

# **CQ-DATV**

dotMOBI



## ***Issue 1 - February 2013***



<http://cq-datv.mobi>

# Editorial

Welcome to CQ-DATV mobi a new free ATV magazine, available for eBook readers. First a little history lesson. I am Ian Pawson G8IQU and I am a past editor of CQ-TV, it was me that took CQ-TV from an A5 magazine with black and white cardboard covers to the A4 full gloss production with colour covers, that is the current format. I am also the person who took the computer production to the next level and sent it to the printers via the internet as a PDF file. This had two advantages, now CQ-TV was in electronic format I could produce DVD back issues and it also made BATC Cyber membership possible.

I have thought for sometime about taking electronic production to the next stage and producing an ATV magazine that is not just an electronic copy of something that is optimised for print, but a magazine that is optimised for the new electronic eBooks. There will be problems particularly with large complex circuit diagrams that will not be possible to read on a 7" screen, but these do not seem to be the staple diet of the modern ATV enthusiast, and rarely appear these days.

Web (http) links are another problem, but they are a problem to paper magazines too, particularly as they seem to get longer all the time and can easily be mistyped into the computer. For this reason we have adopted a format of putting the links in full text format rather than the web method of hiding them behind descriptive text (ie [CQ-DATV](http://cq-datv.mobi) would be shown as <http://cq-datv.mobi>) . If you have an eBook with Wi-Fi and are in a Wi-Fi zone then you will be able to use the links, but be wary of kindle's with 3G that will only connect you to Amazon. If you do not have Wi-Fi on your reader then you can always use the free Calibre software on your PC which has a built in eBook reader.

Why call it CQ-DATV.mobi, well I did originally have a site called CQ-TV.mobi and I used it for testing various software links, when I decided to put a magazine together I first called it CQ-TV.mobi, but the BATC asked me if I would refrain from this as it is too similar to CQ-TV. I did think of CQ-ATV, but the term ATV seems to have been hijacked by people with Quad Bikes. So I went for CQ-DATV, although I want the magazine to cover all aspects of ATV not just DATV.

Why a free download, well I am not into ATV to make money, I am into supporting ATV, and an all electronic

magazine that does not need printing, and does not involve cutting down trees or adding to the world supply of plastic bags appealed to me, and does not cost me anything other than my time, which I give willingly.

What I do need is contributions, I have had the support of Trevor and John to get this issue together if there is to be an issue two I need contributions. The more I get the more frequently I will be able to produce the next issues; I can only start the ball rolling. I need you and your contributions to keep the ball rolling.

Please enjoy Issue 1 of CQ-DATV

***Ian Pawson G8IQU***  
***Editor CQ-DATV***

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## *New repeater*

John G3RFL is building the new 10GHz FM ATV repeater GB3FY; this will be located in Fleetwood Lancashire. The repeater has auto solar noise tracking to correct for noise floor changes during the day/night period and signal bar for tuning up purposes. The NOV was applied for in October 2012 and we will be following the construction of this ATV Repeater in CQ-DATV.mobi [www.g3rfl.co.uk](http://www.g3rfl.co.uk)

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## *GB3XG*

GB3ZZ 23cm Bristol's ATV Repeater was first switched on in 1984. This was later joined by GB3XG the groups 10GHz ATV repeater, which used an advanced logic control system based on a Motorola 8 bit "6809" micro, developed by John Hudson G3RFL. GB3XG plus Beacon was located at Dundry Hill South Bristol along with a 430MHz beacon providing FSK CW. In the 18 years of GB3XG, it only went off the air once when a mouse attacked some of its cabling, but now the site has been withdrawn and the 10GHz ATV repeater and the 430MHz beacon have been reluctantly shut down, leaving only GB3ZZ in service which is located at FULTON North Bristol.

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## *DATV- Express*

Charles, G4GUO, talked everyone through this new an interesting project at the BATC convention last year. The DATV transmitter will operate from 100MHz to 2.4GHz and there is now a video on You Tube showing progress with the MK 1 version <http://www.youtube.com/watch?v=62iTrkDo7dg>

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## *SR-Systems*

Justin, G8YTZ, has imported some SR-System PCB's and is manufacturing cases locally to house these

populated and ready to go DATV transmitters. There are several options for this DATV transmitter :-

- *Bronze* MM2 DVB-T Frequency coverage: 30MHz – 470MHz
- *Silver* MM2 DVB-S/T software selectable: 30MHz – 470MHz
- *Gold* MM3 DVB-S Frequency coverage: 70MHz – 2200MHz
- *Platinum* MM3 DVB-S/T Frequency coverage: 70MHz – 2200MHz>

Contact [G8YTZ@btinternet.com](mailto:G8YTZ@btinternet.com) for more details

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### *DigiLite*

The digital TV transmission kit, marketed by batc is still going strong and about 150 kits have been sold worldwide. There is an outline in this issue of CQ-DATV.mobi and there is a complete eBook download on this site which covers all the developments. Kits are available from [www.batc.org.uk/shop](http://www.batc.org.uk/shop)

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### *Space Ham show airs on BBC Radio Three*

On the 19<sup>th</sup> January 2013 - BBC Radio Three transmitted the 'Between the Ears' edition entitled 'Space Ham', which was a celebration of amateur radio enthusiasts who have eavesdropped on space exploration. The idea for the programme came when a Radio Three producer visited the National Trust Lizard Marconi Wireless Station last summer.

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### *BVE 2013*

Those of you that like playing with professional kit ought by now to have BVE in their diary, this year it will take place on the 26-28 February at its new venue the Excel London. If you have never been to one of these events before, they are well worth a visit, it's aimed at the broadcasters and lots of things will have broadcast price tags, but not everything and if nothing else you will come away with lots of good ideas.

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## *BATC Changes*

The BATC is at the moment balloting all its members on a plan to change from a club to a, company limited by guarantee. The ballot is both electronic and by post, a ballot paper was included in the last issue of CQ-TV. The result of the ballot is expected in February after the ballot closes on January 31<sup>st</sup>.

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## *CQ-TV available in eBook format?*

Several issues of CQ-TV magazine have been converted to eBook format, they were originally available as a download from this site, but BATC has asked if they could be removed and that they will make them available for download on their member site. <https://batc.org.uk/members/cqtv.php>

Sorry for any inconvenience this causes, its due as they say to circumstances beyond our control.

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## *Filming with an iPhone*



If you have every tried filming anything with an iPhone particularly the iPhone 4 which was a big leap in film quality you will have come up against the problem, that it is not the best device to hand hold and get reasonable camera work out of, well now we have our first piece of iPhone grip, in the form of a poor man's steady cam. It uses the usual rigid pendulum and convenient handle, but also so remote controls which must be a plus, it's made by the Tiffen Company, a leading manufacturer and distributor of accessories for the still imaging, video, motion picture and broadcast markets. This latest addition is and called the Steadicam® Smoothee® system, 5.

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# *So we have a new ATV magazine that is a free download*

**By Richard Suppards**

**S**o we have a new ATV magazine that is a free download, no subscription, no fees just download and enjoy. The format has been optimised for eBook readers, but you can always read it on a PC with Calibre from <http://calibre-ebook.com/download> which is multi-platform reader and library manager that will help you keep track of your eBook files, and will also enable them to be read on a PC in Windows, Mac or Linux systems. (If you find calibre useful, then please consider making a donation)

To get the best out of this new magazine you might want to think about buying an eBook reader. They have come down a lot in price recently, with entry level devices at less than £40. It is still possible to spend upwards of £200 on some models, so where do you start. I think the first rule is to decide what features you want.

## *Formats*

There are several file formats for eBooks, most will cope with PDF, but these files do not get the best out of the 7" screens. Mobi and ePub are better formats that will adjust themselves to get the best out of an eReader. Some eBooks will read ePub some will read mobi, at the top end there are readers that will support both formats, Calibre will convert ePub to mobi and mobi to ePub, the conversion is simple and lossless (as with most digital conversions), with only one exception files that have DRM (Digital Rights Management) applied, CQ-DATV does not have DRM encoding, but if you want to use your eBook reader to download more commercial products beware, find your preferred supplier and check if the downloads are DRM protected if so make sure you purchase an eBook reader that will work with the supplied format.

