CQ-DATV

dotMOBI

Issue 2 - April 2013

http://cq-datv.mobi

Editorial

Welcome to the second edition of CQ-DATV mobi a new free ATV magazine, available for eBook readers.

I have been pleasantly surprised at the number of downloads there have been for issue 1.

In this issue John G3RFL has produced a full article on the 10GHz FM ATV TX for GB3FY, John has also made this into a constructional project with a PCB artwork, for those of you with home etching facilities. John has also updated his frequency counter to set up and monitor the performance of GBFY, again he has produce a downloadable PCB design to make this also into a constructional project

Richard Cross has produced an article on home PCB etching so if you have never before home etched a PCB this may be what you have been looking for

Trevor has put on his production hat and given some advice for a wedding video shoot, I hope this is useful should you get pulled into making a DVD of one of these family occasions. Trevor has also reproduced an design he did some time back of a video switcher using the TEA 5114 chip which is still available

DATV has not been forgotten with small 70 cms linear PA that was designed by F1DJO using the MHW 2723 device and can be built on either a home etched PCB or a commercial board that can now be purchased through the BATC On-line shop.

There is also a report on the new DATV express which is being put together by Charles G4GUO, Art WA8RMC, Tom WB6P and Ken W6HHC and sounds very close to been available as a fully populated PCB ready for DATV operation

What I still need is contributions. I hope to make CQ-DATV green and topical. I am aiming for 6 issues a year.

This can only happen if you the readers send in your contributions. Please enjoy Issue 2 of CQ-DATV

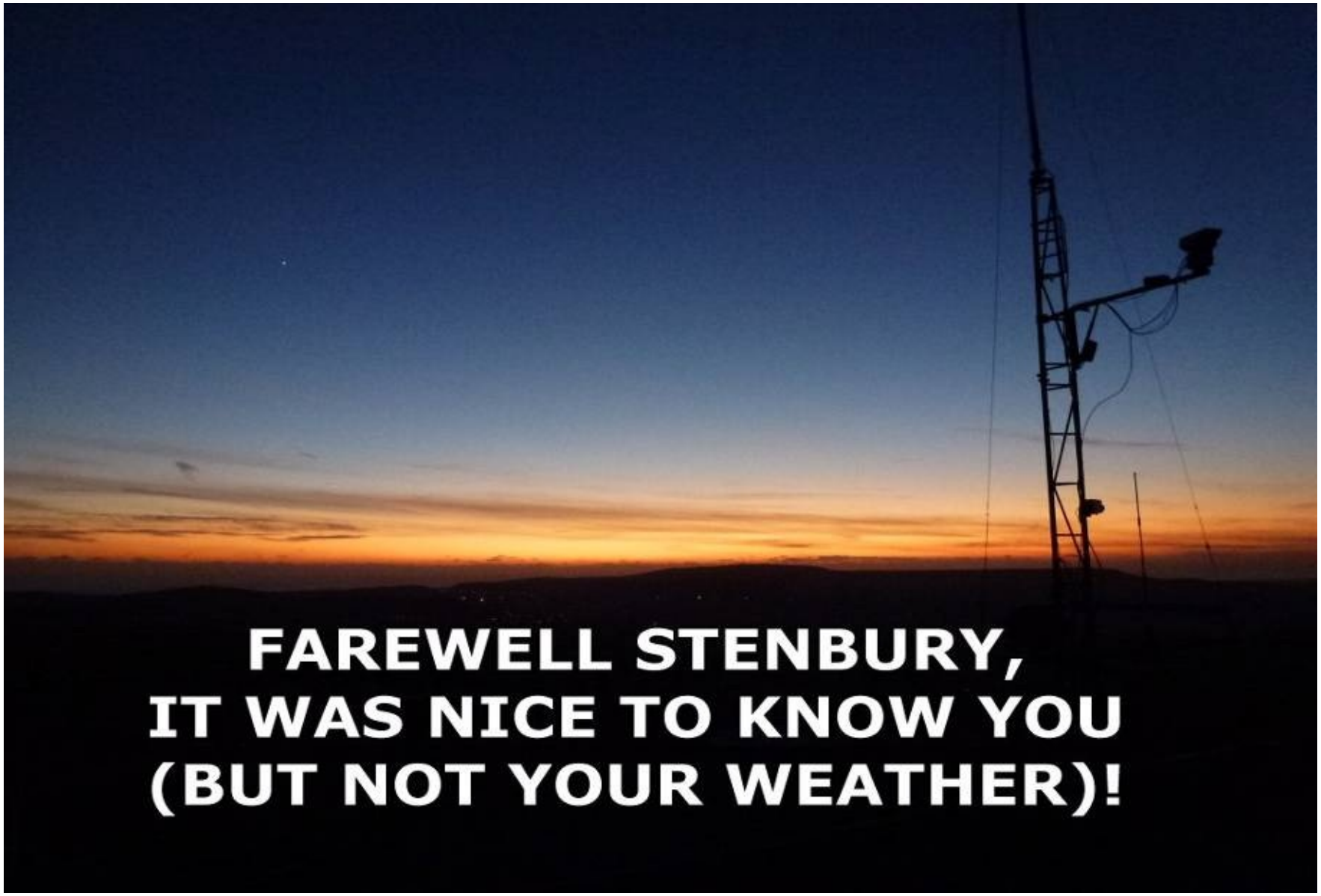
Ian Pawson G8IQU
Editor CQ-DATV (*editor@cq-datv.mobi*)

