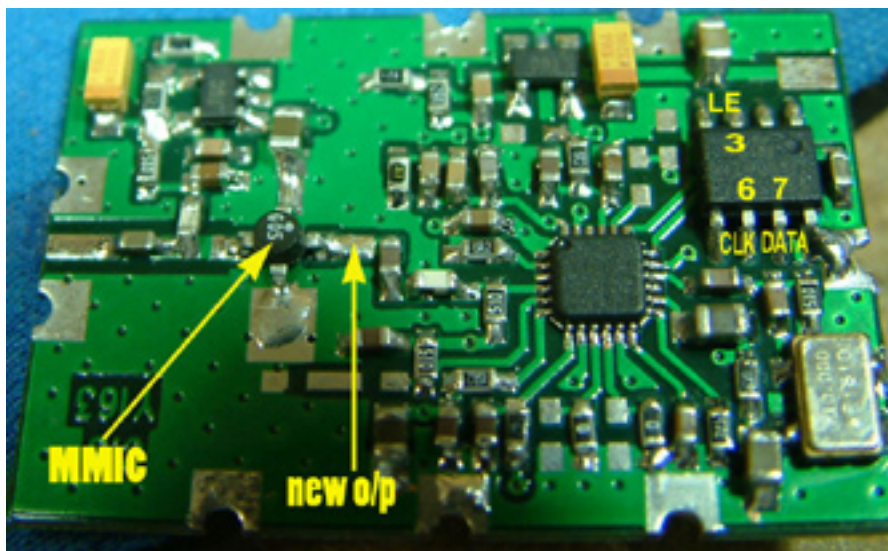
THE USB INTERFACE : Is the LED on the DigiLite(DL) winking once a

second? If not, investigate the USB com port on your Windows/ Control Panel/Hardware Devices to ensure that the USB is being recognised by the PC. Check your settings on the DL Config program and ensure the DL Transmit program is finding the mpeg file on your drive.

THE BOARD: Assuming all the above check out ok and the led is good, you may have a problem with your construction. There are lots of quite close connections on the DL board so a good magnifying bench lamp is essential. Check across the board for poorly soldered components. SMD components can be 'askew' and that will allow short circuits to nearby parts. Wrong values are another possibility.

VOLTAGES: The board draws about 140mA at 12v in. Check the 3v,5v and 8v lines are ok. The pots R29/R30 (I & Q Bias) should have about 2.1v on their sliders, R16/R23 (I & Q Level) should have 4v on sliders. The modulator chip IC4 should have 3.5 to 4 v on its out pin 11. The output leg of the MMIC should have about 4v on it. Using a 'scope to see the waveforms from the serialiser into the modulator section is difficult as the data appears 'jumbled & distorted' but it should be very similar on the I and Q lines.

One of the most common causes of no digital output is the level of the local oscillator in on JP2 being too high . If you are using the Ultram board take the drive from before the MMIC and remove the DL input attenuator resistors R28 and R38 and fitting a link, 0R smd, as R27. This should get you a local oscillator input of the correct level for the mod chip.





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If you are not using the Ultram VCO board make sure that the phase noise figure is good enough for digital modulation. If you are using the Ultram, take the local oscillator output from the input to the MMIC on the VCO board.

There is sufficient signal from the VCO chip to operate the modulator chip via the balun but may need the three attenuator resistors on the input of DigiLite board removed and R27 (82ohm) replaced with a 0 ohm resistor to couple the local oscillator signal to the balun.

Hook the output of the DigiLite board to the aerial socket of the satellite receiver (watch the dc line to the lnb!) directly or lose coupled twisted wires and aim to get at least 60% signal level. Signals bouncing around a room will even cancel out and cause great difficulties in setting up .

If you wish you might try in-line attenuators on the local oscillator feed. Don't use unscreened homemade attenuator boards for the reasons given above. Here is my preferred method of initial setup: Set all four pots to mid-

way. Gently and slowly edge one of the 'level' pots watching the satellite box info display. It takes a moment or two for the quality reading to kick in. Once it has, move to the other pot and aim to raise the level of the quality reading until the level drops back down again. If no Quality reading leave the 'level' pots at centre travel and adjust the two bias pots a small nudge clockwise and repeat the settings described above of the level pots. The dc readings on the level pots are also affected by the dc coming out of the 74AC574 IC1. Check the 3v line is within tolerance. Check voltages on the output pins of IC1. Always read IC voltages on the IC pins not on nearby components. Patience gets results. Visit the batc forum and we will talk you to success!

Good luck,  
Dave G8AJN

## All Seeing Eye

*Dicky Howett scans a pre-war magazine.*

Billed as a 'Radio and Television number' the August 27th 1938 edition of 'Weekly Illustrated' featured glimpses of pre-war BBC television, now 75 years of age. So what did those '5 thousand lookers-in' get to see? Well, a back stage murder for starters, screened live from the studios at Alexandra Palace and plenty of scantily-clad young ladies for seconds.

Billed as a 'Telecrime' devised by Eric Crozier of Weekly Illustrated, the drama involved the viewers by dishing clues as the show proceeded. The viewers then had to guess 'who dun it'. Of the quality of the drama, one has to wonder, but the photos taken from the screen (and re-printed in a magazine) show a remarkable pictorial quality. On a good day these 405 line monochrome images, shot with Emitron cameras with reverse angle and upside down viewfinders, must have been truly remarkable.



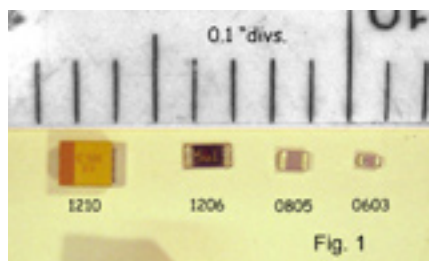


# Constructional Matters

by Mike Cox

Our Chairman has asked me to write a few words about construction of kit, particularly relating to the use of surface mount components. Let me take you back about 25 years when I was getting Cox Associates going. In my previous existence, we had embarked on a series of thin film modules for things like crosspoints, and dc restorers for use in switch matrices. As I no longer had access to this source of supply, the driver was to build our own. As we had to use a different circuit design, prototypes were built using conventional pcbs laid out to accommodate SM components. Batches of these were made and assembled. The assembly method was crude – solder cream was laid down on the pads, the components were placed, and a Black and Decker paint stripper provided the reflow heat. One or two boards fried, but the majority worked. Our assembly sub-contractor, who was a tenant in our building, acquired an infrared reflow tunnel, and we were away. After a year or two, we got a thick film version of the crosspoint made.

That is all very well when one is making quantities of products using large numbers of pcbs. As a home constructor, life is more difficult. Component sizes are dropping, and whereas 20 years ago, the 1206 resistor was common, now 0805, 0603 and even 0402 sizes are common. It is becoming difficult to find stockists of 1206 resistors in all values.



I am grateful to Bernd Kaa, DG4RBF, who wrote an article in VHF Comms recently on this topic.

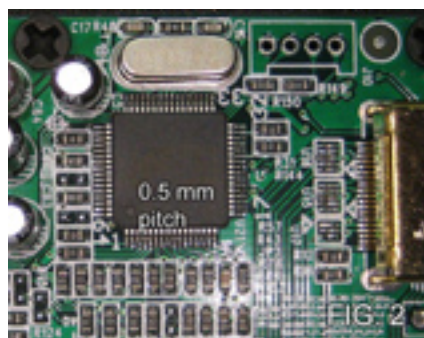
If you are presented with a PCB, with all components, you only have to assemble it. This can be done in several ways, depending on the soldering

method you choose to use. If the board is well tinned, and your components are likewise, additional solder may not be needed. A suitable flux is what is needed for the tinning to flow and anchor the component to its pads.

If you use solder cream, then the cream has to be spread thinly onto the pads. The component then has to be carefully placed on the pads. The board is best kept flat and horizontal for this part. You do not have to place all components at once; it is better to place and solder a few at a time. Also leave ICs until later. For soldering, a small but hot bit is needed, [Some of the Weller Irons with appropriate bits are suitable] and a magnifying light is very useful, even a binocular microscope. The object is to see what you are doing, and with 0.5 mm pad spacing, this is critical.

Note that the solder cream or solder you use should be lead free as most components these days are lead free. Likewise cored solder should be lead free, but if you are not selling the product, this is not essential. Melting point of lead free solder or cream is about 200 C higher than lead/tin solder, and will need a higher temperature soldering iron. This will deteriorate quicker than a lower temperature bit, and should not be left on when not being used.

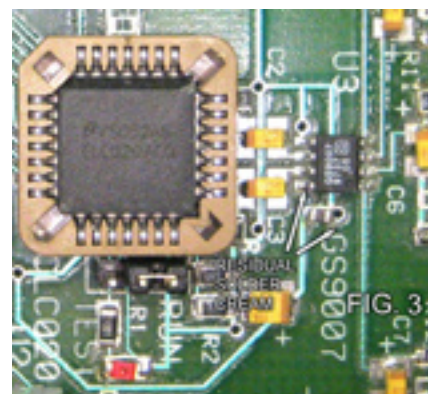
It is worth experimenting with some bigger devices such as SOIC 14 or 16 pin ICs, and 1206 sized components before attempting fitting a 0.5 mm multi-pin package. [Fig. 2 shows a typical 0.5 mm package in an HDMI splitter unit] You will have the better of me here because the finest [size] package I have fitted is the Gennum SDI 8 x 8 routing switcher,



GX9533, which is a 100 pin package with 0.635 mm pin spacing, I also had to create the library shape for that one. [CQ-TV 207, p8 – 11]

If any one would like a bit of spare pcb with pads for larger devices to practice on, and perhaps one or two devices for fit, get in touch with me via the Editor, and I will see what I can do. Luckily a perusal of the Digilite Project parts list shows that most of the components are not the smallest. There is a pair of 0603 inductors, and some 0805 capacitors, but the rest are 1206 or larger.

One of the problems with solder cream is that the board frequently has a lot of very small globules of solder left on it that are difficult to completely remove. They probably won't do any harm, but they don't look very pretty. [Fig. 3]



Bernd gives a good tip [among many] to placing ICs. He suggests laying the IC over its pads, then soldering two pins at diagonal corners of the chip. This then anchors the chip, and you can then go on to carefully soldering the other pins. He also makes some valid points about soldering irons, with advice not to use a very light iron, but one of the meatier Weller irons with a 0.8 mm bit. [Fig. 4 Weller TCP iron with PTFx bit] The numbers on Weller irons indicate the temperature they work at; a -7 bit works at 3700 while a -9 bit works at 4800, a bit hot.

One of the things I did while preparing for this article was to make a "Poor Man's Ring Light" to use with my Canon Ixus camera, which tends to be my workhorse. This has taken nearly



1900 pictures in the 4 or so years I have had it. The ring light is built on a piece of 0.8 mm FR4 cu-clad laminate, with a hole for the lens. Fig. 5 shows the construction. Three 3W LEDs which I found in the CDs [CQTVs passim] were used in series, with a PP3 battery for power. At least two of the figures for this article were taken using it. The LEDs were “Super-Glued” to the laminate, as was the wiring and switch. “Velcro” pads at the corners anchored the panel to the camera.

I hope I have covered the salient points about placing SM components in this short piece. There are some golden rules:

- Take your time.
- Be able to see clearly what you are doing. Fig. 6 & Fig.7 shows a magnifier light in action.
- Practice first on a scrap PCB.

As an alternative to a magnifier light, you could use a cheap video camera, or a webcam. Maplin’s have such things. [Fig. 8 shows such a set up, with camera looking at PCB, and display on monitor.]

#### List of suppliers

##### A. FLUX

Farnell: FL88 flux, 15 ml pen, order code 876732 @ £6.97 + VAT

RS: RMA Solder Flux 9 g pen, order code 425-9379 @ £7.00 + VAT

Rapid: SMF12P, 12 ml pen, order code 87-4426 @ £5.67 + VAT  
[Prices correct at time of writing, December 2011]

They will also stock Weller and other makes of iron, RS stock solder cream as well.