## *Design*

Dedicated e-book readers, such as the Nook, Kindle, Kobo, and Sony Reader, use an e-ink screen. However, e-ink screens have some drawbacks: they're black and white, and the pages don't refresh as quickly as those



on an LCD do. However, they do an excellent job of reproducing the look of printed paper. Also, you can read e-ink readers in direct sunlight, which is something you can't do on an LCD screen. Previously, the biggest drawback for e-ink screens was that they were not self-illuminating (unlike LCDs, which are backlit by definition). But that's now changed with the release of the, Kindle Paper white, and Kobo Glo, all of which use side-lighting technology to illuminate the e-ink screen for reading in dark environments. They cost more than their non-illuminated counterparts, but the added value for reading in dark environments (such as the bedroom) is often well worth it.



### *Memory/Battery Life*

The battery life of your eReader is crucial. Nobody wants their reading devices to run out of power part way through your book. The number of pages that you can turn on a single charge and the amount of memory available for storing books is important for making the eReader experience more enjoyable

Let's start with the entry level ***Binatone readme colour*** at the time of writing this is available from Argos at £39.99

- *7 inch screen (TFT LCD)*

- *Stores 600 books.*
- *Screen resolution - 800 x 480 pixels.*
- *Built-in 128MB memory.*
- *Micro SD card slot supporting up to 16GB.*
- *Portrait and landscape viewing options.*
- *Bookmark facility.*
- *4 hours battery life (rechargeable Lithium-ion battery)*
- *Supported formats: ePub, PDF, FB2, TXT*
- *Supported picture formats: Jpeg*
- *DRM Compatible (Adobe digital)*

Ok it is not touch screen and only has 128MB of internal memory, it connects and charges through a USB download lead that comes with the unit, but no charger, so on holiday away from your computer you might want to invest in a plug top charger, because the 4 hour battery life is a little limiting. You can add a micro SD card if you feel the internal memory is a little light weight.

### *Pros*

- *Touch screen*
- *Colour screen*
- *Internal illumination*

### *Cons*

- *Does not re-sizing pictures and diagrams*
- *External hyperlinking does no work (no web browser)*
- *Short battery life*

# *An ATV repeater for Lancashire*

**by John Hudson G3RFL**

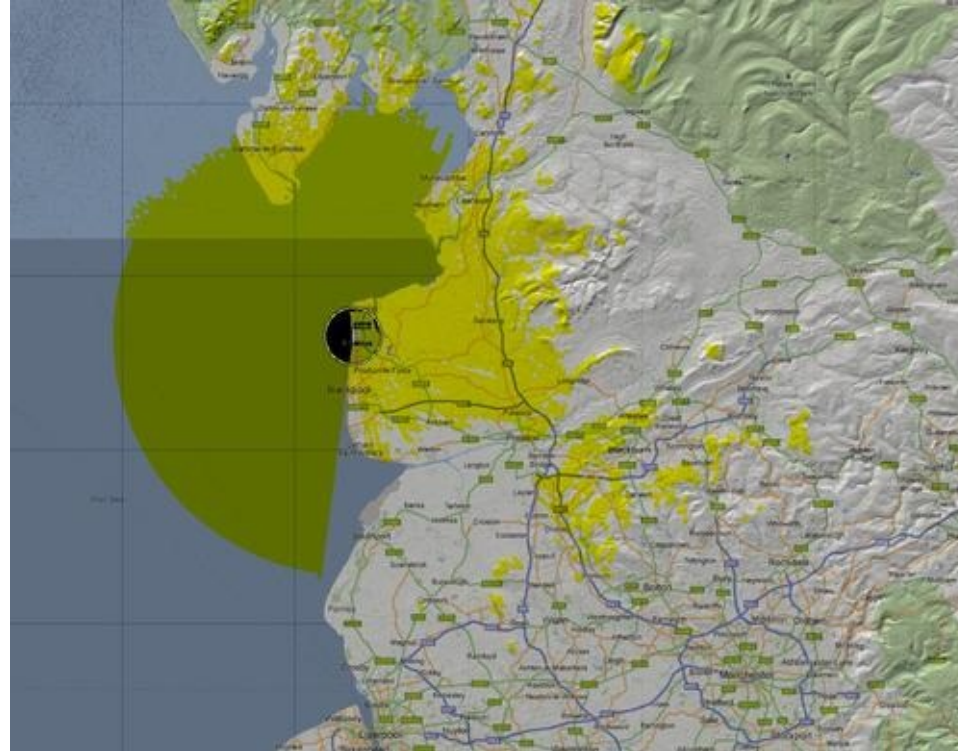
**A**t the moment Lancashire is devoid of an ATV repeater, so in the anticipation of receiving a NOV I have started work on GB3FY. The application is for a 10 GHz FM ATV repeater with the input on 10.315GHz and the output on 10.065 GHz. The NOV was applied for in September 2012.



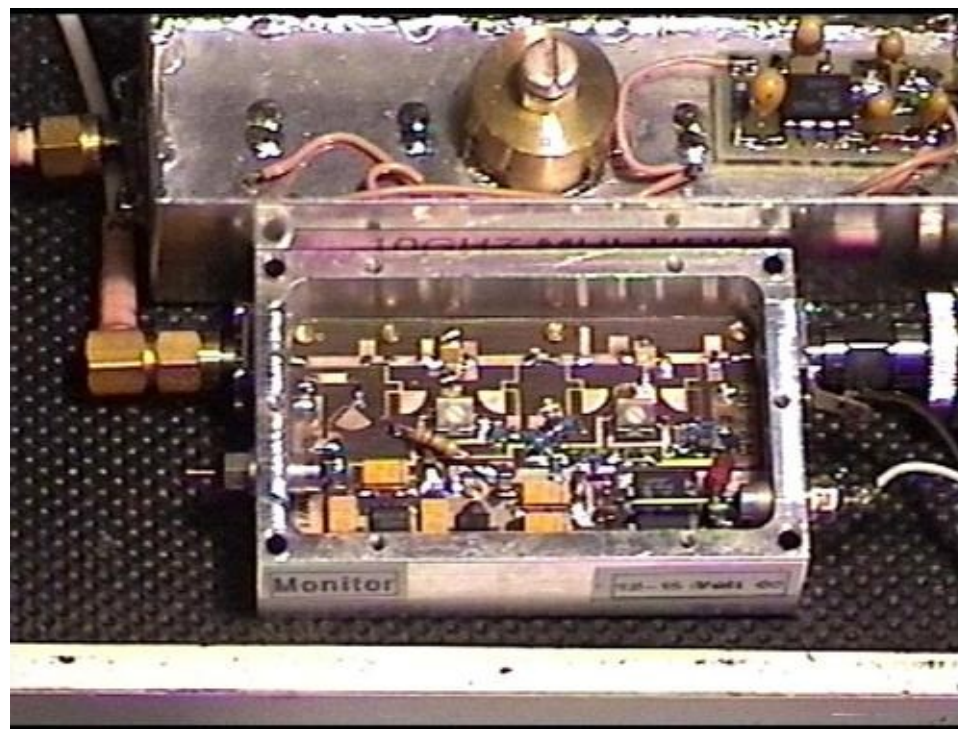
The first thing I did was to locate a suitable site for the unit and was amazed at the support from the non ATV fraternity in particular. The chosen location is at a local theme park called Farmers Parrs Heritage Museum, which is a charity for children with AUTISM and has been in operation since 2007.

I was introduced to the owner James Parr by a family friend and comedian Syd Little (remember Little and large). James Parr is the owner and the museum is positive gold mine full of old farm equipment, a cobblers repair shop with a foot X-RAY machine Rock displays, old kitchens Steam Roller even old working Tanks and

an Old Blackpool Tram and lots lots more.. As I said their main function is raise funds for Children with Autism. They also have an excellent cafe which is open all year round and is well worth a visit.