A site move for GB3IV and GB3IW by Howard Chapman G3NZL

The owners' solicitor's letter of December 21 gave us three months' notice to quit with vacant possession and we kept our word.

Frank, Colin and I went to Stenbury last Saturday March 16, it was a miserable day and climbing the ridge through intermittent old snow drifts was "challenging" (as you will see on the video which is currently being assembled).

The first job was to see what faults we have to clear before we do a fresh installation across the Solent and we got considerable help from Peter on 23cms and Noel on 70cms. Some peculiar snags had developed during the three months that we had been unable to visit the site and it was encouraging that all of the gear (excepting the known FM driver problem) worked correctly after we juggled a few connectors – so this was a repeat of the snags we had at this time last year when the phono plugs proved that they cannot stand Stenbury's salty air.



We removed all of the gear from the racks before Colin and I put on our protective clothing ready to remove the aerials etc from the towers. Colin went up the ladders with me having to use all of my considerable weight to stabilise things whilst it was blowing a hooly at just above freezing point - well done Colin. Meanwhile Frank was loading his large van with all of the equipment we had assembled over the years – the whole of the big Merc's floor was occupied and we were surprised about how much there was.

We then tidied up and headed for the ferry. We had been charged £164 for a day trip (you can do a day trip to France for £25)! And we got to the terminal early and were then told that we would have to pay another £13.50 to catch the 4.30pm (which had space) so we waited on the "prom" and caught the scheduled 6pm boat – So the forthcoming hop across the Solent will be most welcome after that ! Frank then delivered Colin and I back to Southampton but his day was by no means over as he then had to transfer all of the gear into store. Fortunately he had the help of Peter, Simon and Julia but it was a long day and we should thank everybody for the good work.

THE SITE CHANGE (Part Two):

We have already reached agreements with our new hosts but as the bureaucracy for a site change is extensive and rather unpredictable we will save the details until the AGM so that we can give the true picture.

About the Applications:

We anticipated the situation and the App for GB3IW's NoV was accepted on the Thursday before with GB3IV following on the Friday.

The ETCC who handle these were certainly on the ball and we are already in the Vetting lists, so we will be watching closely to see whether the promised improvements in flow actually happen.

Stenbury on a nice day (which Saturday wasn't)!

Your Tech Team are far from idle whilst we are waiting for the paperwork – there is site planning, aerial and feeder installations plus shoehorning all of the equipment into a single rack to do and we have already started the planning stage.

Also work is already under way on various modules (for instance the Solent FM Tx is behaving properly again on my bench after a driver change) we also intend to change some of the many co-ax connectors which were such a major problem at Stenbury.

The gear will be fitted in stages before we receive the NoVs and the intention is to initially operate under our own licenses during the testing phase – so please remember to keep an eye open for some activity because operations will resume as soon as is practicable.