B. Illuminated Magnifiers

RS: A range from bench magnifier @ £29.40 [+VAT], order code 137-452, to a flexible magnifier @ £44.25 [+VAT], order code 137-480



Rapid: Their own @ £34.11 [+VAT] order code 86-3366,  
Long reach mag. lamp  
@ £58.24 [+VAT] order code 86-3333.

Machine Mart: I got my magnifier from here. They have many branches around the UK.

<http://uk.farnell.com>  
<http://uk.rs-online.com/web>  
<http://www.rapidonline.com>  
<http://www.maplin.co.uk>

Good luck! I am off to get some flux from RS.

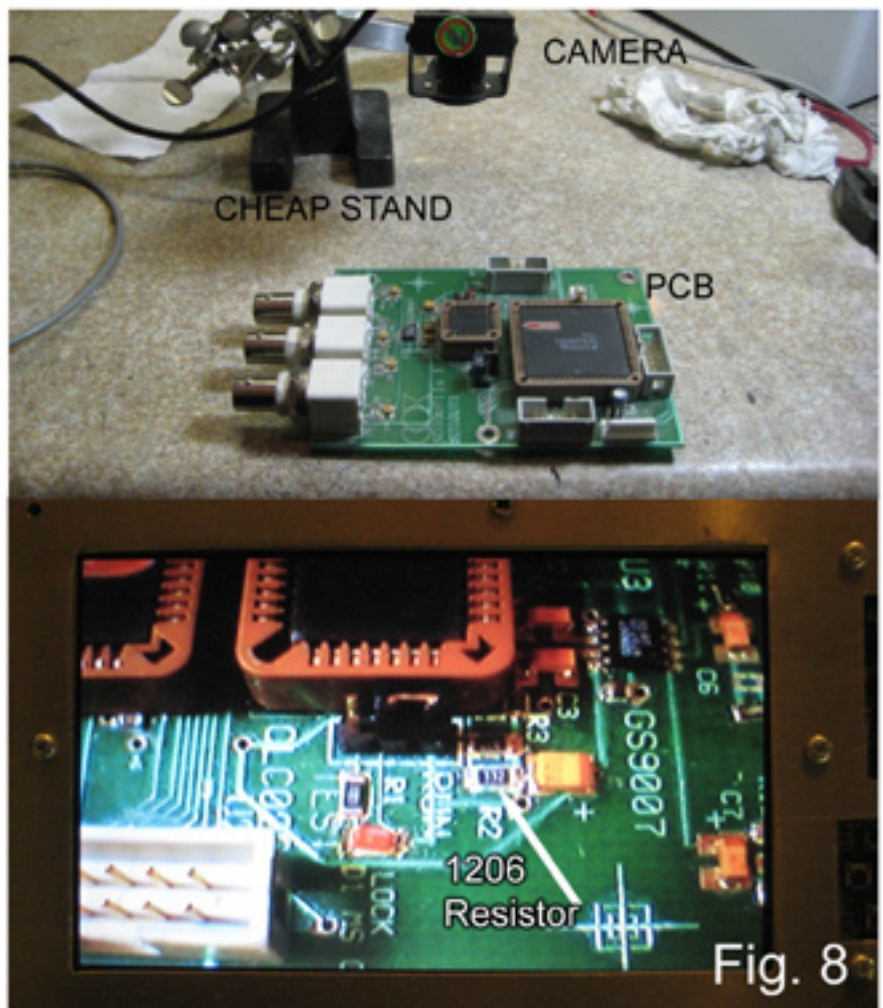


Fig. 8



# A Compact Flash player for 405 Lines

by Karen Orton

## Overview

The device described in this project permits replay of 405 line video and audio from a compact flash card. The hardware is minimalist and simple - three ICs, four if you include the power regulator.

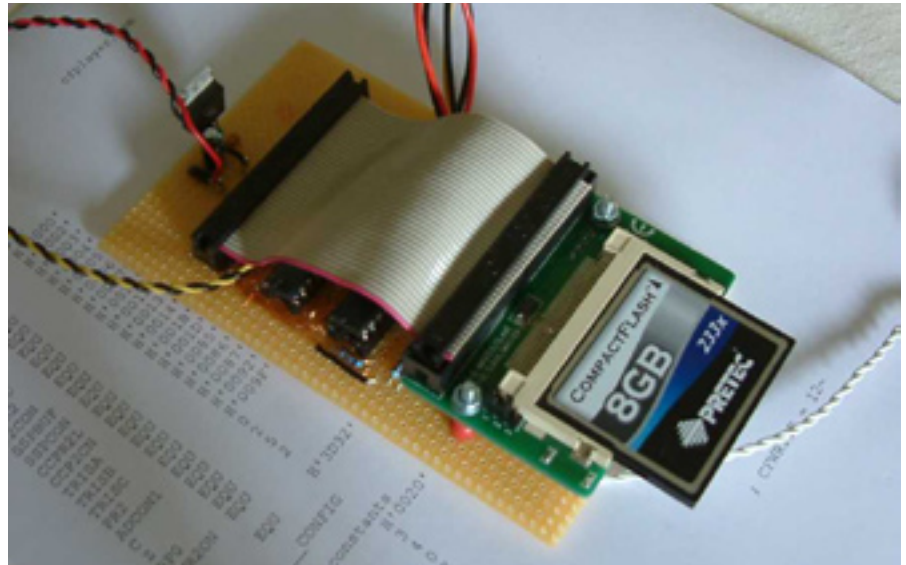
The simplicity of the design is made possible by streaming video data directly from the card and onto a video DAC without use of intermediate buffering. This means that video signals are stored in an uncompressed format on the compact flash card, which leads to considerably less play time than an equivalent amount of MPEG material.

For example, an 8GByte compact flash card, which might hold an entire movie in compressed form, may only store twenty minutes of uncompressed material. The aim however, is to provide a good source of signals for the obsolete 405 line standard, for which no modern consumer source exists.

## Disclaimer

This project is experimental and depends upon characteristics of devices that are not specified by their manufacturers. It is possible that the design won't work with some compact flash cards, or with ICs obtained from a different batch or production run. The features in question may be changed by the manufacturer without notice, possibly making this design useless. The PIC employed in this project, while the fastest of its type, is over-clocked.

This project is supplied as a courtesy to other experimenters and no responsibility is accepted by the author for any loss or damage that might occur as a result of using the information supplied in this project. The copyright for the firmware source code remains with the author at all times however, it may be freely used for non-profit purposes.



## Project components

The project comprises a small amount of hardware. In addition, there is some Linux software for the preparation of the uncompressed data required by the compact flash card.

## Hardware

The hardware for the project consists of a board bearing three ICs - a PIC, a DAC and an octal latch. There are also some discrete components. The board is powered by a standard 5V regulator. Compact flash attachment is accomplished by use of an external IDE-to-Compact Flash adapter which are available very cheaply on the internet. Two connectors are provided for this purpose: a 40 way box header for IDE cable attachment and a power connector to provide power for the compact flash adapter. Note that there will almost certainly be a 'master/slave' link on the adapter. This must be set to the 'master' position.

There are three other connections to be made to the main board: external power (9V); the video output and the audio output. The video output should look into a 75 Ohm load to ensure correct video drive levels. The audio output is approximately 800mV peak-to-peak when driving a 5k Ohm load. A Pretec 233x 8GByte compact flash card was used during the project's development.

## Data preparation

To prepare data for the compact flash card you will need a Linux computer with 'ffmpeg' installed on it. 'ffmpeg' is a powerful freeware media format converter and provides the standards conversion required to create the uncompressed video data. 'ffmpeg' accepts a wide range of file formats, however, it is assumed that the source video material is essentially of 625-line origin with a 4:3 aspect ratio. One source might be clips ripped from region two DVDs but I cannot advise that as it involves copyright infringement.

There are three items of software needed for preparing data for the compact flash card:

1. The Linux shell script 'mkcfscript'.
2. The Linux shell script 'findcf'.
3. The 'C' program 'mkcf.c'

The scripts are supplied with '.txt' extensions so as to make them easier to manipulate under the Windows OS on which this document was created. These extensions should be removed once they are in a Linux environment. The scripts will also need to be given execute permission. This is easily done by right clicking on each script, selecting 'properties' and then selecting the 'permissions' tab. A tick box for



awarding execute permission will be found on this tab.

The procedure I use is as follows:

I ensure that my scripts, the program 'mkcf.c' and my source movie file are all on my desktop. I then open a terminal window, make myself a super user, and then change directory to my desktop by typing:

```
sudo su -  
(enter my account password at the prompt)  
cd ~karen  
cd Desktop
```

Super user privilege is needed in order to do any kind of access to the compact flash card. Be wary when in this state because a super user is capable of immense damage! I make myself a super user routinely when doing anything connected with my compact flash player, even if I am not planning to write to the compact flash card itself. The reason I do this is because certain temporary files may become locked to me if they were created as a super user and later accessed as a normal user.

The 'C' program 'mkcf.c' will need to be compiled. This need only be done once and is accomplished by typing:

```
gcc -D_FILE_OFFSET_BITS=64 -Wall  
-o mkcf mkcf.c
```

The Linux shell script 'mkcfscript' manages the preparation of the data for the compact flash card and involves three phases:

1. The script calls 'ffmpeg' to create a file of raw video data called 'video.tmp'
2. The script calls 'ffmpeg' to create a file of raw audio data called 'audio.tmp'
3. Finally, the script runs the supplied program 'mkcf' to combine these temporary files into a file suitable for the compact flash card.

I run the script by typing:

```
./mkcfscript ./<filename> ./cfbin
```

Note the '.' at the beginning of each argument. Do not omit these. If the

script succeeds, then the file 'cfbin' will hold the binary data for the compact flash card.

Getting the binary safely onto the card is a somewhat fraught undertaking. It is a matter of identifying the card's physical disk file in /dev and copying 'cfbin' onto this. This is EXTREMELY DANGEROUS as a mistake could overwrite your hard disk or a flash drive containing valuable data.

I would advise unplugging all removable media other than the compact flash card destined to receive uncompressed video. I would also urge careful consideration as to how you will get your computer back up and running if you do make a mistake and clobber your main hard drive!

Bear in mind too that any data already recorded on the compact flash card will be utterly destroyed in the process of loading it with uncompressed video. In fact, it will no longer hold a valid file system and will be completely unreadable by your computer! (But the latter is reversible)

The Linux shell script 'findcf' is supplied to assist in the location of the compact flash card by doing a search for disk drives of the 'compact flash reader' type. If it succeeds in finding a compact flash reader (and assuming you have only one compact flash reader attached to, or contained within, your computer) 'findcf' will report the path of the card's physical level file in /dev.

When inserting a compact flash card into a reader or compatible card slot, Linux should spot its appearance and may try to mount it onto your file system. This is particularly likely when inserting the compact flash card for the first time. On later insertions Linux will find the card unreadable and won't try to mount it.

If Linux does mount the card, then unmount it again. It is important to unmount the card because once our binary data has been written to the card there will be no valid file system left on it and Linux may crash while trying to make sense of the uncompressed video - if it were still mounted.

At the same time that Linux notices the

card, a file of the name 'sda', 'sdb' or 'sdc' etc. will be allocated in /dev to represent the physical card. Note that there may be no new allocation since Linux does not always delete /dev/sd... entries when a disk is subsequently ejected.

'findcf' will hopefully find and report the path of the appropriate /dev/sd... entry for the compact flash card. It is likely (though I have no certain knowledge of this) that the internal disk drives of a Linux PC are allocated to /dev/sda, /dev/sdb etc. If this is the case then entries with the higher alphabetical letters are most likely to be your flash card.

On my computer my compact flash card appears as /dev/sdc. Copying the 'cfbin' file onto the flash card can only be done with super user privilege. On my computer, the following command to the terminal window will load the uncompressed video data onto the card:

```
cat ./cfbin > /dev/sdc
```

Alternatively, I could avoid creation of the (very big) 'cfbin' file by specifying the compact flash physical file in place of 'cfbin' in the script invocation:

```
./mkcfscript ./<filename> /dev/sdc
```

(Remember to substitute '/dev/sdc' with the output of 'findcf' on your computer)

## The buttons

There are four buttons on the player:

- STOP - this stops playback and de-selects the compact flash card, thereby making it safe to remove it.
- PLAY - plays the audio and video on the card. If the player is already playing, then this button causes a pause \*
- REWIND - when held down, plays video in reverse at ten times normal rate \*
- FAST FORWARD - when held down, plays video at ten times normal rate \*

\* Audio is muted while the player is paused, rewinding or fast forwarding.