***The coverage area which we hope will be around 20 miles radius.***



I am working on the transmitter and at the moment trying to frequency modulate a YIG

I first looked up on the WEB 'tinternet' the word YIG only to find it's a mythical being referring to snakes and all sorts of mumbo jumbo stuff.

I found some stuff on the WEB by yes a Radio Amateur KE5SX more proof there are some very clever experimenters out in our hobby and do for free place information of their own findings purely from trying it. Most inventions come by accident and are not planned.

YIG is a kind of synthetic garnet with a chemical composition  $\text{Y}_3\text{Fe}_2(\text{FeO}_4)_3$ . It is a ferromagnetic material.

Yig's in the past have been very expensive indeed until recently, but can be bought on eBay at reasonable prices as surplus taken out of telephone equipment as well has YIG Oscillators there is YIG Filters too!

So I purchased one of these YIG devices and made a PCB that would control the current through the YIG and keep it constant as the coil warmed up.



Usually there are two coils one to tune its main frequency and one you can FM with modulation but a much smaller coil and limited smaller currents have to go through that. Each coil has a polarity and as you increase the current the frequency goes up. I suspect ,but not tried, if you reverse the coil connections it will go down in frequency.

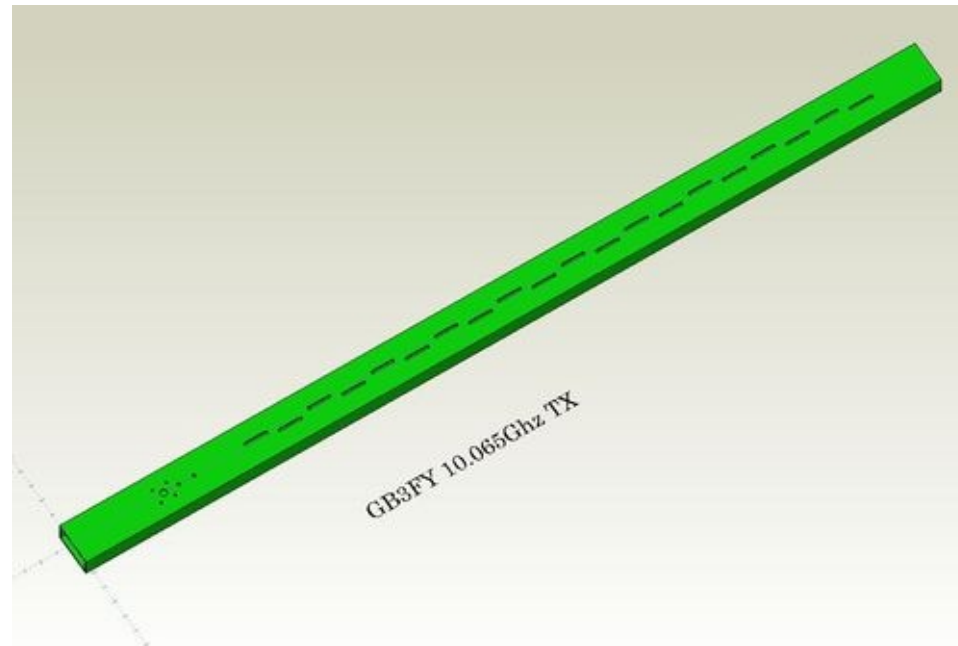
I can confirm that the YIG is a very clean signal and can be controlled also can cover a wide range if required. These have been found in lots of test gear for years.

Also it is very linear with current making it ideal for say DATV modulation.

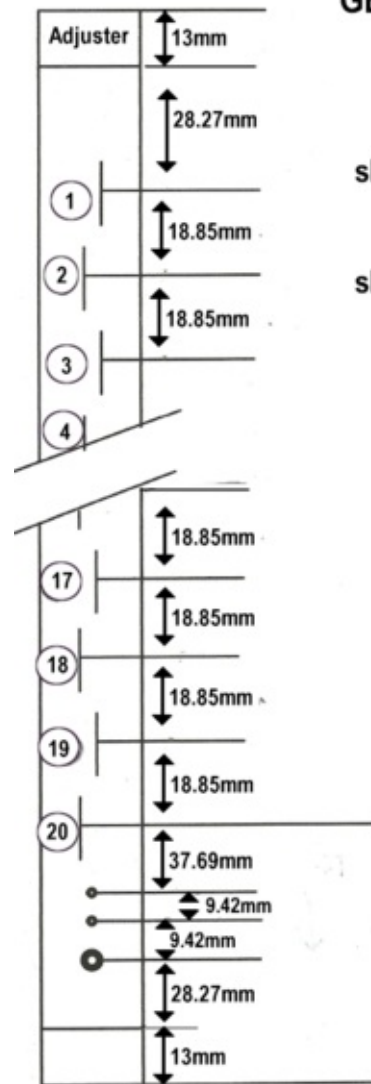
The only problem I found was you could modulate it well up to about 500KHz the  $2\mu\text{H}$  inductance @ 1R comes into play and at 5MHz is a no go for ATV so I am experimenting with simulated circuits to correct for this with excellent results so far!

On the STELLEX YIG I used just needed 8.5V supply running about in total 120mA. The output was above +10dBm. (more like +20dBm on my HP power meter).

If anyone has experience of video modulation and frequency control on a YIG please get in touch.

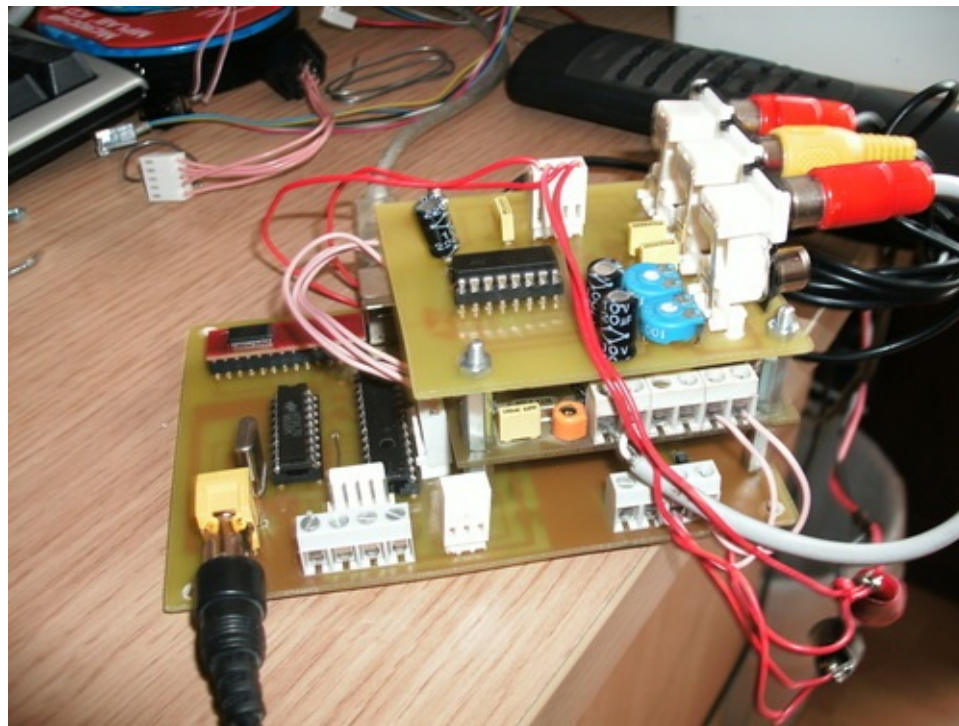


# GB3FY RX 10.315 MHz omni 14dbd



slots offset from centre line =1.46mm  
slot length 14.06mm  
slot width 1.59mm  
slot spacing centre to centre 18.85mm

Both aerials will be the conventional slotted wave guides one for transmit and a second one for receive, they will be Omni directional and should deliver 14dBd of gain.