CBC Museum

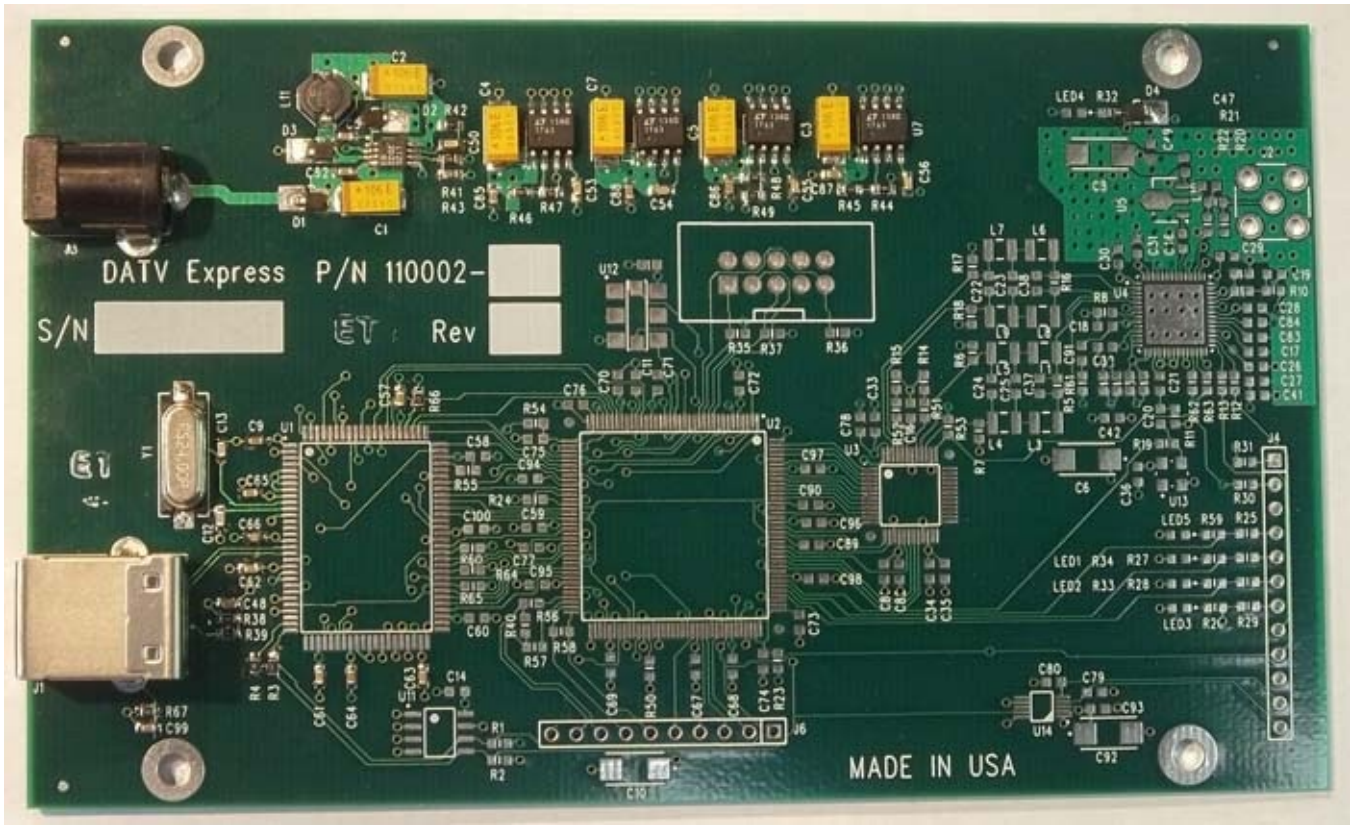
Since 1936, the Canadian Broadcasting Corporation has been the voice of this nation, linking Canadians from coast to coast to coast with its respected brand of journalism, sports coverage and entertainment.

Come to the CBC Museum and Graham Spry Theatre to experience first-hand the history of Canadian broadcasting… and the shared stories of Canadians!

For more information, visit *http://www.cbc.ca/museum/*

DATV-Express Project – February update report by Ken W6HHC

The DATV-Express team ordered a small batch of bare PCB's from a PCB fabricator in Oregon, named Sunstone. The blank boards arrived yesterday and will be used to check a few prototypes assemblies of the second layout. Art WA8RMC has already begun to hand-solder a "first-article" prototype to see if the PCB board design works. Hand-soldering SMT parts requires uncommon skills (in my opinion), especially when fine-pitch SMT chips are being used. Our vision for the project is that when the design is proven, then larger batches of boards will be commercially assembled using "solder paste mask" techniques, "pick and place" robots, and soldering thermal reflow ovens.



This is a photo of the "mostly bare" second-pass PCB layout with the power supply components already soldered in place.

When WA8RMC completes the hand-assembly of the first-article PCBA, he will first check out the five on-board power supplies. Then he will load onto the board some initial test code that has been supplied by Charles G4GUO to do simple tests of the FPGA…like blink some LEDs. If all goes well with Art's electrical checkout, the first article prototype PCBA will be shipped across the pond to Charles in England to begin checking out the ported software. Charles has been updating the old FPGA code for this rev2 PCB. This will allow rapid evaluation of the new board when it arrives.