## Theory of operation

Each 405 line field is stored as 188 sectors, each sector corresponding to one scan line. Fields are on a 256-sector spacing and therefore do not straddle 256-sector (128kByte) boundaries. Each sector holds:

1. Six bytes of audio information for play-out during the scan line.
2. One byte of audio data that is sent to a FIFO buffer store for play-out during the frame blanking interval.
3. 501 bytes of video pixel information.
4. Four bytes that are set to zero.

Video is stored as eight bit grey scale values without synchronisation. The video DAC can only resolve seven of these bits. Audio is stored as twelve bit samples and employs a sample rate of 40500Hz, which is precisely four times the line scan frequency.

There are three modes of read/write access to the compact flash card:

1. During the frame synchronisation period, the PIC issues a 'read sector(s)' command to the compact flash card by manipulation of its port lines. This is very slow - perhaps 500kByte/second.
2. During the active display lines of the picture (of which there are 188 per field) and in the line blanking interval, the PIC issues slow data read cycles (around 1MByte/sec) in order to extract the audio information that is at the beginning of each sector.
3. During the active part of each active display line, the PIC generates a fast read clock (6.25MHz) for the purpose of feeding pixel information to the octal latch. The PIC is not a recipient of the data at this time - data is simply moved from the card to the octal latch.

Note that the field blanking interval provides approximately 1msec between issue of the read sector(s) command and the beginning of sector data transfers so as to allow the compact flash card time to perform any internal operations required. Note also that, while the audio data is being read from the card by the PIC, the read data is prevented from

appearing at the output of the video latch because the PIC holds the latch's clear line active.

Generation of all read strobes to the compact flash card is accomplished using one of the PIC's pulse width modulators. This is used in one of two modes:

1. With a basic cycle of one instruction (160nsec) and zero duty cycle, the PWM output produces continuous low levels that the PIC uses to perform slow reads from the card.
2. With a basic cycle of one instruction and a 25% duty cycle, the PWM output produces fast (6.25MHz) pulses to time pixel transfers from the card to the octal latch. The read strobe waveform is low for 120nsec and high for 40nsec.

The video DAC is of the simple weighted resistor type but yields surprisingly good results. The audio DAC is a twelve bit IC with a simple SPI interface to the PIC. Note that the PIC does not check the status of the compact flash card after issuing commands, on the basis that if anything goes wrong there is nothing the PIC can do about it. When beginning playback on a card the following operations are performed:

1. The card is issued with a reset pulse.
2. The card is issued with a 'set features' command in order to place its data interface in single byte transfer mode.

The PIC does not check the capacity of the card (in fact, it doesn't even check for the presence of a card!). When playing video from the card, the PIC does not observe any maximum sector address limit and so will escalate the sector address indefinitely if playback is not stopped manually by the user. This may yield odd results but is not thought to be hazardous to the card.

All 405 line timing is accomplished using very carefully cycle counted program loops and should be very accurate (the line frequency, for example, is within 0.05% of nominal).

## Acknowledgements

The author wishes to thank Kat Manton for suggesting 'ffmpeg' and for writing the origins of 'mkcfscript', Jay Oldstuff for donation of a Sony TV9-90UB and of course my partner Kevin for building a Linux machine, writing 'findcf' and generally tolerating his PIC widower status.





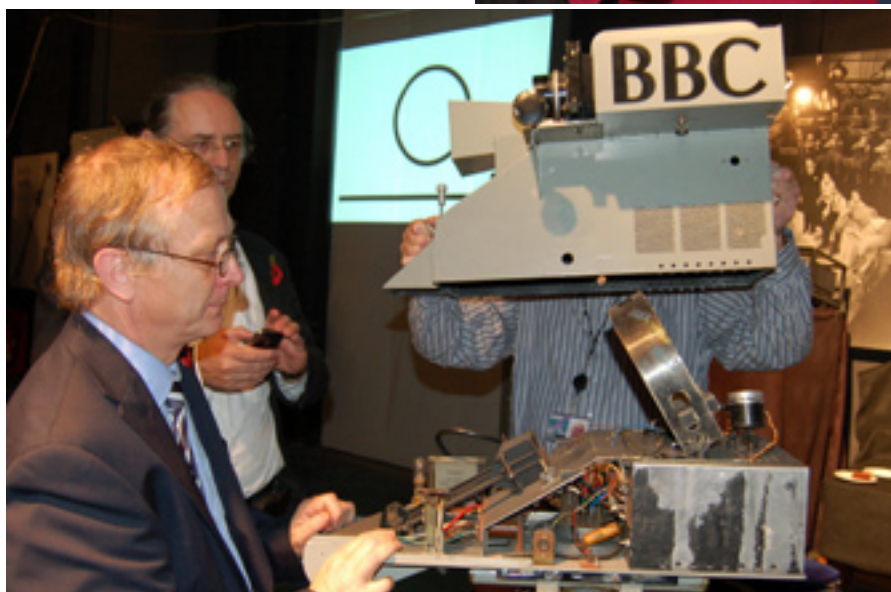


# Lifting The Lid Off Television

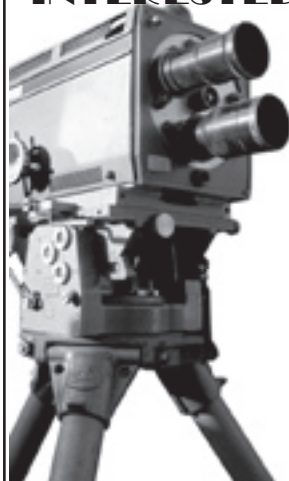
*Dicky Howett reports:*

On Wednesday 2nd. November 2011, BBC Television celebrated 75 years of 'High Definition' broadcasts with a modest gathering at Alexandra Palace.

Cake and wine were on offer as well as an opportunity to meet various 'AP' tv personalities (amongst whom were Zena Skinner and Michael Aspel) and also to prise the top off an original Emitron camera. Attendee Paul Marshall (exhibiting his functioning Image Iconoscope camera) discovered that although the EMI's Ike-type picture tube was missing, all the (surprisingly small amount) of head electronics were intact.



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# A Matching System for two 23cm Antennas

by Peter Cossins VK3BFG

This technique was derived for matching two 23 cms co-linear arrays for the Melbourne Digital Television Repeater, VK3RTV. The repeater inputs are 1250 Mhz, 1255 Mhz and 1278 Mhz and the antenna could be pressed into service on any of those frequencies. The co-linear arrays are broadband in their nature and will accommodate the frequency range.

This matching system is not unusual in its concepts, but its mechanical construction and control of dimensions is accurate and appropriate for 23 cm work. The equation below forms the basis of the theory.

$$Z_0 = \sqrt{Z_S \times Z_L}$$

$Z_0$  is the characteristic impedance of the quarter wave matching line,  $Z_S$  the sending end (antenna) impedance and  $Z_L$  the load impedance (line impedance).

If  $Z_S$  is a 50 ohm antenna and  $Z_L$  is 100 ohms, then  $Z_0$  is 70.7 ohms.

Joining two 50 ohm antennas together with their quarter wave matching lines, the result is two 100 ohm loads in parallel making 50 ohms, a match to the line impedance. This simple network is called a 'Phasing Harness'. (Odd multiples of one quarter wave can be used as well.)

This theory is all well known and well used, but the problem with 23 cms is that dimensions become somewhat critical. If you have access to coaxial hardline at the required impedance then this can be used with the length adjusted for the velocity factor of the cable.

The length of cable required can be calculated by:

$$\text{Cable length} = \frac{\text{Velocity Factor} \times 3 \times 10^8}{4 \times \text{Frequency}}$$

This matching system uses standard stock brass tube available from most Hobby Shops. The diameter I used was 5.5 mm, but it was selected to just fit the

inner of 5C-2V, 75 ohm solid dielectric coaxial cable. The inner was obtained by cutting a piece of the cable and removing the outer cover and shield, leaving the insulation and the inner cable intact. The dimensions given in this article are for solid dielectric versions of the cable. If foam dielectric cable is used then the quarter wave lines will be a bit longer to allow for the lower velocity factor. Solid dielectric cable is preferred for this application as it is more robust.

Any suitable 75 ohm cable can be used, with the cable and the brass tube length cut according to the equation above. The main criteria is that the brass tube and the coaxial cable inner form a snug fit.

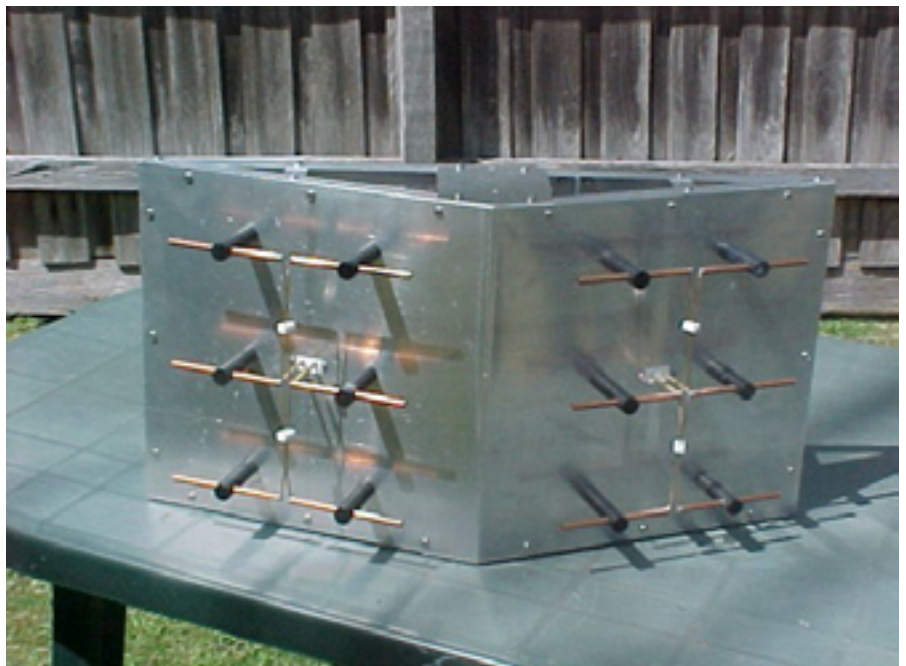
The brass tube can be accurately cut and filed to the required length. Using 75 ohm cable will provide a satisfactory result as final testing proved.

Referring to the photograph, the components required are a silver plated N Connector with Teflon insulation, brass tube to fit the inner of the 75 ohm cable used, double sided PCB, and a 60 by 100 mm approx diecast box. It is advisable to use stainless steel nuts and bolts for durability. The extra cost is absolutely minimal.

Be wary of cheap alternate N Connectors as the insulation in some of these is some form of plastic and will not stand the heat required.

The construction process is as follows:

1. Cut the centre solder terminal of the N Connector down to a maximum of 2 mm in length.
2. Using a mini blow torch, pre solder the N Connector near where the brass tube is to be fixed.
3. Tin the ends of two lengths of 41 mm brass tube. Do not use excessive solder.
4. Join the two brass tubes at one end at an angle of approximately 300 using a metal plate to keep the tubes aligned.
5. Jig/lightly clamp the two brass tubes on the pre-soldered N Connector so that they are aligned as they will be in the final assembly. I attached the N Connector to a piece of scrap flat aluminium plate to simulate the PCB ground plane. It is very important to keep all lead lengths to a minimum.
6. Use small gas torch to fill in solder around the N Connector and the brass tube.





7. Strip back the inner of the cable to be used and accurately cut them to length using the brass tubes as a guide. Leave a small length of inner at each end. Put them aside for later use.