***The LOGIC unit is so far three stacked PCB,s***

The bottom PCB is a 18F2550 PIC u/P controller and an interface chip to USB (optional use). An HT9170 DTMF tone decoder is a CW clean-up filter to stop key clicks and generate a 1.2KHz CW TONE, and a voltage regulator to produce 5v from the 12v Supply.

The middle PCB is the Test Card Generator, which produces 16 test card pages. The design was published in CQ-TV 233 and is in use for repeaters all over the world.

The top PCB is the Sound and Vision switching using my olds favourite TEA5114A chip again, all these are controlled by the PIC.

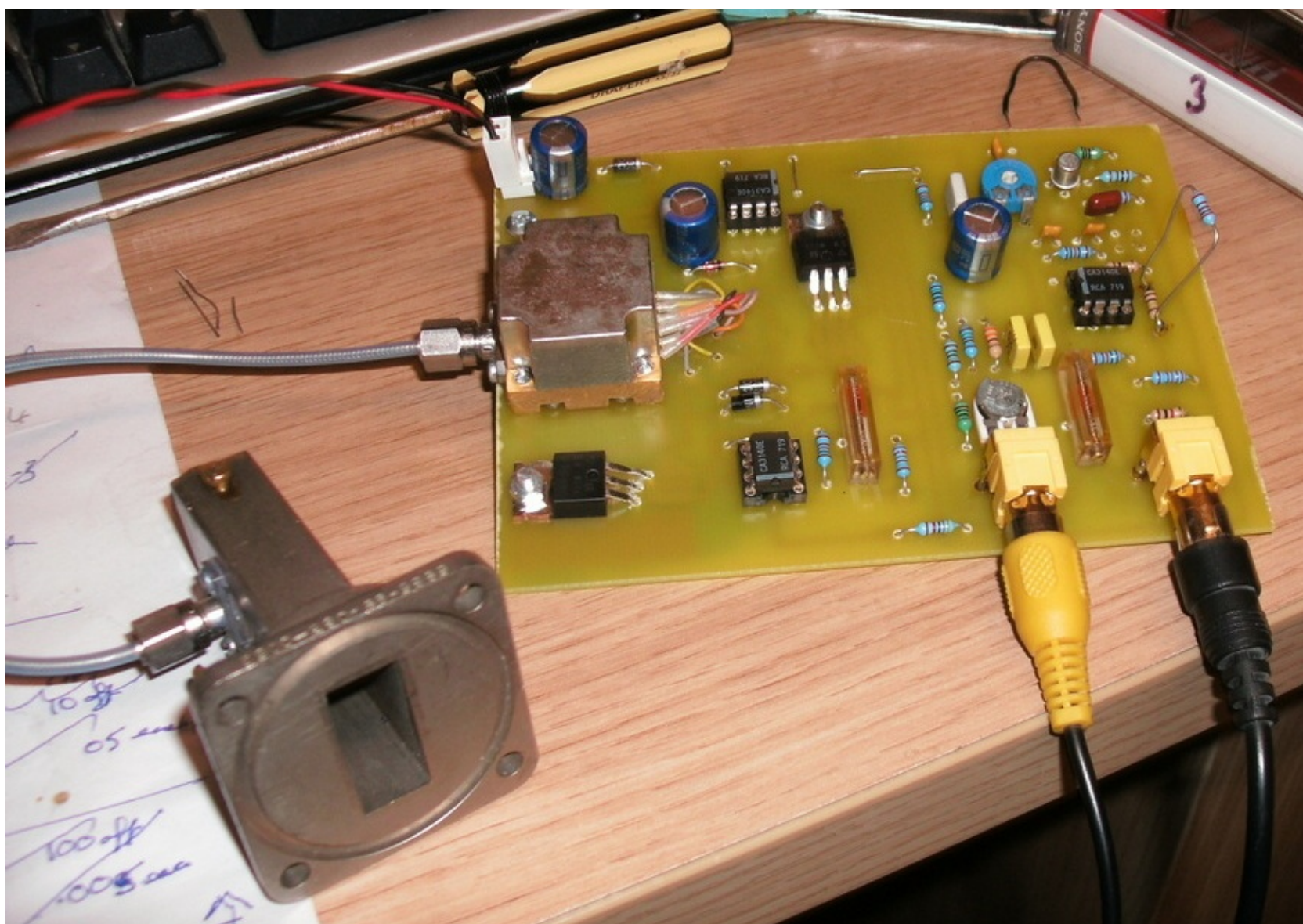
All sound and Video connections are PHONO type.

There will be 11 signal bars on the TCG for tuning up purposes and this will stay on for 15 seconds after you drop carrier for test purposes, only when it detects carrier AND sync will it switch through to the received video being transmitted.



To aid carrier detection every 30mins the noise floor is corrected to compensate for the change due to solar noise changes as the day progresses, this usually peaks around 2pm with the sun being detected and 4am being the quite time I learnt this while testing GB3XG 25 years ago.

There are some 12 of us in the group, but I seem to be the chief engineer, constructor and planner, but in April I should be joined by DAVE G3ZGZ who is at present resident in South Africa, but moving back to the UK to live in the Cleveleys. Dave has been a big help so far but the gap between us has been somewhat of a problem.



***In issue 2, John shows us how to drive the YIG with FM Video***

# *Shooting your own video*

**By Trevor Brown, G8CJS**

The week before Christmas my neighbour stopped me in the drive and said “you know all about television” (the word does seem to get around) “I want to make a DVD of my son opening his Christmas presents, how do I do it”.



My starting point would be what are you going to film it with, forget all the old camcorders particularly if they use tape, and go for a modern electronic stills camera that shoots HD movies, if you don't own one its time you did, look for one that has the magic words AVCHD on it. This is the format it stores video in on the memory card. I prefer camera's that use SD memory cards, treat yourself to a card around 16MB and make sure it is fast enough for the camera, in movie mode, usually grade 4 and above, but it is hard to find a slow SD card in the shop's so unless it's come from you magic draw where everyone keeps all the things they will never use again, you should be OK.



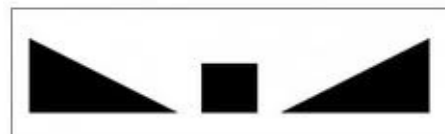
"A tripod would be nice but I can lend you one", make sure the camera of choice has a tripod bush mount, should be ¼ Whitworth thread, my personal preference is one that you can release the camera of in a hurry, and one that is a little more robust than the average stills tripod. The one I lent him was my pride and joy, a bowl tripod, with an almost fluid head for panning, the bowl action means you can level it without shortening or extending legs, it's a single quick adjustment at the top of the tripod just under the camera mount.

He got a lesson on the drive, and seemed to take a shine, to my kit. He also took my advice and bought a Canon S95 compact camera, there are some around at bargain prices now it's not the latest model. It will only shoot 1080i and the zoom will not function when it is recording video (the later more expensive models will, and also support 1080p). I Would like to have 1080p, but the zoom is not a problem, when you try to zoom these compact cameras on shot, they look rubbish, so I never do, I set them as wide as possible and then press record, why wide because it improves your camera work, and I need all the help I can get, also it puts you close to the subject, remember the mic is in the camera.





Next problem is light levels and colour temperature. Daylight is cold blue light around 6000k for the uninitiated and tungsten room lights are around 3000k, a mix of the two is not good, the professionals would put coloured gels on the windows to warm up the daylight to match the interior lights, or replace the room lighting with some cold professional lights usually LED these days. On this level shoot I would go for one or the other not both, either draw the curtains and use room light or open the curtains and turn the room light off. You then need to tell the camera the colour of the lighting, it's called white balance, the canon is quite sophisticated it has manual white balance(MWB) in the menu, my preferred option, look for the symbol.