While waiting for the new board design to arrive, Charles has been looking at what might be done using the Raspberry-Pi (ARM based) single-board-computer and the MK808 media player (also ARM based) to interface with the DATV-Express board as an alternative to using a normal PC. With the help of Rob M0DTS, Charles has played with a modularised version of his DATV host software. It turns out that the Reed-Solomon FEC

encoder software consumes a large portion of the ARM resources. Charles has tried porting the Reed-Solomon code to run inside our FPGA. This seems to work well. Also, we are lucky that Brian G4EWJ has written an optimised version of this module in ARM assembly language. His module uses about 1/4 of the processing that the G4GUO C module does. So we have managed to get the whole thing down from 60% to about 20%. There are further improvements that can be made.

Charles is hoping that the DATV-Express project can become a collaborative one at least as far as the software is concerned. “It may not be possible for everyone to hand solder SMD components these days but everyone can try to write some software. For small projects like this it is not that difficult and we all have to start somewhere”.

Art WA8RMC has been working hard on the new board. He has completed hand-soldering the components onto the “first article” DATV-Express PCBA that uses the project team’s second layout. Art reports that all of the five power supplies are working correctly. The LED for power lights up and no IC’s get hot (a good thing) and the Oscillator is running OK! At the end of a hard day of work, Art reported that he had not run the test software Charles G4GUO forwarded to him yet.

The "first article" PCBA is shown fitting nicely inside a box chosen for the project.

I agree with G4GUO who has stated that the board looks better with its clothes on!

"full speed ahead"...de Ken W6HHC

The team members:

- *Charles G4GUO*
- *Art WA8RMC*
- *Tom WB6P*

- *Ken W6HHC*

For the latest information, see Charles bolg at *http://g4guo.blogspot.com/*

A video explaining the DATV Eapress project can be viewed at *http://www.southgatearc.org/news/november2012/datv_express.htm#.UVLg7KB6mA0*

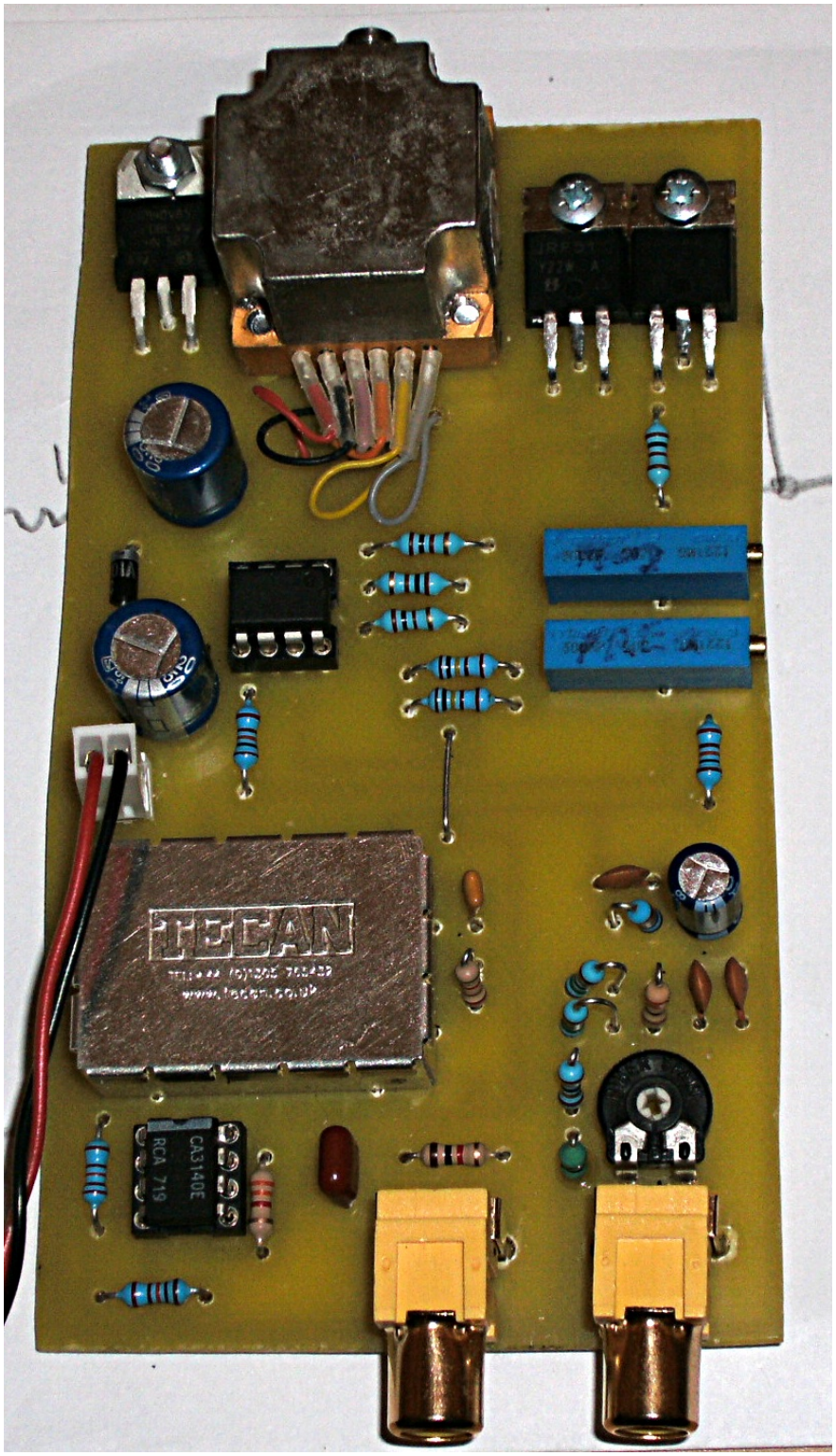
Just in: The March DATV Express update can be viewed** here**.