8. Pre-drill the diecast box for the N Connector and the PCB groundplane. The N Connector should be at one of the diecast box facing outwards from the bottom. (Refer to photograph)

9. Recess a piece of double sided PCB so that it fits snugly around the N Connector as in the photograph.

10. Pre-drill the PCB and the die cast box for the six stainless steel mounting bolts.

11. Pre-drill the diecast box on its bottom edge for the two coaxial cable entries and also two moisture holes. The cable entry holes will need to align with the ends of the brass tube.

12. Using the N Connector and the soldered brass tubes as a guide, mark exactly where two lands (insulated connection points) should be etched or cut out. These should be just large

enough to terminate the phasing harness cables and the cables from the antenna.

13. Etch or cut out the termination lands on the PCB.

14. Assemble the network using solder lugs to bind the N Connector to the PCB and solder the end of the brass tubes to the PCB groundplane. (Refer to photograph)

15. Insert the RG59 inners and terminate on the N Connector and also to the two PCB lands.

16. The two 23 cms antennas should be fed with equal lengths of 50 ohm cable, fed through the bottom holes of the die cast box and terminated on the PCB lands.

17. Alternatively, two additional N Connectors can be assembled to the diecast box and connected either directly to the ends of the brass sections or by short lengths of 50 ohm Teflon coaxial cable.

18. Remember to keep leads as short as practically possible with all 23 cms

wiring connections. For example, if using the additional N Connectors, the flanges should be pre-soldered and the Teflon coaxial cable outer soldered directly to the flange. A minimal length of inner then makes the connection to the cut down centre pin of the N Connector.

Practical testing of the arrangement using a signal generator, directional coupler and spectrum analyzer with the two brass tube coaxial cable ends terminated using two 100 ohm SMD resistors in parallel on each resulted in a Return Loss of 32 dB.

Return Loss is term commonly used in Industry to describe a RF match. A Return Loss of 32dB means that the reverse or reflected power is 32dB lower than the forward power. 32dB indicates an excellent match.

As most amateurs are unable to measure Return Loss, VSWR measurements are often used. A Return Loss of 32dB represents a VSWR of 1.05:1.

I have built two of these units with almost identical results.

## Editorial Musings

I had a bit of space to fill, so here are some fairly random tidbits of information that may be of interest to some...

If you haven't come across Grant's website yet, it is well worth a visit:

<http://www.qsl.net/z1lwt>

He has several articles of a constructional nature as well as information on ATV in New Zealand.

Another one that always fascinates me are the guys that launch balloons into the stratosphere - for fun! Take a look at WB8ELK's website:

<http://hiwaay.net/~bbrown/>

Fascinating stuff, the constructional data on the telemetry system is worth a read, even if you're not interested in the balloons themselves.

For the growing interest in DATV this software looks interesting:

<http://www.vivadatv.org/page.php?p=tutoune-en>

Very comprehensive information from your DVB-S PCI cards on received signals and it's free!

Graham sent me a link to a YouTube video he made of his Vidicon camera:

<http://www.youtube.com/user/cineprojectorman>

Watch right to the end to see the history and a link to CQ-TV 33.

Another good source of ATV info is our very own website:

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

It is continually evolving and has the most up to date info on your club.

Your club has around 800 members, and is run by a small number of volunteers who form the batc committee. Although there have been one or two new faces over the years, the committee is very similar to how it was when I first came across the batc over 25 years ago!

I have been trying (in vain) to find someone to help with the editors job, but it would be good to see some new faces on the committee and get some fresh blood running through the clubs veins! So if you have a bit of spare time (and it doesn't need to be much) why not put yourself forward for a post on the committee, there are lots of things that need doing and the current committee would be glad of the help.

Drop me a note if you are interested or have any questions as to what might be involved and see if it is something you can do to help your club.



# DATV in Peru

by Trevor Brown, G8CJS

One of the best things about running the new on-line shop has been the increase in the BATC membership, delivering that nice warm feeling that we are doing something right and the people you come into contact with, who all have their ATV stories to tell, particularly in some far away parts of the world.

Josue Zavala, OA5AZ, lives in Peru and he is now a new member of batc. Josue was drawn to us by the DigiLite project but Josue is no stranger to DATV. He too read about Jean-François Fourcadier, F4DAY and “The Poor man’s digital ATV transmitter” back in 2005.



In Josue’s prototype, in the absence of the BFR96S, he replaces it by a BFG135 without changing the PCB



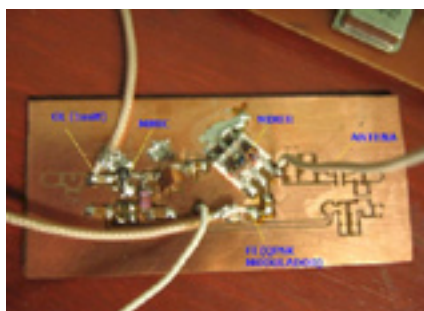
Complete Local Oscillator Module in 900 MHz marked as UREA4-306A, extracted from an old cell phone.



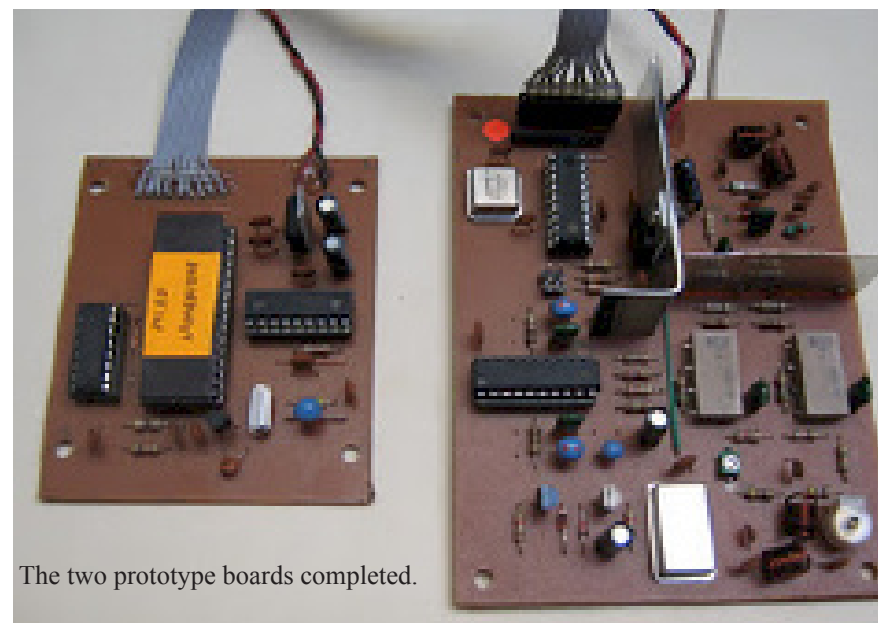
Josue’s digital test card with the banner of the TT Micro S271 receiver

The problem that held back Josue in the original design was that it required a JTAG programmer. Josue describes this on his website as something complicated that is an essential component in the serialization of the digital signal from the parallel port of the PC.

In 2006 thanks to the redesign of the original project made by French amateurs F1FAU - F9ZG - F1GFF (see links), The new design used a more available microcontroller-PIC16F628 and thanks to the excellent tutorial that has been published on the website of Netonoff (see links) and the F1DUJ (see links) He was able to implement this redesign.



The Up-Converter, the output of the Local Oscillator is 900.330 MHz, so in the QPSK modulator 66.667 MHz is added to make 966.997 MHz ~ 967.0MHz. This frequency is only for the first test before migrating it to the 23 cm band.



The two prototype boards completed.

I think the pictures and captions tell it all, right down to the oscillator module he extracted from a Japanese Cell phone.

## Links:

Josue OA5AZ

<http://www.televisiondigitalamateur.blogspot.com>

Jean-François Fourcadier F4DAY

[http://www.microsofttranslator.com/bv.aspx?from=&to=en&a=http%3A%2F%2Fjf.fourcadier.pagesperso-orange.fr%2Ftelevision%2Fexciter%2Fexciter\\_e.htm](http://www.microsofttranslator.com/bv.aspx?from=&to=en&a=http%3A%2F%2Fjf.fourcadier.pagesperso-orange.fr%2Ftelevision%2Fexciter%2Fexciter_e.htm)

F1FAU - F9ZG - F1GFF

<http://www.microsofttranslator.com/bv.aspx?from=&to=en&a=http%3A%2F%2Ff1gff.free.fr%2F>

Netonoff

<http://www.microsofttranslator.com/bv.aspx?from=&to=en&a=http%3A%2F%2Fwww.netonoff.com%2Findex2-tutos-245.html>

F1DUJ

[http://www.microsofttranslator.com/bv.aspx?from=&to=en&a=http%3A%2F%2Ff1duj.free.fr%2Fdatv%2Fcreation\\_mire\\_datv%2Fcreer\\_mire\\_datv.html](http://www.microsofttranslator.com/bv.aspx?from=&to=en&a=http%3A%2F%2Ff1duj.free.fr%2Fdatv%2Fcreation_mire_datv%2Fcreer_mire_datv.html)

## Letters to the Editor

Members of the GB3KM repeater group held their first Christmas meal at Heighington, County Durham.

Left to Right:

Terry G1LPS (Keeper of GB3KM)  
Clive G4FVP  
Eddie G0EHV  
Brian G3KJX  
Wes G8KZN  
Tony G8FLV

GB3KM is located in Kirk Merrington, County Durham. IO94EQ. More information can be viewed on their website:

<http://www.m0dts.co.uk/gb3km>



Hi,

I had a lot of trouble recently sourcing ready modified LNBs for ATV. With surface mount and suppliers constantly changing products it can be difficult to modify yourself let alone calibrate correctly and maximize sensitivity.

Anyway I found a supplier in Germany that has lots of them at reasonable prices. They/he only has 40mm round collar types, not rectangular waveguide types.

The local oscillator is 9.0Ghz meaning the 10.0 to 10.5 band will appear on an analogue/digital satellite receiver at 1.0 to 1.5Ghz

There are no details on his website but you could get more info from his ebay germany add:

[http://www.ebay.de/itm/ATV-LNB-digital-analog-DX-TV-Ham-LNC-/330670307392?pt=DE\\_TV\\_Video\\_Elektronik\\_Funkger%C3%A4te&hash=item4cfd7c7840](http://www.ebay.de/itm/ATV-LNB-digital-analog-DX-TV-Ham-LNC-/330670307392?pt=DE_TV_Video_Elektronik_Funkger%C3%A4te&hash=item4cfd7c7840)

His email address is: dl2kbh@gmx.de  
His homepage is here:  
<http://www.dl2kbh.de/>

It's best to contact him directly. The LNBs were advertised for 22 Euro plus postage.

I thought you might like to mention this

in the magazine.

I also hope to have more articles for the magazine. In Dublin Ireland we are currently installing a new 13CM analogue TV repeater, linked by radio to the old Cavan TV repeater. We also have a 10GHz licence but it's not ready to go live yet.

I have spent the last year working on the repeater, and sourcing good/cheap receiver and transmit gear. It's all analogue for now.

Some info is here:  
<http://www.iatc.ie>

Regards,  
Dan EI9FHB  
Dublin Ireland

A reminder that GB3PV activity night is Thursdays at 19-00 clock.  
If you can't receive 'PV watch at batc.tv - 73 Ian G3KKD.

Make a note of the new batc number:

**01400 41 42 43**

You can also send us a text message on the number  
see Contact Details on page 4 for details



# Contest News

## Summerfun Contest

First of all my apologies for the delay in publishing the results of the Summerfun contest.