Find something white in the room illuminated by your choice of lighting, fill the frame with it, select MWB on the menu and in the case of the canon press menu, to lock it in (different on other camera's with MWB). If you want to warm the pictures up a little, you can cheat by selecting something other than white, something with a hint of blue will warm the pictures up, or a nice cream wall will make the picture look cold (why would you want that?).

Last but not least don't leave the camera in the same position looking like you shot it from CCTV every few minutes move the camera, but do it quickly, and if you can stop and start the camera so it produces clips rather than one long scene, we can edit out the camera moves, and join the clips, but if you are slow, then the pile of presents might diminish in the edits. An ideal shoot would be two camera's giving two different views and then cut between them in the edit and miss nothing.

The S95 will run for about 25 minutes in this fashion, if you have a 16MB card it will be the battery which will give up first, if you are using a different camera, try it before hand, and find out how long the battery will last (it helps to know).

You will need a computer and edit package, to join the sections of the shoot together and remove any unsightly camera moves, I would recommend wondershare, and it must be the simplest edit package ever and can be downloaded as a free demo from: <http://www.wondershare.com/video-editor/> it is fully functional in every way except any renders are watermarked

It is a JAVA based programme so please make sure your JAVA is up-to-date.

It is available for both the Mac and Windows XP/Vista/Windows 7 Mac OS X 10.5, 10.6, 10.7, 10.8 (Mountain Lion)

It's very simple to use and ideal for putting clips together, you can also add a separate sound track that can be commentary or music, but remember music downloads are copyright, just because you have bought the download or CD, you do not have permission to use it in your production.

Rather than step you through wondershare, have a look at the demo's on You Tube, it really is user friendly see :-

- <http://www.youtube.com/watch?v=dxgtQZQpAl8>
  - <http://www.youtube.com/watch?v=AzUPjuQjLFo>
  - [http://www.youtube.com/watch?v=nBTr\\_HKgmEc](http://www.youtube.com/watch?v=nBTr_HKgmEc)
  - <http://www.youtube.com/watch?v=bYO70CZHug0>
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# *Inexpensive home constructed dummy load*

**by John Hudson G3RFL**

**I**n a senior moment, I managed to damage my RF dummy Load, by using it on a 13cms transmitter that was more than capable of delivering 120W. So it was time to consider a replacement and an upgrade to cope with the higher power Levels.

I started by purchasing a 50ohm 250W surface mount resistor. The resistor I chose has a specification. (see [data sheets](#) below)

That will enable it to be used up to at least 2GHz, and cost £7. I have seen some on eBay for about the same price, but only 150W versions.



I was fortunate to find suitable heat sink in my junk box, something I suspect was left over from a computer

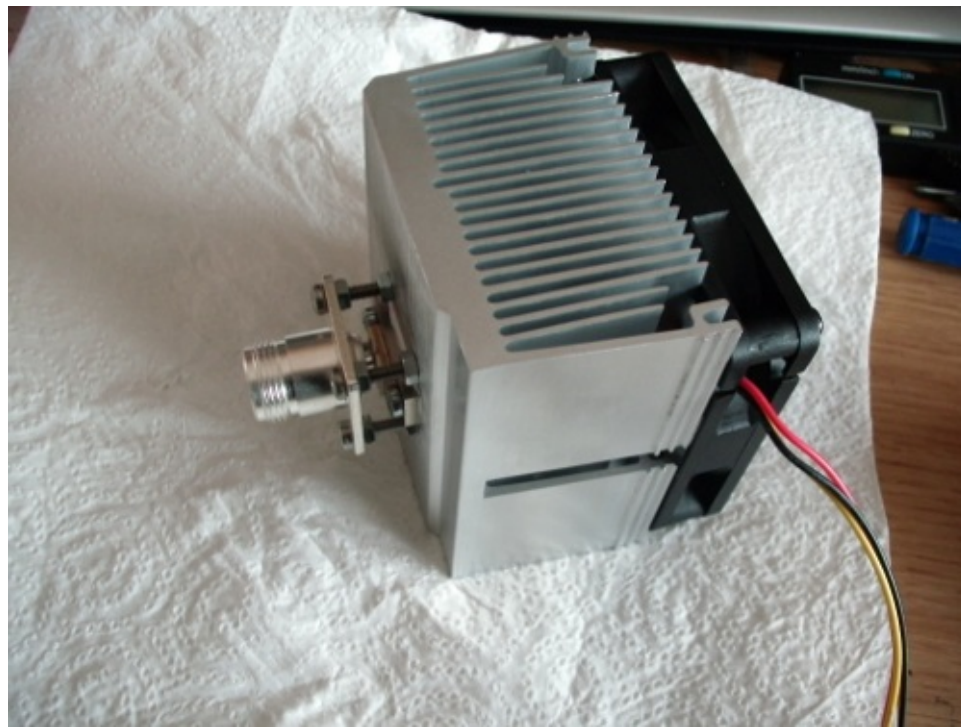


upgrade. It was a simple task to drill the heat sink and mount the resistor applying a liberal dosage of heat transfer compound. I folded the TAB back over itself onto its top and filed an "N" type connector plug, filing the centre pin down as much as possible as this goes over the resistor and compression touches the resistor tab, carefully not over tightening it or you will break the resistor.

In theory the unit should work up to 2GHz, but my first test was on 2m with just 50w, the heat sync soon got too hot to hold, after only a few minutes.

So I decided to add a fan, quick search of my junk box and I failed to come up with a suitable fan for the heat sink, probably why the heat sink was in my junk box, so it was time to invest some of my children's inheritance in a commercial product. The 12V fan I chose came from CPC and was designed for use used on PCu/P and cost just over £7.

When the fan arrived I fitted it and repeated the experiment with the two meter source, once the heat sink became too hot to hold, I powered up the fan, and after only a few minutes the temperature dropped to just a few deg above room temperature. I was well pleased with my £7 investment, in what proved to be a very quiet fan, well worth the £7. The fan also has the third wire which provides pulses to indicate the fan is spinning, this might be useful for the future when I develop the unit further, but my first addition will be a Voltage detector interfaced to a PIC so I can read out the POWER via a USB lead.....watch this space.



***Completed unit ....so far.***

*Data sheets*

# Anaren

## RF Power



### Features

- DC - 2.0 GHz
- 250 Watts
- BeO Ceramic
- Welded Silver Leads
- Non-Nichrome Resistive Element
- 100% Tested

## Model RFP-250-50RM

### Flanged Resistors

250 Watts, 50  $\Omega$

### General Specifications

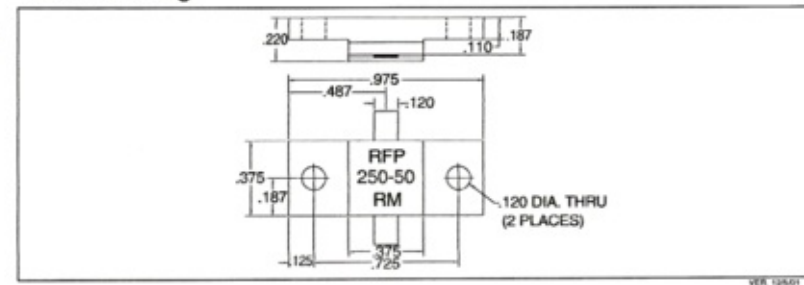
Resistive Element:	Thick film
Substrate:	Beryllium oxide ceramic
Cover:	Alumina ceramic
Mounting Flange:	Copper, nickel plated per QQ-N-290
Lead(s):	99.99% pure silver (.005" thick)

### Electrical Specifications

Resistance Value:	50 ohms, $\pm 5\%$
Frequency Range:	DC - 2.0 GHz
Power:	250 Watts
Capacitance:	3.3 pF

Notes: Tolerance is  $\pm 0.10$ , unless otherwise specified. Operating temperature is  $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$  (see chart). Designed to meet or exceed applicable portions of MIL-E-5400. All dimensions are in inches. Lead length 0.15" minimum. Specifications subject to change without notice.