Building GB3FY part 2

By John G3RFL

The 10GHz ATV transmitter using YIG technology

These very small balls are about 10 to 30 thou in diameter. They are sliced from the grown garnet and then diced and tumbled to produce the finished ball. The value of the raw material on the open market is several million dollars per pound. Don’t worry, you don’t have to buy the whole pound. Garnet balls are available on eBay at affordable prices as part of functioning surplus telecom equipment. These small self-contained devices can be powered up and modulated with video, either analogue or digital, and provide the basis for a transmitter in the 10GHz band.

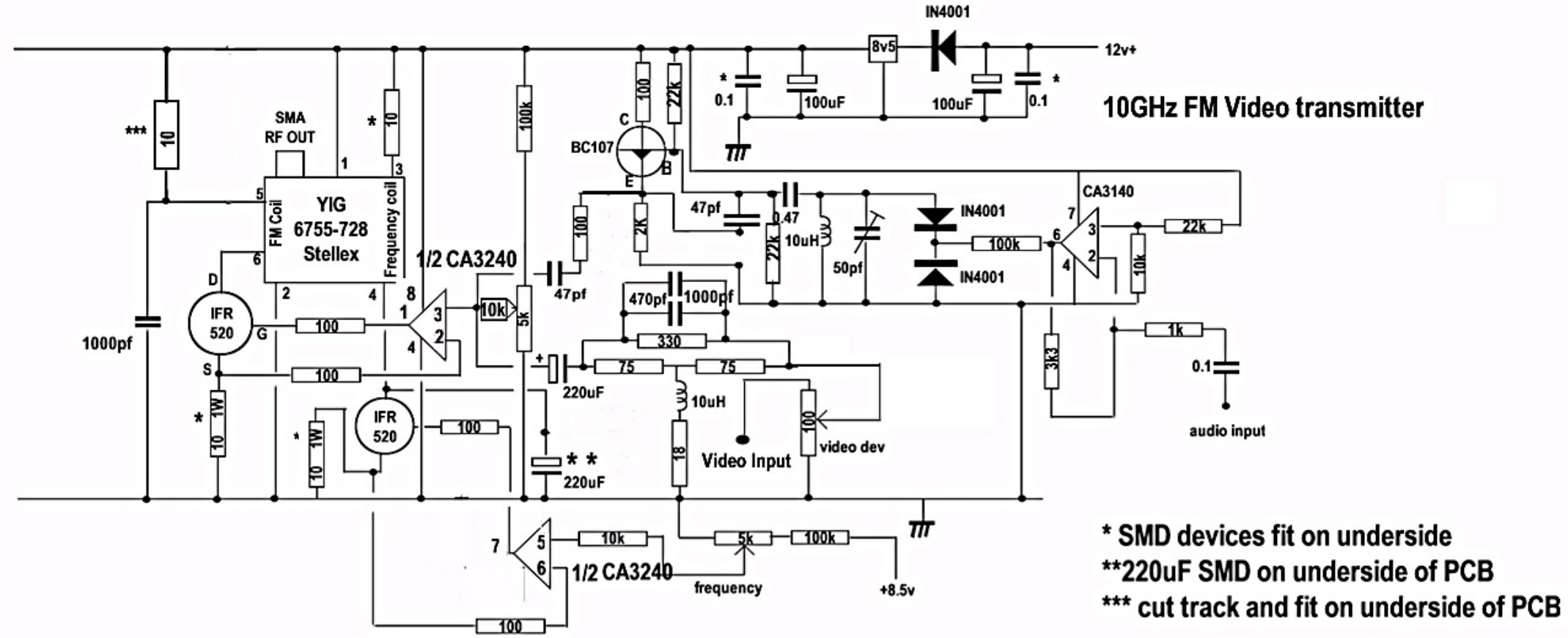

TECAN
CA3140E
RCA 719

The completed transmitter

The key to controlling and modulating these devices is via a magnetic field. There is a magic number to set the frequency of a YIG and this is 2.8MHz per gauss of an applied magnetic field. So if a 1000 gauss field were applied to the YIG it will oscillate at 2.8GHz. Similarly 2000 Gauss would move the frequency to 5.6GHz.

However the STELLEX devices I used have built in magnets so they just cover a small frequency range. My STELLEX 6755 728 covers 9.5 to 10.43GHz, and without any power being applied to the coil it runs at 9.985GHz.

The control coils (yes there are two) can add or subtract from the frequency. The main coil is about 15 ohms and creates a lot of frequency change per mA of applied current. The smaller FM modulation coil is about is 1ohm and has an inductance of 2µH. Driving this inductor was the first problem. Not too difficult up to 500kHz, but above that frequency we need some sort of EQ or current drive, to compensate for the inductance. So far I am still on a learning curve, but I have managed without any serious equipment to create a watchable modulation system good enough for ATV.



The Circuit Diagram

I have two circuits, one to drive the main coil and set the frequency, the other for this smaller 2µH coil for FM modulation of video and sound. *BEWARE* this coil is very easily damaged. Never let it sink more than 200mA and never take one apart. They use a very fine wire and damage easily. I speak from experience.

Now we have understood how a YIG functions let's see if we can turn one into a successful FM ATV transmitter. The circuit I used has a surprisingly small component count and was constructed on a home etched PCB in a single evening. For those of you that have home photo etching facilities I have provided all the necessary details and they are available on *www.cq-datv.mobi* downloads page. (*yig_tx.zip*)