### 70cm

Pos	Call	Locator	QSOs	Points	Best DX	QTH	QRB
1	G6MNJ	IO91SR	5	311	G8LES	IO91LC	80
2	M0DTS/P	IO94LK	3	300	G0EHV/P	IO94ET	56
3	G0EHV/P	IO94ET	3	164	M0DTS/P	IO94LK	56
4	G1LPS	IO94EQ	3	144	M0DTS/P	IO94LK	47

### 23cm

Pos	Call	Locator	QSOs	Points	Best DX	QTH	QRB
1	G1LPS	IO94EQ	6	658	M0DTS/P	IO94LI	53
2	M0DTS/P	IO94LK	3	600	G0EHV/P	IO94ET	56
3	M0DTS/P	IO94LI	2	538	G7AVU	IO93OJ	108
4	G0EHV/P	IO94ET	3	376	M0DTS/P	IO94LK	56
5	G6MNJ	IO91SR	2	368	G8LES	IO91LC	80

### 13 cm

Pos	Call	Locator	QSOs	Points	Best DX	QTH	QRB
1	G1LPS	IO94EQ	3	855	M0DTS/P	IO94LK	47
2	M0DTS/P	IO94LK	1	470	G1LPS	IO94EQ	47
3	G0BWC/P	IO83RO	1	310	MW1FGQ	IO83IG	62

### 3 cm

Pos	Call	Locator	QSOs	Points	Best DX	QTH	QRB
1	M0DTS/P	IO94LI	1	540	G7AVU	IO93OJ	108
2=	M0DTS/P	IO94LK	1	235	G1LPS	IO94EQ	47
2=	G1LPS	IO94EQ	1	235	M0DTS/P	IO94LK	47

And the combined scores:

Pos	Call	Locator	70 cm	23 cm	13 cm	3 cm	Total
1	G1LPS	IO94EQ	144	658	855	235	1892
2	M0DTS/P	IO94LK	300	600	470	235	1605
3	M0DTS/P	IO94LI		538		540	1078
4	G6MNJ	IO91SR	311	368			679
5	G0EHV/P	IO94ET	164	376			540
6	G0BWC/P	IO83RO			310		310

Congratulations to Terry G1LPS (helped by his son) on winning. Terry even had 6cm available, but no-one to work. Thanks again to Rob M0DTS for activating 2 locations during the contest. In addition to the stations who submitted entries, the following stations were also active: G7AVU, G8LES, G8GTZ, G8ADM, G8ASI, G8ACT, G4FVP/P, G3KJX, G4ZCN, GW6NOI/P. G0BWC/P was operated by Ross G6GVI, Derek G1AEQ and John G3PHA.

Thanks to all who braved the wet weather to operate with portable equipment.

It was good to see activity on 70cm - both analogue and digital - although on this occasion I was unable to allow double points for separate contacts on each mode. However, I would be prepared to change the rules to treat analogue and digital contacts as separate and eligible for 2 sets of points; what do you think?



Thanks to G3MCD for the pictures taken through GB3NQ the photo below is of G4OCO



## Contact

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

## Contest Calendar

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

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

## December Repeater Contest

The December Repeater Contest saw all the activity on GB3NQ:  
BATC Repeater Contest 10/11 December 2011

### Section 1 - Transmitting

Place	Call	Points	Locator	QSO	Repeaters
1	G3MCD	388	IO73OL	6	GB3NQ
2	G4OCO	324	IO70MK	4	GB3NQ
3	G0KTD	218	IO70OI	4	GB3NQ

### Section 2 – Receive only

Place	Call	Points	Locator	QSO	Repeaters
1	G0VDU	98	IO70OJ	5	GB3NQ

Congratulations to Keith G3MCD and thanks to all those who participated. It would be good to see a few more groups active in March!



## TV Amateur 163

### SSTV visualization on the iPad

With help of the app “SSTV” by Black Cat Systems the owner of an iPad, iPhone or iPod Touch is able to “decode” the Slow-Scan-TV audio signals from an rf or vhf receiver and visualize it live on the display - even by acoustic coupling of receiver loudspeaker and gadget microphone...

The analogue SSTV mode is signaled by its VIS code heading the picture transmission and is utilized automatically by the app. Common modes are Robot, Scottie and Martin. During bad conditions and interference the mode can be selected by hand (experienced SSTV ops are able to recognize it by ear, also the correct tuning with SSB signals). Slanted SSTV picture reception can be corrected manually, and each frame is saved automatically if wanted. For distribution of pictures to friends by e-mail or other channels all features of the mobile Apple product line are available. The “SSTV” app can be downloaded at iTunes for 2.99 USD.

[http://www.blackcatsystems.com/ipad/iPad\\_SSTV\\_Pad.html](http://www.blackcatsystems.com/ipad/iPad_SSTV_Pad.html)

Online video demo:

<http://www.youtube.com/watch?v=TamacFOJ1cs>



### RF interference to Samsung-LCD-TVs (Christian, DL1ELU)

My LCD TV Samsung LE37B579 reacted irritated (change of TV programs or loudspeaker level, switching off or on etc.) caused by shortwave transmissions nearby, even with low power. After some unsuccessful tests with ferrite cores on mains cable etc. I suspected the remote control device, as the disturbing effects vanished after extracting the batteries - but not for long...

Searching the web for solutions I found a hint on the Samsung TV “hotel mode” which is activated by pressing the buttons MUTE - 1 - 1 - 9 - ENTER on the remote control. Then you can de-select the touch-button control panel at the TV set. Now the interference had gone totally - but some handy features like looking up the program schedule too.

So I took a screwdriver and opened the TV set (guarantee had expired already). From the main board a multicore cable ran to the infrared signal receiver, another one from there to the touch-button control panel. Luckily the cable contacts on the main board are indicated by signal names like “KEY1” and “KEY2”.

I removed these two leads from the plug, and a short test proved it useful: no more rf interference! I can live without the control functions at the TV set, but actually we should complain about missing EM resistance.

According to web sources Samsung is not open for that topic, so be warned during your next TV shopping tour. (forum.db3om.de)

Translations by Klaus, DL4KCK  
AGAF e.V.

# How I got into ATV

by G0KTD

2010 I was asked if I would like to have a DATV system for 70 cms and I accepted the offer and it duly arrived in the back of G6MNJ's car. It was brought into the shack with dismay from the XYL. After mounting in a rack system Paul and I connected it all up, then came the steep learning curve in how to set it up, as Paul G6MNJ and Mike G8ASI had set the system up in Hemel Hempstead, the system was donated by John GW3JGA - my thanks to John.

Now I was on my own as no one in Cornwall had DATV up and running so after a few weeks I learnt to set the system up as it had no back up or store working so it always went back to default settings.

Then had to get the local Radio Amateurs to try and receive my pictures that I was transmitting, I then read MODTS modification to the SUP2400 up converter and ordered 4 from an eBay supplier in the USA, these were modified by me and I bought two freesat boxes so I could loan one out so others could receive 70 cms DATV.

Before this I went along to the local ATV meeting, this is not a club as such, it is a group of Amateurs who are all interested in radio and it also happened that they cover the repeater and beacon's on the same site as GB3NQ.

So I asked if any one was interested in DATV, they asked how to get on and receive DATV transmission and I explained what I had learnt in a short time. Eight asked if I could get them one of the SUP2400 up converter so I did and modified them and handed them out. As some of them had freesat boxes and 70 cms antennas so could or should be able to receive transmission, but the nature of the terrain in Cornwall makes it very difficult to make contacts.

Only one could receive me even though I had plenty of power to hand, this was M3XTG Terry who was about a mile up the road.

So now I had another thought about DATV how could ask the others to invest in my venture. So I started to build up an ATV system so I could join in with them but I was off to Canada for three months Baby sitting for my son in Vancouver.

So the Comtech boards was ordered ready for my return and this was put together in 2011 and I was now on ATV 23 cms as well as DATV on 70 cms, then Peter G3PYB came down in the Dartmoor area to conduct tests but no luck with me and others to receive him other than G4ALY and Ralph, who received my transmission which is about 35/40 miles from me, so some success. Thanks to Peter G3PYB for trying.

Next the Digilite came out so thought I would build up one for myself and ordered the boards and built one up with the Plate Antennas which was in the Bate magazine. Help and encouragement from Dave G8AJN and Colin G4KLB and of course the GB3SQ Net on a Sunday & Wednesday evening. The longest part for me was getting the software running on the Computers, the desktop was not bad but the laptop with the Hauppauge USB2 box was fun but long winded, as I am not that good on the computer side, although I can install operating systems and repair faulty laptops. I managed the install after many attempts.

I must say I have enjoyed my building so much I am now going to build the 70 cms version for portable work as the terrain in Cornwall does not lend itself to RF; all the Granite soaks up the RF.

So the only thing for now is to go portable, and I have built up flat antennas from the design article by G3WKF in the BATC publication and it works better than 36 element beam.

I am now in the process in making and boxing up the Digilite with it's Mitsubishi amplifier kit from Mini-Kits Australia and the object is to keep it small for portable and also to use at home in the winter as more will hopefully join in .

## **This is how I got my Wintv to Install and work:**

I first started trying to install the drivers from the CD the driver updates from Hauppauge then the wintv Prog, with some success but it kept locking up so I went to the Hauppauge site and tried downloading the drivers there: Result!

The next step was to try other drivers from other pvr's and found I PVR 250 with WINTV6 so downloaded it and it worked ok. In all this playing around installing and uninstalling I found you must do the hwc clear many times to get it to install on my Toshiba Satellite A100-285 1.8Ghz 1.5MB memory. It works ok at the moment, setup as per the Digilite Web Site. During all this I kept the CDROM in the laptop because it needs to see a valid CD.

I then installed it on an Old HP Pavilion DV5000 laptop 1.7 GHz with 1MB memory and all was ok. Then I installed all the other software, had a little problem with FT2232H port set up but after uninstalling from control panel and reconnect found it was ok, mine was 4 & 5 and it came together slowly.

In Wintv Menu Channel Manager  
Scan Tab  
Country: United Kingdom  
Broadcast/Cable: PAL\_BGHIK  
Sources tab select: Composite Source  
Video Format select: PAL\_BGHIK  
Channel Name: DATV 23 Cms.

This is what I have named mine in the description I called it Video. Save it if you have installed the driver and Program Wintv. Mine is Composite (PVR 250) but I am using Wintv PVR2 USB2 with PVR 250 WinTV 6.

In the next box  
Name: DATV 23 cms  
Preset: 1

Devices Tab box should have + PVR 250 (click on it and in the Model serial Number & Device Details) all the number and info will be displayed.



Channel Tab. Click on All Channels and opposite should be:

Box with a tick,  
Preset: Ticked  
Name: DATV 23 cms  
Description: Video  
Channel: TV

Close it down.

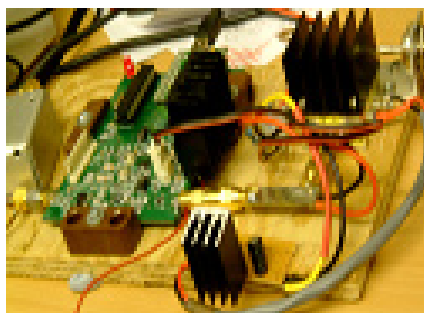
Spanner Icon Wintv Settings  
On Screen Display tick 3 Seconds  
Movies Tab DVCR Record File Path

C:\MyVideos\  
Pause Mode Record Path  
C:\MyVideos\  
Pause Buffer Size  
1000 MB  
Quality Level  
MPEG2 2.0MBit/sec  
Ten click Advance

Configurations select  
MPEG2 2.0MBit/sec

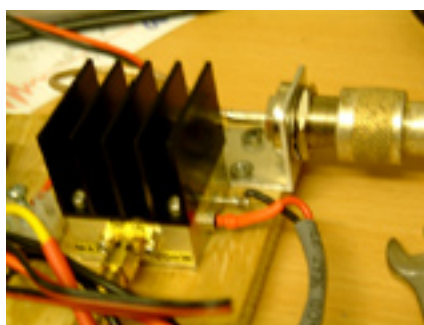
Video Tab Output stream select Program  
Rate Details (I have selected Variable  
and Video Resolution 720x576

This is what I had to do to get my  
programs to work, I am using a Wintv  
PVR2 USB Mpeg-2. I also have the



Board mounted on a board for testing  
and the G4DDK Pre amp in line SPF  
5043z amplifier

With the G4KLB 2 Watt PA below.



Hauppauge Installation and Utilities  
CD Version 2.2 which enables me to  
download Wintv 6 for PVR 250.

This might not work for others but it

My board complete



Almost 2 Watts



could get you on your way in getting  
yours setup.

Good Luck.  
Andrew Keith Bonney G0KTD

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# The care and feeding of MOSFET RF power amplifier modules – Part 3

by J.D.Ingham, ZL2TAR

The story so far....