### Outline Drawing

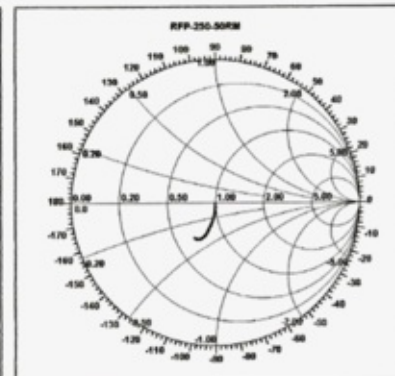
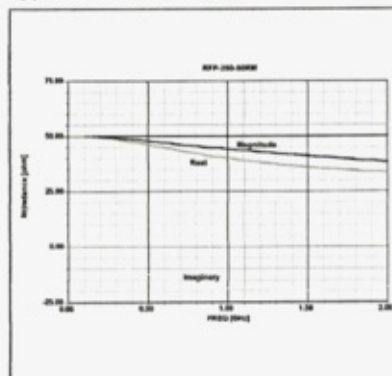


Sales Desk USA: Voice: (800) 544-2414 Fax: (315) 432-9121  
Sales Desk Europe: Voice: (+44) 23 92 232392 Fax: (+44) 23 92 251369

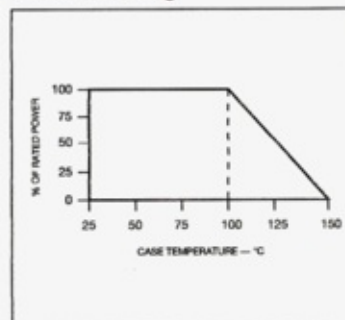
**Anaren**  
What's on your mind of next?

1

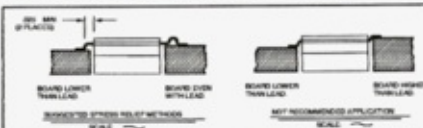
## Typical Performance



## Power Derating



## Suggested Mounting Procedures



1. Make sure that the devices are mounted on flat surfaces (.001" under the device) to optimize the heat transfer.
2. Drill & tap the heatsink for the appropriate thread size to be used.
3. Coat heatsink with a minimum amount of high quality silicone grease (.001" max. thickness).
4. Position device on mounting surface and secure using socket head screws, flat & split washers. Torque screws to the appropriate value. Make sure that the device is flat against the heatsink. (Care should be taken to avoid upward pressure of the leads towards the lid).
5. Solder leads in place using an SN63 type solder with a controlled temperature iron (210°C).

# DigiLite System Overview

**by G4EWJ (edited by G8AJN)**

**D**igiLite is a system designed by radio amateurs to provide a lower cost method of home building a digital modulator for transmitting live digital TV pictures (DATV). It is a derivative of the Poor Man's DATV System which many amateurs have contributed to over several years. The system has 6 main parts:

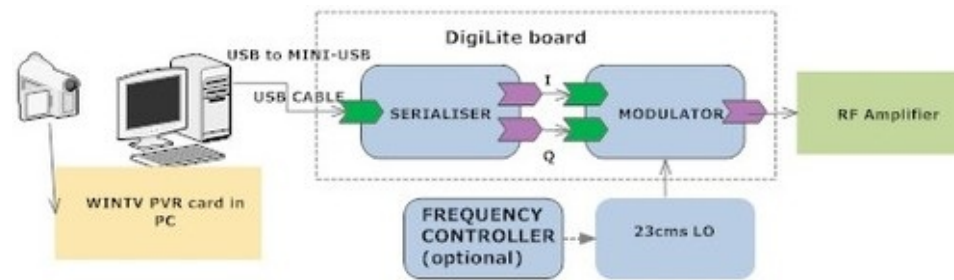
- *A Windows PC with a video capture card that uses an MPEG-2 compression chip.*
- *A recording program on the PC to save the data from the capture card onto hard disk.*
- *A program running on the PC to read the recorded data from hard disk, convert it to a form suitable for transmission and send it to a serialiser.*
- *A serialiser, which is a device that connects between a PC USB port and a modulator.*
- *A QPSK modulator.*
- *A program to configure the transmission parameters.*

## DigiLite System Outline Details

A Windows PC with a video capture card that uses an MPEG-2 compression chip. The current project assumes a WinTV PVR card. A recording program on the PC (either WINTV v 7 or GBPVR v1.4.7 )to save the data from the capture card onto hard disk.

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

If an older PC is available, which can be dedicated to DigiLite, this is ideal. A single core 1.8GHz processor with USB2.0 should be sufficient on a 'quiet' system. On a non-dedicated PC, if Windows gets busy doing other things, the conversion program may not get all the processing time it needs and that can cause an occasional glitch in transmission. The more powerful the PC, the less chance there is of this happening.



## Recording program

DigiLite has been designed to use the Hauppauge PVRx50 PCI video capture cards. There is also a Hauppauge PVR USB2 external device that can be used with laptops. Other cards are being evaluated, but they need to do the mpeg2 encoding in hardware (in an IC not in software). There are often WinTV cards available cheaply on Ebay etc. It should be possible to get a card and disk (a disk is needed to download WinTV v 6 free). If you don't get a disk you will need any version of an Original Hauppauge Install disk in the PC to get a free download of the WinTV 6 programme.

If you cannot get WinTV you can use GB-PVR.

VGBPVR is a free PVR (personal video recorder) program. Version 1.4.7 has been used successfully. Later version may not work. GBPVR requires a certain standard of video graphics card to run, even if you do not actually want to watch the video on that PC. Older graphics card may have problems. More card details on hardware pages.

## Conversion program

DigiLite Transmit is the program that reads the recorded data from hard disk immediately it has been written.

The data is in Program Stream format, which is very similar to the format used on DVDs. The video and audio are extracted and converted into DVB-S transport stream format, which is the format used by European broadcasters to deliver standard definition programs via satellite. This means that a cheap FTA (free to air) satellite box may be used to receive the transmission. Other data is placed in the transport stream such as date and time, channel name, program name and Electronic Program Guide info. The transport stream data is

sent to the serialiser via a USB2 port.

## *Serialiser*

This is the device that connects to a high speed (480Mbps) USB 2.0 port and accepts the transport stream data from the PC. Two bits at a time (a symbol) are sent to the modulator at the symbol rate. The serialiser may optionally apply the FEC (aka Viterbi) forward error correction processing to the transport stream data, or this can be done on the PC. Doing the FEC on the serialiser is preferred as it reduces the data rate over the USB connection. The serialiser has a second communication channel which is used to receive control information from DigiLite Transmit to set the required symbol rate and FEC.

The serialiser can also be put into one of several test modes, to help set up the modulator. The serialiser has been used successfully at symbol rates between 1250k and 6250k. Several symbol rates are pre-programmed into the system.

The serialiser has an SD card socket for playing pre-recorded transport stream files. This function is still in development and is not available in the initial release. The serialiser CPU chip dsPIC333 will need to be re-programmed to add new functions such as this.

## *Modulator*

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

## *Configuration*

DigiLite Config is the program that is used to set the symbol rate and FEC and also the channel name and program details. Settings are stored in the Windows registry, which DigiLite Transmit monitors continually to look for any changes in transmission parameters. DigiLite originally began life as the 'Poor Mans Digital



encoder'. Credits must go to those with the original concept.(including F4DAY and F1HPR ). Brian G4EWJ has worked on the software and developed the serialiser and USB version. Using the MPEG2 encoder chip on the WIN TV capture card with a PVR program to record on to a PC's hard drive whilst simultaneously reading from the file to create a serial USB stream.