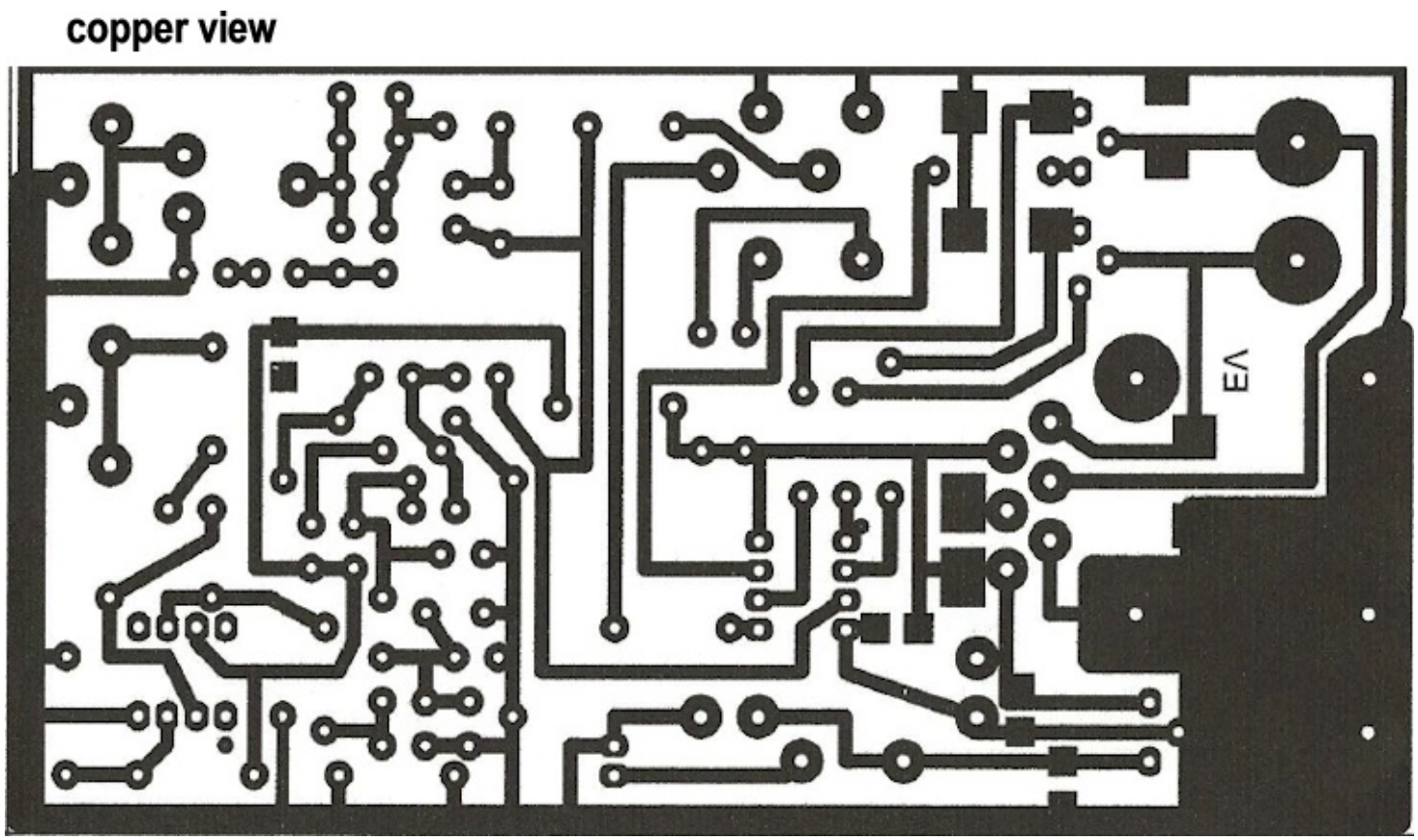
The video input is via a 100ohm pot. If you want to be pedantic and make this a true 75ohm input then you can add a 330ohm resistor across it. This then feeds a standard CCIR 405 pre-emphasis circuit which will

increase the level of the HF component of the video signal. This is necessary because FM sidebands are notoriously low power and if it were not for pre-emphasis then the pictures would suffer some 2 to 3db in noise immunity. CCIR 405-1 has become the FM TV standard and all receivers are fitted with the appropriate de-emphasis. (See http links 1 and 2 below)

The video is then amplified by one half of a CA3240 op amp to provide some modest gain before being used to drive a power FET. In our case an IFR 520 which is little over the top for this application, but I had a supply ready to hand as they say. The IFR 520 is then used to current modulate the smaller FM coil that is part of the YIG assembly. The supply is regulated down to 8.5v and 10 ohm limiting resistors are provided in series with the YIG coil and in the source of the FET to effectively provide current limiting. For those of you using my PCB design the FET source resistor marked * is an SMD resistor and is fitted to pads on the underside of the PCB. The 10ohm current limiting resistor marked *** was I am afraid a late edition and requires a track cut to accommodated it under the PCB.