In CQ-TV 233 there was a discussion on the factors which are usually considered when selecting the DVB-S (and DVB-T) transmission parameters for Digital ATV home/mobile (and repeater) stations.

In CQ-TV 234 the features of Mitsubishi MOSFET RF power amplifier modules were described, together with their significant differences from the earlier generation of Bipolar modules. Tips were given on how to obtain the best linearity for use with the DVB-S and DVB-T Digital ATV transmission modes.

In CQ-TV 235 test results were given for four different MOSFET, and three different Bipolar, RF amplifier modules... Now read on.

## DVB-S TRANSMISSION AND RECEPTION QUALITY

The factors determining the theoretical bandwidth of a DVB-S transmission were described in CQ-TV 233.

Figure 1 gives more details of the ideal spectrum shape of DVB-S and DVB-S2 transmissions, including the standardised 0.35 spectrum roll-off factor. The Horizontal (frequency) and Vertical (amplitude) axes have linear scales.

The -3 dB bandwidth is equal to the Symbol Rate (SR); the “spectrum extinction” (typically -40 dB, or better) bandwidth is 1.35 times the SR, and the width of the flat portion, in the middle of the spectrum, is 0.65 times the SR.

The specified receiver roll-off factor is identical to that of the transmitter, so that the combined response of transmitter and receiver is -6 dB at the 1.00 Symbol Rate points, maximising reception quality.

Failure to use the specified roll-off factor in either the transmitter or receiver causes the received Bit Error Rate (BER) to be higher than it should be, thereby limiting the DX capability of the equipment.

## SPECTRUM OCCUPANCY

The ITU-R Radio Regulations require that the minimum bandwidth (and

minimum power) be used to achieve the desired communications purpose.

The Regulations also define the maximum level of unwanted out-of-band emissions, to minimise interference to services on adjacent frequencies.

National Regulations, such as in New Zealand, often specify stricter limits than the ITU-R.

As previously discussed, the power amplifier adds distortion while amplifying the output from the exciter.

Obviously, for minimum transmitter out-of-band radiation, the in-band spectrum of the exciter should be as close as possible to the theoretical, shown in Figure 1, while the level of the exciter's out-of-band spectrum should be as small as possible.

A good rule-of-thumb is that the out-of-band spectrum of the exciter should be at least 10 dB better than the intended out-of-band spectrum of the power amplifier.

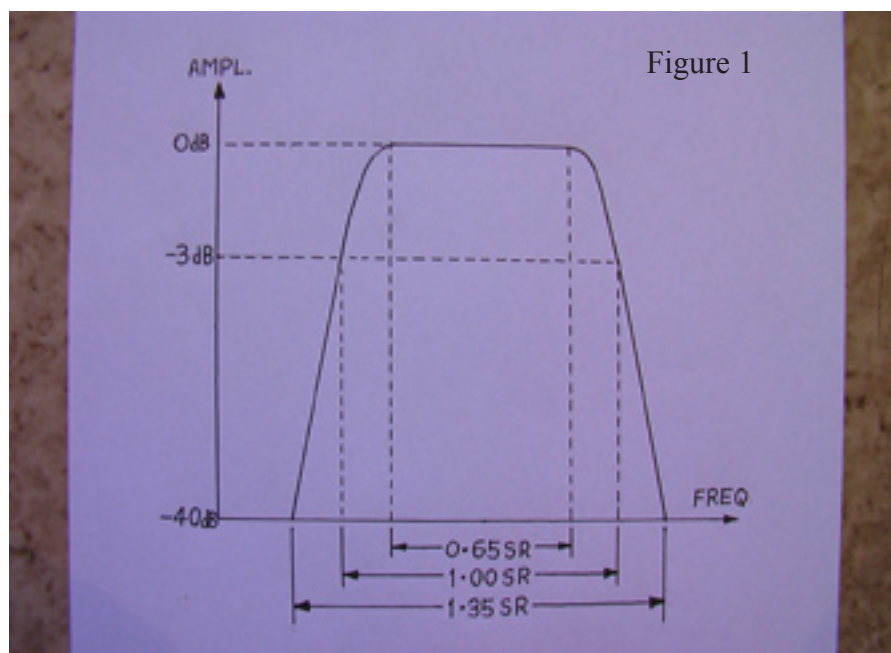
Photograph 1 shows the output spectrum of the SR-Systems DVB-S MiniMod Exciter when programmed with the following parameters, as described in CQ-TV 233:

BitRate	4078 kbits/s
FEC	$\frac{3}{4}$
Symbol Rate	2950 kSym/s
Wanted b/w	3982 kHz

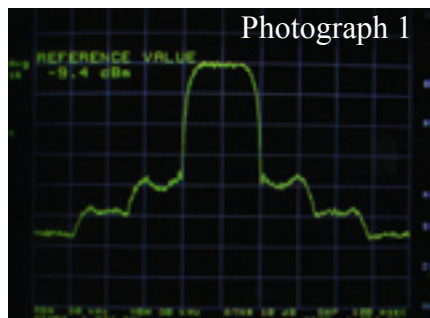
The Spectrum Analyser settings are:

Horizontal axis	2 MHz/division
Vertical axis	10 dB/division

This spectrum shape is often referred to as “head and shoulders”. The head corresponds to the wanted part of the spectrum; the shoulders are the unwanted, out-of-band, part of the spectrum, caused by equipment imperfections.







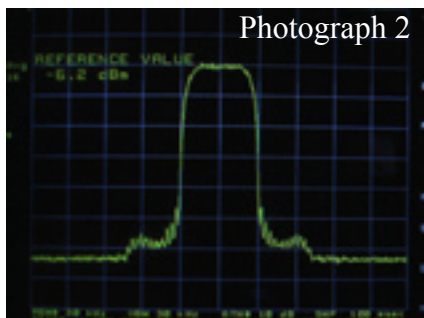
Photograph 1

The shoulders are -58 dB below the top of the head, rising to -48 dB at the "neck". This is an excellent result.

Photograph 2 shows the output spectrum of a typical transmitter, consisting of a SR-Systems Exciter and a Mitsubishi RF power module, adjusted in accordance with the advice given in CQ-TV 234 and CQ-TV 235. This is a good result.

Note that the shoulders have a concave shape, being a maximum of -38 dB at the shoulder pads, falling to -41 dB at mid shoulder, and rising to -38 dB at the neck. These shoulders are referred to as "third order". This is because the shoulders tend to increase by 3 dB as the wanted output power is increased by 1 dB.

Photograph 2 also shows the appearance of another set of shoulders, at lower and higher frequencies than the third-order shoulders, at about -48 dB. Similarly, these shoulders are referred to as "fifth order": this second set of shoulders tend to increase by 5 dB as the wanted output power is increased by 1 dB. The out-of-band radiation, caused by power amplifier non-linearity, can be reduced



Photograph 2

by inserting a Linearity Pre-Corrector between the exciter output and the power amplifier input. Reference 1.

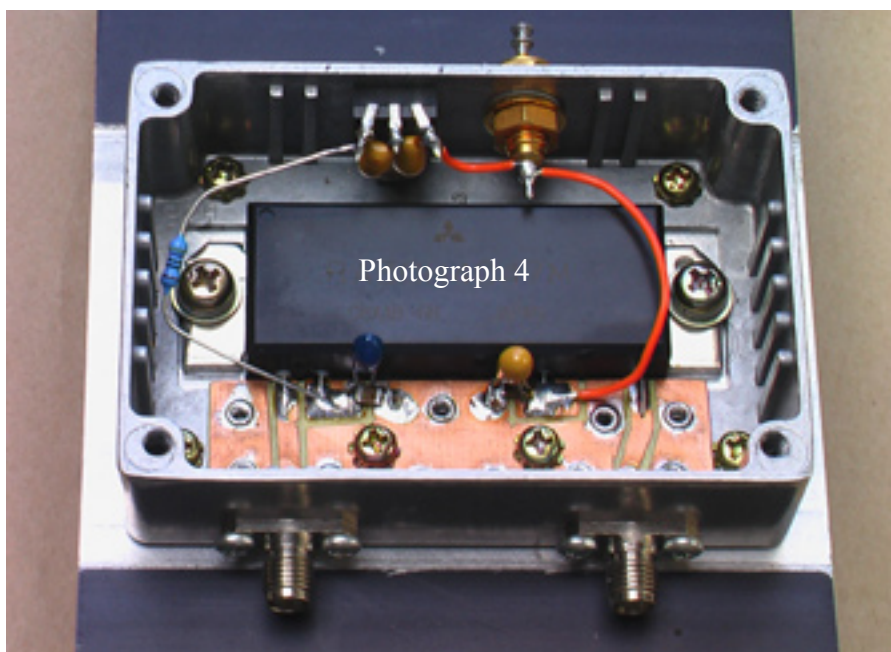
A pre-corrector, included in the majority of professional transmitters, deliberately creates non-linearity which is 180 degrees out of phase with the non-linearity of the power amplifier, hence reducing the overall non-linearity of the transmitter and the amplitude of

the shoulders.

In practice, -10 to -15 dB of reduction can be achieved and/or the wanted output can be increased by a few dB.

## A TYPICAL POWER AMPLIFIER

Photograph 3 shows a complete 70 cm band MOSFET RF power amplifier. The heat sink base is 150 mm by 90 mm. The cooling fins are 47 mm high. When rotated by 90 degrees about the long axis, to maximise the convection cooling, the cooling efficiency is 0.8°C per Watt. In other words, when the amplifier module is dissipating 30 Watts of waste heat, the heatsink temperature will be about 24°C above that of the ambient air.

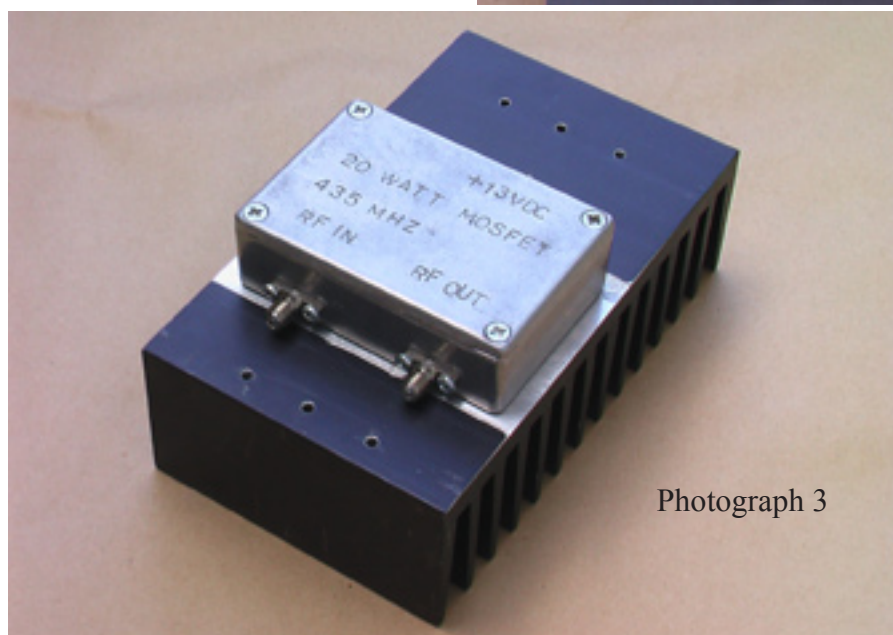


Photograph 4

Photograph 4 shows the view inside of the shielded enclosure, together with the RA30H4047M RF amplifier module. The TO220 device, on the rear wall of the shielded enclosure, is the 7805 5 Volt bias regulator.

## REFERENCES

- 1 Television transmitter linearity pre-corrector. J.D. Ingham. Q-Bit, September 1995, Pages 11 to 17.
- 2 CQ-TV 233, Pages 16 to 18.
- 3 CQ-TV 234, Pages 13 and 14.
- 4 CQ-TV 235, Pages 24 and 25



Photograph 3



# DATV and 70cm

by Peter Blakeborough G3PYB

A recommendation for frequencies to use, plus hints and tips for DATV operation in the 70cm band.

70cm is a crowded band with a whole range of different services; we are secondary users and, additionally, there are some geographical transmission limitations in the UK. The old days of reduced bandwidth but fast scan analogue AM transmissions have disappeared, following the almost universal move to 23cm and FM modulation.