This goes to the serialiser board where the stream is buffered and extra code is added to the packets before being sent to an IQ modulator as a Transport Stream. The modulator uses a local oscillator set to the required output frequency,e.g. 1249MHz. Rob(M0DTS) worked on getting the PC to serialiser and modulator hardware running up to the required 4Ms/s and using the more convenient USB input. Brian(G4EWJ) worked on the hard drive reading software for the serialiser and USB and moved it from the original Linux software to the current Windows version. Test boards were built by Rob and Malcolm G0UHY to confirm that it can be replicated. Symbol rates were gradually stepped up from 2Ms/s to 4Ms/s and above.



Here is a description of the digital system adapted from the M0DTS website...

A Digital ATV Transmitter is built of 3 main stages, these are: MPEG-2 encoder, multiplexer, Error correction



and Convolutional coding, Serialiser, Nyquist filter and then to an IQ modulator. The MPEG-2 encoder takes the analogue Composite video and audio signals in and converts them into a digital signal; it then gets compressed into the standard MPEG-2 format. Currently using a Hardware MPEG-2 encoder, the Hauppauge PVR-150 (or 250/350/500) pci card in the PC. The multiplexer takes the MPEG-2 audio, video and service information and puts them into one single stream called a Transport Stream which is made of 188 byte long packets of data. Software reads the transport stream from the HDD and splits it into separate Audio and Video elementary streams, Service Information tables (PAT, PMT, SDT, EIT etc.) are added also Reed Solomon correction is added into the transport stream.

The serialiser takes in the parallel data stream and converts it to a serial stream in IQ format ready for the modulator. This is done in a microprocessor dsPIC333. The Nyquist filter is a special Low Pass Filter that removes the unwanted sidebands from the I/Q signals and retains the impulse response of the data signal very well, the same as used in the F4DAY system. The filtered IQ outputs are fed into a modulator, using F1HPR's design, an Analog Devices AD8346 IC for this as it directly modulates the LO for the band you are operating on. This makes it very easy to change between different bands by simply supplying a different LO frequency and some minor adjustments of IQ bias and level (and perhaps the Nyquist filter components if using lower symbol rate). The modulator has preset pot's to adjust balance of I/Q level and I/Q voltage bias for canceling out the LO. After that a MMIC amplifier gets the signal up to a level required for input to an external amplifier to raise the level to that required by the PA. Remember that the bandwidth of the 4000ks/s is roughly 4Mhz, so the power required to cover as well as the 12Mhz analog one does is much lower. This allows you to lower the drive to your PA and thus get into the best linearity that you can without any loss of coverage.

CQ-DATVmob have produced an eBook containing a compilation of DigiLite articles and it is available as a free download from <http://cq-datv/ebooks>



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# *Fade to Black*

**By Trevor Brown**

Seeing John's repeater logic and the TEA 5114 which he assures me are still available, but maybe only from his junk drawer reminds of me building a simple fade to black unit, using the same video switching chip, I think it only existed on a prototype board and several people have added improvements to the basic circuit over the years (see CQ-TV 160 and 157). I remember burning the midnight oil on the unit because one of my neighbours needed to give a video presentation to a football club using of different sections of several VHS tapes. These clips needed editing together onto a single tape so they could be part of a presentation.

This would have been easy on a modern NLE editor, but this was back in 1989 when things were not quite what they are today, the unit was built alongside an audio fader unit, yes you have guessed it, a single pot. I spliced the unit into a SCART lead so it could be used to connect two VHS machines and enable, fading up and fading down, when transferring material, This helped isolate the required sections when copying between the two machines. Couple this with a the pause edit that always look terrible on VHS machines, but if you faded to black and then paused, cued up the player released the pause and faded up, well it looked passable.

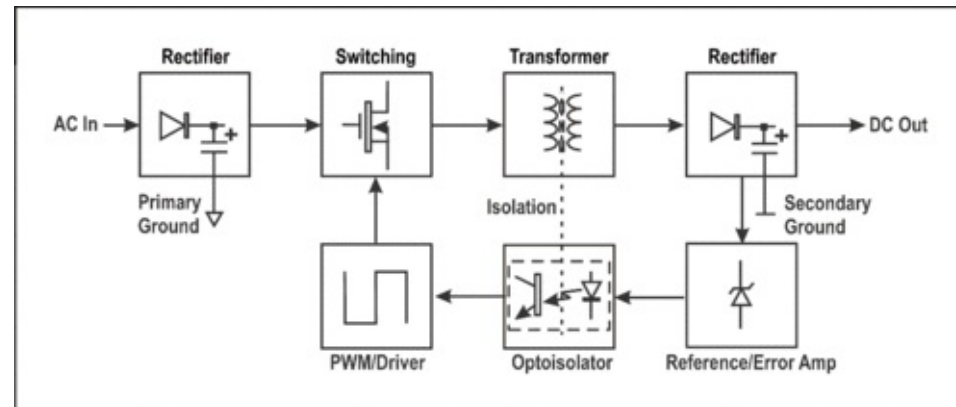


more modern vision switching chip are on the market. Although I hope you never come home from work to a note and two VHS tapes that needed the above work at very little notice.

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# Switchmode Power Supply Basics

These power supplies follow a very similar basic structure illustrated in the following block diagram:



1. A rectifier stage which produces a smoothed DV voltage directly from the incoming AC mains supply.
2. A regulator stage which uses a high voltage switch, usually a power FET to generate a variable AC voltage into the transformer primary, driven by a PWM oscillator.
3. The transformer to provide both power conversion and isolation between the primary AC mains input side of the power supply and the secondary side of the transformer. The secondary side is connected to the equipment.
4. A low voltage rectifier stage to convert the secondary AC voltage to the required secondary DV voltage.
5. A voltage detector and feedback stage to the primary-side high voltage switch, usually via an optocoupler to preserve primary-secondary isolation, to maintain the required output voltage under different loads, and
6. An optional current limiting stage to limit the maximum output current of the power supply to design limits.

The 'primary side' is the high voltage 110VAC or 230VAC mains power supply side that feeds the rectifier and regulator stages of the switchmode power supply. The 'secondary side' is the low voltage DC side that connects to my circuits. It's really important to make sure that there is absolutely no chance that the primary side voltage, which can rise to above 340VDC, can come in contact either with the circuit being tested, or,

more importantly, the person doing the testing - you or me!

Isolation in the older transformer-type power supply is provided by those relatively large and heavy iron transformers. In a switchmode power supply, or at least good ones, the isolation is provided by the combination of the tiny switchmode transformer, the physical separation provided by a good PCB layout, and (usually) an optocoupler which is used to carry the voltage feedback to the primary side switching device. While these supplies typically employ a high voltage FET driven by a simple transistor oscillator, an increasing number are using a single small high-voltage IC containing the switching device and many of the associated primary-side components.

The switchmode power supply transformer is smaller because transformer losses reduce with increasing switching frequency. The old transformers operate at AC mains voltage frequencies of 50 or 60 Hz. Modern switchmode power supplies operate at much higher frequencies, anywhere from 30kHz to 300 kHz, with the result that losses are reduced. So, transformer sizes can be smaller too.

Some cheap power supplies avoid optoisolation, relying instead on feedback from one of the transformer windings.