Moving to the digital environment, the bit rate reduction through audio and video compression techniques, plus the coding gain of 2 from QPSK 2MS/s modulation allows a much reduced transmission bandwidth whilst retaining good image quality. Horizontal polarization will remain the norm.

The current common practice is to use MPEG 2 coding and QPSK such that the transmission energy is close to a

bandwidth of 2MHz. With the user then deciding how much of the bit rate to be used for error correction.

For long haul contact with obstructed path the theory says a maximum Forward Error Correction (FEC) of  $\frac{1}{2}$  should be used. This takes a significant proportion of the bit rate from the video and audio services. Experience with local transmission into the Isle of Wight repeater GB3IV has shown we can use a reduced FEC of  $\frac{3}{4}$  or even  $\frac{7}{8}$ . The GB3IV repeater receiver has its FEC set to Auto enabling the user to use the best FEC to suit the path.

In the near future, MPEG 4 coding will become more readily available as new satellite receivers are deployed with tuners that lock to the transmission rate down to 1MS/s. The rate of change over to DATV has been quite rapid due the availability of low cost satellite receivers. We might soon expect to see MPEG4 /H264 S2 receivers in regular use.

The take up of the DigiLite transmitter project has spurred a number of ATV groups to consider DATV only repeater operation on 23cm. The same devices can produce 2MS/s transmission on 70cm and we might expect to see MPEG4/H264 coding allowing down to 1MS/s in say 1.2MHz in the future.

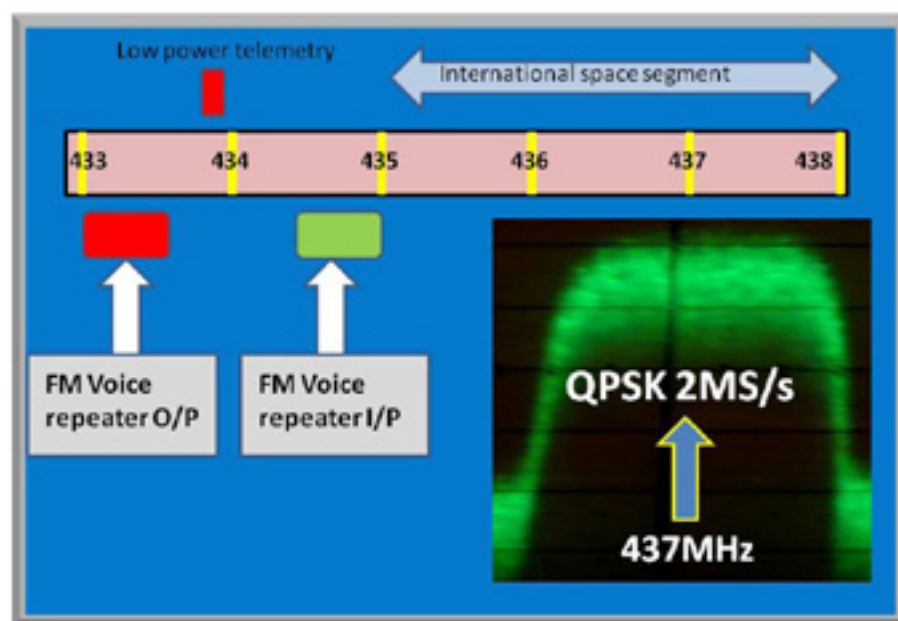
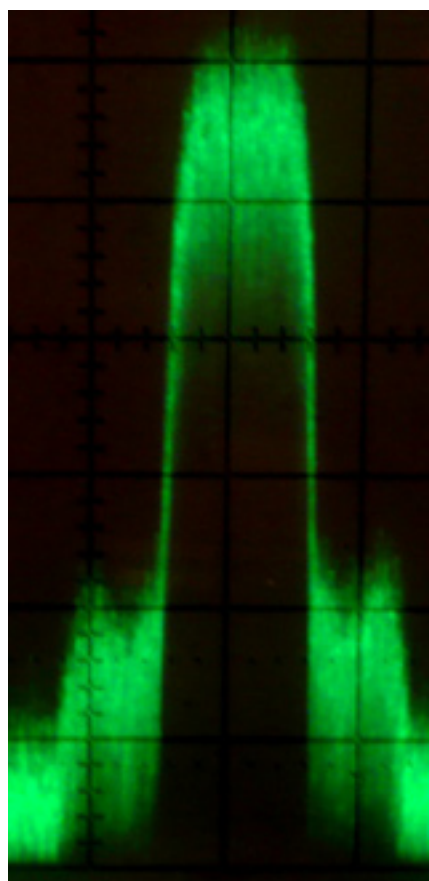
## What transmission frequency should we use?

As mentioned above, we share the 70cm band with many amateur and other users. In addition there are local powerful transmissions in near by bands such as Tetra.

There is no optimum frequency for all the users of the 70cm band, but after discussion with members of the RSGB Spectrum Forum we have concluded that the centre of energy should be 437MHz with energy constrained as close to 2MHz as possible or less, with minimum ERP for the task. The allocation for amateur satellite is from 435 to 438MHz with the most active segments being between 435 and 436MHz and above 437.5MHz

It is unlikely that any repeater outputs will be cleared on 70cm - Even applications for voice repeaters are presently embargoed. However in north London DATV is regularly seen on 437MHz into the GB3IV repeater on the Isle of Wight some 70 Miles away over a heavily obstructed path.

Simplex operation between stations will be the norm, and it useful to consider what techniques will contribute to a successful contact.





### Receiver technical points.

When a QPSK receiver is set-up to demodulate a symbol rate of 2MS/s it will continue to have other nearby transmissions appearing in the pass band. IF filtering maybe be anything up to 8MHz wide. However the PLL demodulator characteristics will offer some selectivity to the wanted DATV signal. Large local signals such as the FM voice repeater in the 433 to 433.5MHz segment may be present. Users on the input of the repeater may also be present 1.6MHz higher but they will present as an intermittent transmission. Low power telemetry and telecommanding, particularly temporary crane collision warning devices around 433.9 MHz can be troublesome. 10 or 25mW at 150 feet in the air can cover a large area.

A whole range of telemetry signals can be seen in the band 432 to 438 MHz

from a high site near our big cities, fortunately they are mostly vertically polarized.

### Receiver overload.

Further complications can arise from out of band or close by unwanted signal reducing the receiver sensitivity. The best advice is to ask a local station with a spectrum analyser to see what signals are appearing on your antenna. Then plan for some filters to notch out the largest unwanted signal. Remember even spectrum analysers have a limit to the signal levels they can accept before overloading.

### Adding a DATV receiver to your existing repeater.

Bearing in mind the above comment this would seem to be difficult or near impossible task, if the same site has a UHF voice repeater. The SCART

group had such a situation at GB3IV. The 433.225MHz Vertical polarized transmission was 10 feet away from the planned 8 element horizontal yagi for DATV. Some separation was gained by using the horizontal yagi, but a dual notch filter made from ex Tetra band-pass filter provided sufficient filtering to place the 433.225MHz TX into the noise on the DATV converter.

### Operating techniques.

Finding a weak remote DATV remote station in the presence of a number of the low level unwanted signal is quite a problem. Most of the DATV receivers have an AFC pull in range of anything up to 5MHz. The tuning pages on the receiver allow a manual mode to input the frequency, the Symbol rate, FEC, FTA (Free to air) etc and then require a scan to allow the demodulator and decode process to function.

Unless you have a strong signal the chances of a full lock might be dependent on the peak of QSB. To get round this, lock on to a known local DATV station on 437MHz or ask a nearby station if you can visit to ensure you have the 437MHz parameters stored in you memory. The signal level and quality or Bit Error Rate bar indicators on most receivers can greatly assist tuning problems.

Small transmission frequency errors do not cause problems, as the receiver AFC will normally track the incoming signals. Interfering signals will often show as momentary loss of lock on the quality indicators. Good linearity in the whole transmitter chain is essential. A good indicator is to use a single carrier adjusted to place the maximum power near to the 1db compression point (just below compression onset), then switch to QPSK, which depending on the display, should be 8 to 10dB below the single carrier level.

### Recommendations

- 437MHz as centre of TX energy.
- 2MS/s for MPEG systems
- FEC to suit path, auto FEC on the receiver.
- Horizontal polarisation
- Ensure good linearity





# Review of LG DM2350D 3D TV Monitor

As part of my 3D project, I was interested to see that both LG and Toshiba had launched displays using circular polarising technology, and passive glasses. This frees viewers from the embarrassingly expensive active shutter glasses.

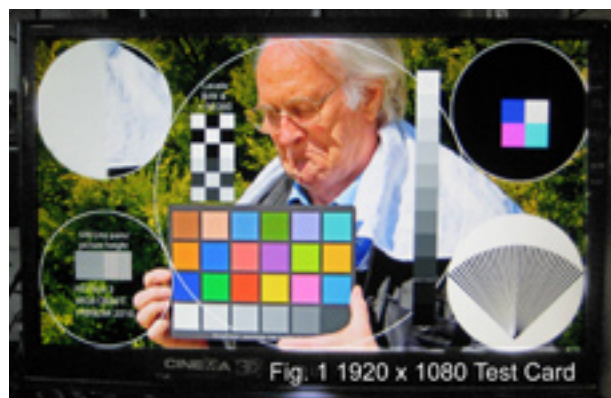
I was even more interested to see that LG had brought out a small [23.5"] display at a reasonable price. I took myself down to Richer Sounds near me to look at one. I also took my Fujifilm W3 3D still camera and an HDMI lead to try it out. I was impressed and so bought one, and thought that a few words about it might be in order. I have now installed it in my edit room, replacing a 24" Benq monitor.

"Antenna". [Fig.3] How, you ask does it work with 3D sources?

So far, I have tried it with the W3 still camera, and a 3D Blu-Ray player. Crisp pictures from the W3, and as there is a movie mode on it, 3D moving pictures as well.

The only 3D Blu-Ray disc to hand "Ocean Wonderland 3D" was most impressive. Small fish appeared to swim in your eyeball in front of a handsome turtle.

Any problems?

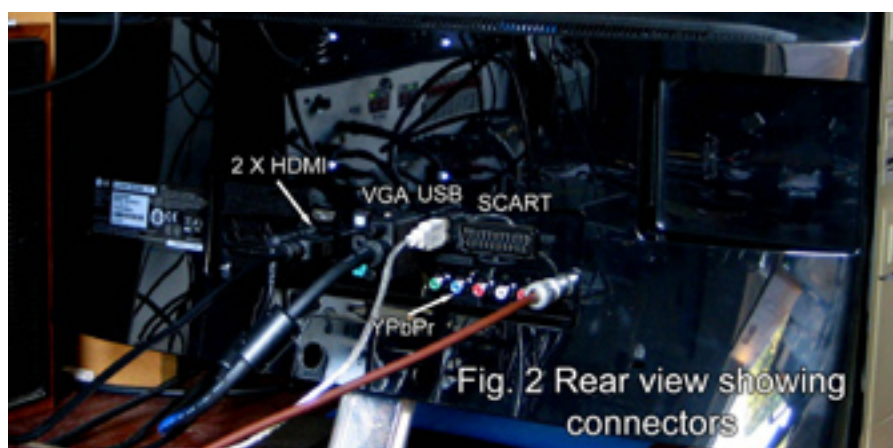


A minor drawback is the lack of a PAL standard definition input. Or you could use a SCART adapter. However, I already had a PAL to HDMI upscaler so that is not a serious problem.

This is a very useful display for anyone who needs a variety of input formats, and allows useful work to be done with it. It is also equipped for the future with its 3D capability. Oh, and you get 2 pair of circular polarised glasses with it. These are identical in performance to the RealD glasses I already had. Dabs.com are offering a monitor only version of this, or at least I think it is the same display, for £189.

[Type D2342P]. The odd thing is that they are offering an Nvidia kit to go with it [extra £102.99] including an IR emitter and active glasses. Shurely shome mistake!