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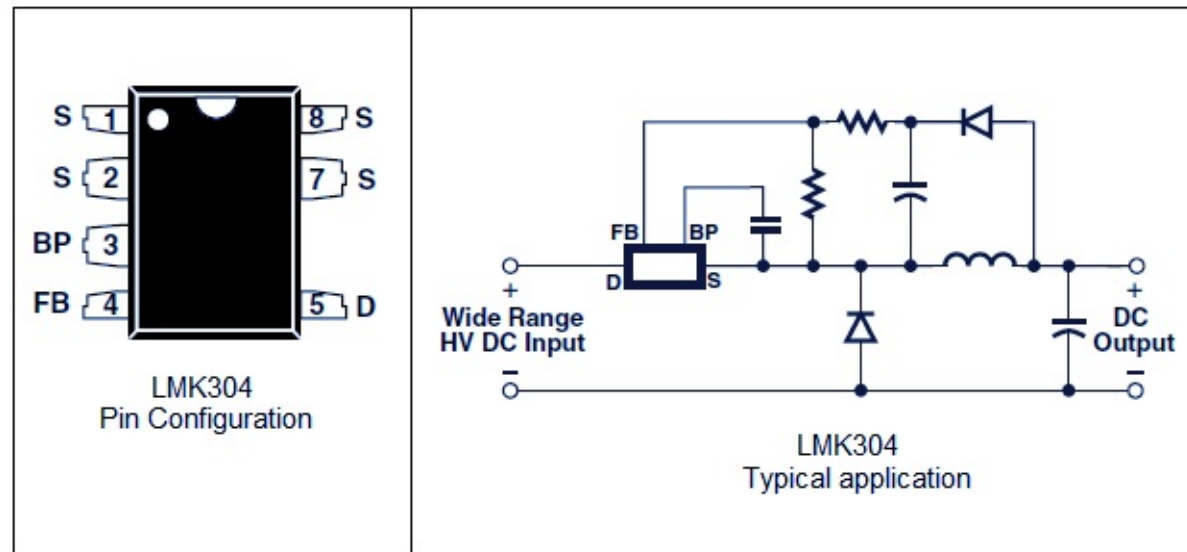
## *Transformer-less switch mode power supply circuit*

### ***12V/120mA switch mode power supply circuit.***

**T**ransformer-less switch mode power supplies have become very popular these days. The circuit shown below is of a 12V/120mA output, 85 to 230V AC input transformerless switch mode power supply using LNK304 IC. Applications of a power supply based on this IC includes hand held devices, timers, small appliances, LED drivers, industrial gadgets etc.

LNK304 is a low component count, efficient off-line switcher IC that can support buck, buck-boost and flyback

topologies. The IC has a built in auto start circuit for short circuit and open loop fault protection. Other features of LNK304 includes low temperature variation, thermal shut down, high break down voltage, good line & load regulation, high band width , wide input voltage range (85 to 230V AC) etc. In general the LNK304 has a better performance when compared to the many other discrete buck regulators.

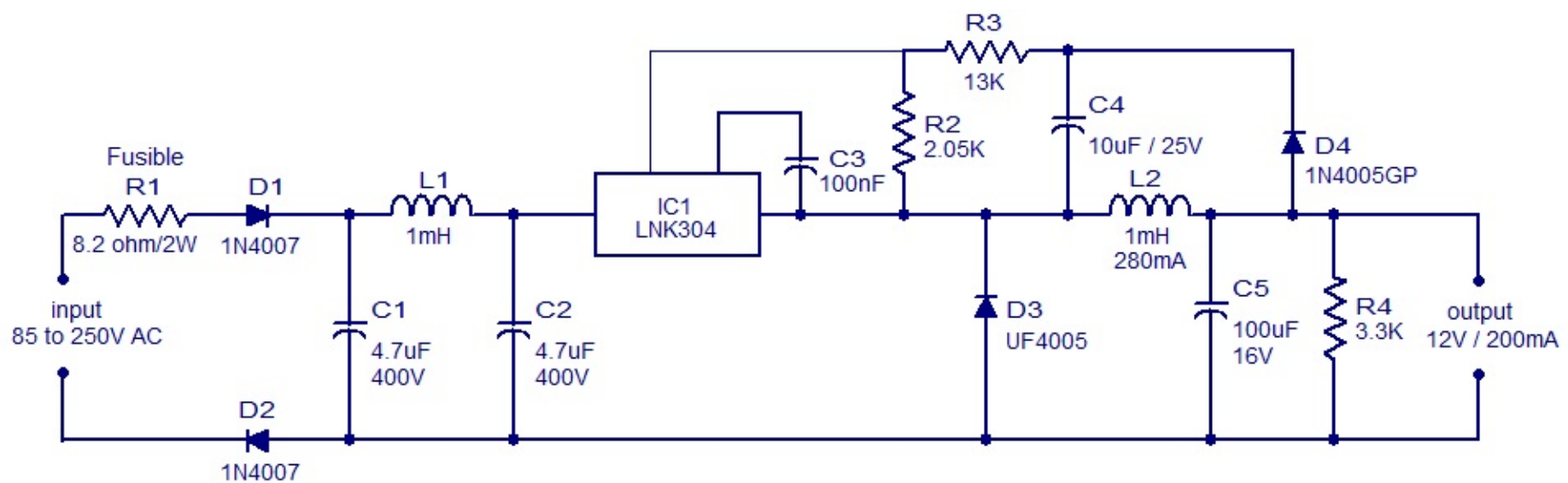


***LNK304 pin configuration and typical application***

The pin configuration and the typical application diagram of LNK304 are shown above. Drain (D) pin the drain connection of the built in power MOSFET. The external by pass capacitor (0.1 $\mu$ F) is connected to the BYPASS (BP) terminal. FEEDBACK (FB) pin controls the switching of the built in power MOSFET. A current above than 49 $\mu$ A delivered to this pin will inhibit the switching. The internal power MOSFETs source is connected to the SOURCE (S) pin.

*LNK304 based switch mode power supply circuit.*





### ***12V /120mA switch mode power supply circuit***

The circuit diagram of a practical 12V/120mA transformer-less switch mode power supply is shown above. Resistor R1, capacitors C1 and C2, diodes D1 and D2 and inductor L1 forms the input stage. D1 and D2 forms the rectifier section while C1 and C2 are input filters. Resistor R1 which is a fusible resistor limits the inrush current, increases differential mode noise attenuation and also serves as an input safety fuse.

The next stage is the regulator stage which consists of IC LNK304, diodes D3 and D4, capacitors C3, C4 and C5, resistors R3, R4 and R5 and inductor L2. D3 is the freewheeling diode while L2 is the output choke. C5 is the output filter capacitor which limits the output ripple voltage to a value as low as possible. The IC LNK304 is so configured that the power supply operated in the most discontinuous mode and that's why a fast recovery diode (UF4005) is used as the freewheeling diode (D3). UF4005 has a reverse recovery time of around 75nS and it is well enough for the given situation.

The voltage drop across diodes D3 and D4 are practically same and so the voltage across C4 tracks the output voltage and this voltage is picked by the network comprising of resistors R2, R3 and is fed to the feedback pin. R2 and R3 sets the output voltage and for 12V output the voltage at the feedback pin must be 1.65V DC. The circuit attains regulation by skipping the switching cycles. When the output voltage rise, the current at the feedback pin also rises and when the current rises above the threshold value, subsequent

cycles are skipped until the current at the feedback pin goes below the threshold and thus a constant output voltage is maintained.

The IC will auto restart if no cycles are skipped during a 50mS time period and this limits the maximum output power to 6% of the maximum over load power. That's how over load protection is attained. Resistor R4 serves as a small preload which nullifies the effects of tracking error.

### *Notes.*

- *Assemble the circuit on a good quality PCB.*
- *LNK304 is a very high efficiency switching regulator IC that has a hand full of applications.*
- *LNK304 is commonly available in SMD package (DIP is also available) and care must be taken while soldering it.*
- *D1 and D2 are standard 1N4007 silicon rectifier diodes.*
- *D3 (UF4005) is a fast recovery diode.*
- *D4 (1N4005GP) is a glass passivated diode.*
- *C3 can be a ceramic capacitor.*
- *C1,C2 and C4 are polyester capacitors.*
- *C5 can be electrolytic or polyester capacitor.*
- *Voltage ratings of the capacitors are shown in the circuit diagram.*
- *R1 is a fusible, fire proof resistor.*
- *Maximum possible output current is 120mA.*
- *Input voltage range is 85 to 230V AC.*



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"One of our trains is missing" - Trevor Brown

"The boss said that the project was on the right lines!"

"No I don't think we can get away with leaves on the lines again"



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## *Next issue...*

- *John will be looking at simple frequency counters to set up GB3FY*
- *Trevor will be planning a wedding video shoot*
- *John shows us how to drive the YIG with FM Video*
- *Ian will be explain how to search the BATC DVD's*
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