Mike Cox



It has a number of advantages: -

1. It is a Freeview TV [DVB-T]
2. It is a genuine 1920 x 1080 pixel display, unlike the Benq, which was 1920 x 1200 pixels. [see Fig.1]
3. It has 2 x HDMI ports, a VGA port, a YPbPr set of RCA connectors, a USB port and a SCART port. It also has some audio inputs.[Fig.2]
4. it is very light, much easier to carry about than the Benq
5. Because it is LED backlit, its power consumption is low – 45 W in ECO mode.

In use it makes an excellent computer monitor, and if you want to catch upon your favourite soap, switch to

You need to watch it head on. If you view slightly from above, there are some crosstalk effects. Luckily the stand has angle adjustment to get the position right.







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# Turning back the pages

A dip into the archives of CQ-TV, looking at the issue of 48 years ago.

## CQ-TV 50

"The half century. Fifty issues of CQ-TV. What a fine achievement this is." So began President's letter in CQTV 50, which appeared early in 1963. The first edition, with a circulation of 12, appeared in November 1949, but had risen to a print run of 1000 copies. In that time, BATC members had achieved the first two way tv contact in the world, in May 1952, the first amateur colour pictures, in December 1953, the BBC Panorama transmission using an amateur camera in 1957, slow scan pictures sent from New York to Yeovil in 1961, and "splendid colour demonstrations at the Radio Hobbies Exhibition" - also in 1961.

This particular issue carried full page adverts for "Careers in the Engineering Division" (BBC) and "Opportunities in Colour Television" (GEC Electronics) - BATC membership was seen as a good 'training ground' for those wishing to join the industry - whilst the back cover advertised "Painton faders at BBC Television Centre" - aimed,

presumably, at BATC members working professionally in television, as they would not have been readily obtainable by the 'average amateur'.

The technical articles were wide-ranging. The first by Mike Barlow, who began "I may be unusually dense, or it may be that I have not read CQTV with my usual care, but I seem to have missed some important points to do with slow scan tv. As this is such an interesting field, being concerned with video tape recording and bandwidth conservation, I think the bare bones of the notes by Messrs Plowman and Macdonald should be expanded. Basically the problem is to find a way of compressing the bandwidths of a normal video signal so that it may be passed through audio channels, either in tape recorder or radio link equipment. Video bandwidth can be compressed in three general ways, by:

1. eliminating information redundancy
2. sacrificing picture quality
3. exchanging bandwidth for time

He then expanded on each method, and showed how the slow scan standards had been derived. (Of course, those same factors apply to the compression of fast scan digital television signals, although the methods used are of course different).

Mike Cox's contributions appeared next - an explanation of the SECAM system, which at the time was "under active investigation along with the NTSC and PAL systems by the European Broadcasting Union who are to recommend a colour system to the CCIR for use in Europe". Mike explained how the colour difference signals were sent sequentially, line by line. The block diagrams showed the coder and decoder, whilst the photograph of the decoder board has a rather large aluminium can clearly visible - which was the 64mS glass delay line. The chroma signals were applied either direct or through this delay line to a switching circuit, using 8 diodes, to feed a continuous colour difference signal to each discriminator in the decoder (the vertical resolution of the colour signal being half that of the luminance one). The aim was to produce a system that was compatible with existing monochrome receivers - something more easily achieved than a common standard for Europe. A further article from Mike described his flying spot slide scanner, which was based around a projector 'used backwards', with the 931A photomultiplier placed where the lamp would have been in normal use.

News of members' activities included Dave Mann, G3OUO/T, who had been active in the London area on 70cm. In South London, the Television Society had a transmitter at Norwood Technical College, which made regular weekly transmissions. News from Ian Waters, G3KKD/T, showed that there was plenty of activity on 70cm in the East Anglia area.

Grant Dixon had exhibited his camera at the Science Masters Association in Manchester - and a dozen or so school physics teachers had joined BATC as a result. Also in Manchester, Gordon Sharpley, G3LEE was getting pictures from his colour slide scanner, which used 3 photomultiplier cells. Other members were active in Australia, Bermuda, Cyprus, Hong Kong, Illinois, Ireland, The Netherlands, New Zealand and Pittsburg - BATC certainly served 'the world' of amateur television.

### Opportunities in Colour Television

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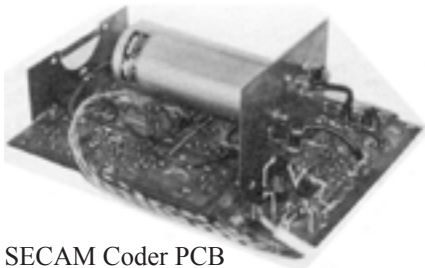
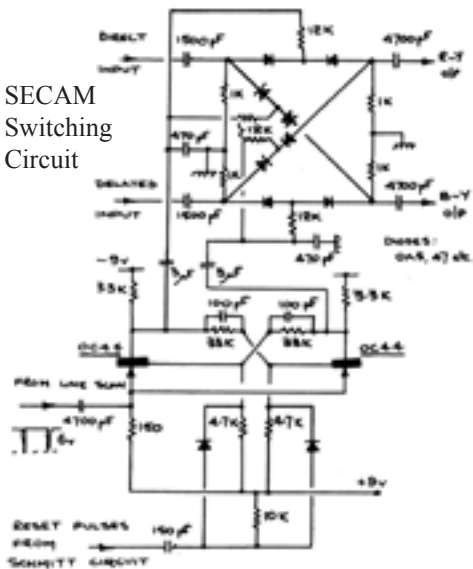
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**To: OTHER SIXTH FORM BOYS**  
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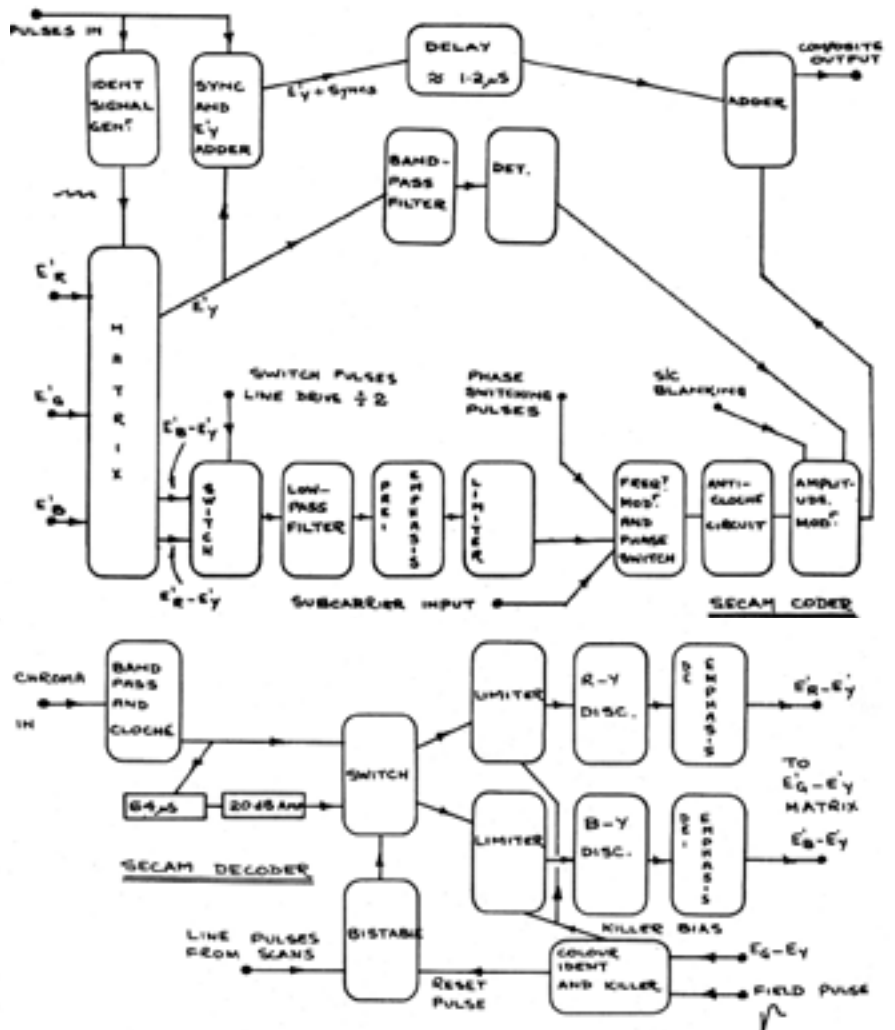
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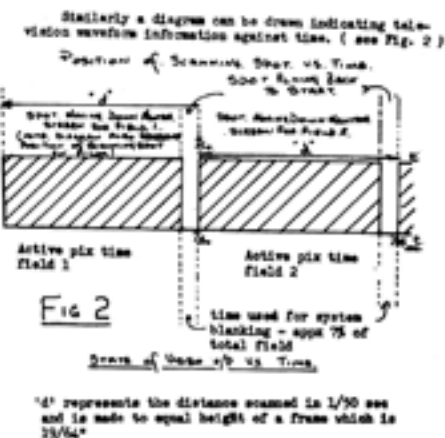
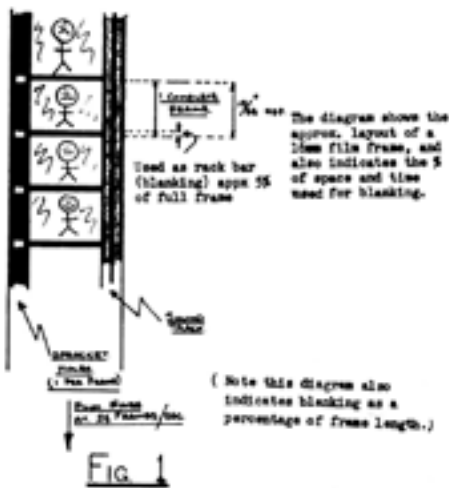
SECAM  
Switching  
Circuit



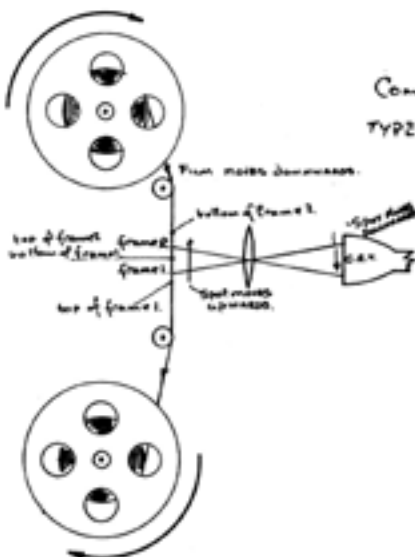
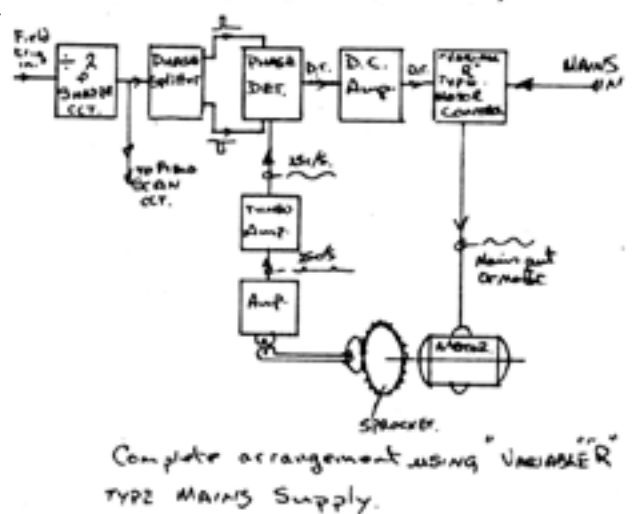
SECAM Coder PCB



Frame layout for 16 mm film



A different aspect of flying spot scanning was the subject of the next article, by Martin Salter, which explained how to modify scan circuits to produce a telecine system in which the film moved continuously, rather than the rapid pull down system used



in a film projector. The film was made to move at 25 frames per second - a coil detecting the movement the film sprocket tooth movement. A series of diagrams explained the principals. The actual scanning on the crt had to be inverted to compensate for the effect the lens had. The 'special' circuitry was to control the film drive motor so that the film sprocket was phase locked to the frame drive signals.



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