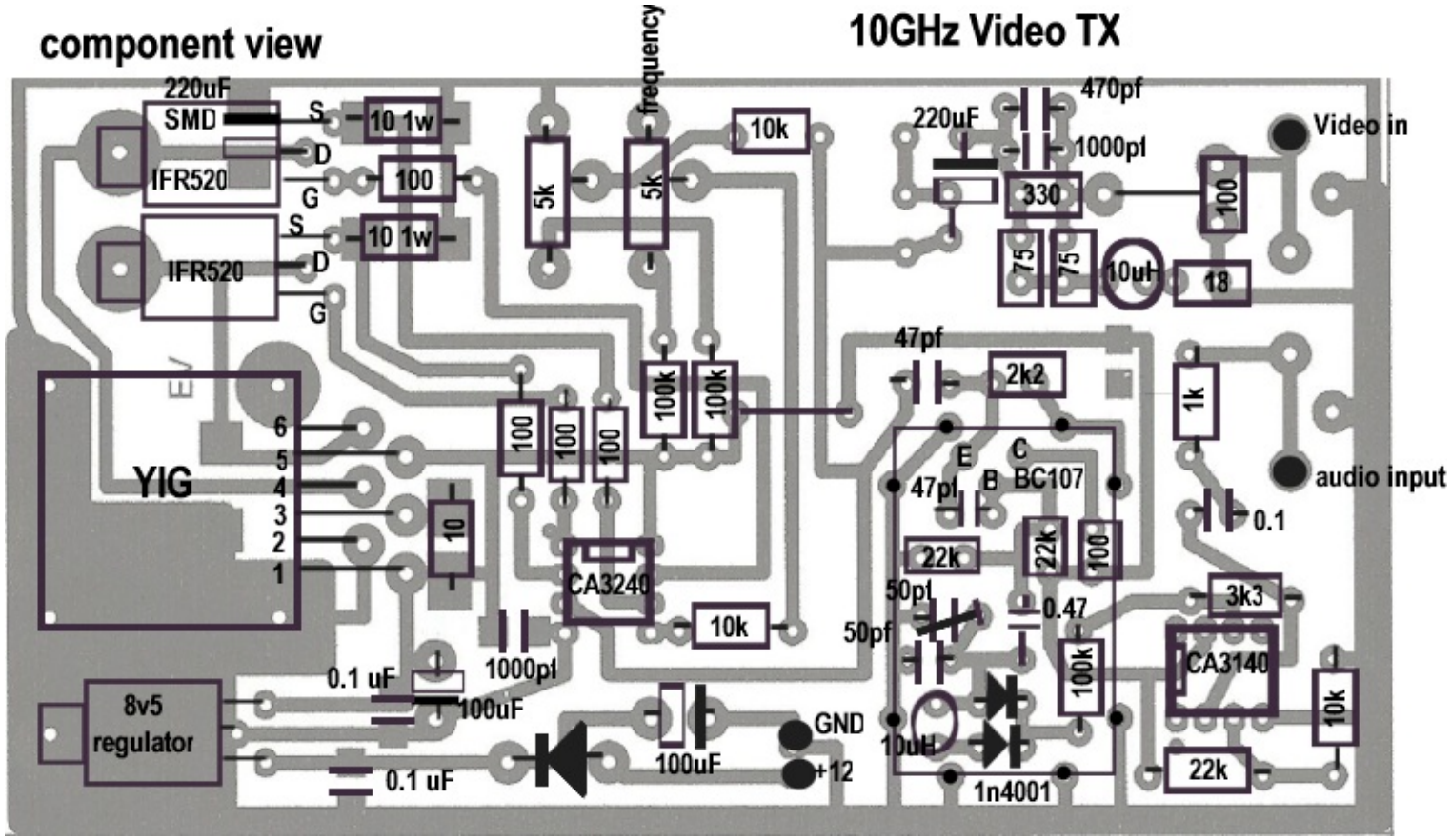
My apologies for this. The PCB is the third rebuild that was required to reduce the size to enable its use on GB3FY where size matters. It is fitted directly below the transmit aerial and inside the protective cover ie a Jewsons white 68mm drain pipe. The B&Q plastic grey water pipe did not cut it. Trying to ascertain loss figures for plastic weather proofing was not easy, and there is little published information. I tried several samples in my microwave oven and selected the sample that was the coolest after several minutes on full power, and this was the Jewson White 68mm.

Microwave ovens operate at considerably lower frequency than the required 10GHz, but when needs must you use whatever test equipment is to hand. Once I had settled on the correct material for the protective cover for the aerial and combined masthead transmitter, then some size corrections to the PCB were required and in the rebuild this important resistor was omitted and added later in complex surgical procedure to the PCB (well actually I just cut the track and bridge it with the resistor). All in all, had I planned the cover before the PCB and realised that the only piece of test equipment to measure RF absorption was in the kitchen I would have saved myself some grief on PCB rebuilds for the Smaller Jewsons drain pipe and you the constructors a track cut.



The PCB foil

Every video transmitter needs audio and the FM system makes this possible in the most simplest of ways using inter-carrier sound. (If you were not around in the days of AM television on 70cms please take my word for that) The BC 107 is configured as a simple Colpitts oscillator, (see http link 3). The oscillator runs at 6MHz, the frequency is controlled by a 10µH inductor and a 50pF trimmer and can easily be moved to other frequencies if required. The FM modulation is supplied by a CA3140 op amp which takes in the audio signal and lifts it in level by a gain of three and reduces the impedance to enable it to drive two reversed biased 1n4001 diodes. If you remember you basic theory the depletion zone is proportional to the voltage when reverse biased and hence the diodes act as capacitors, with the capacitance being inversely proportional to the applied voltage.



The component overlay

Yes there you have it, as the audio signal wiggles about the capacitance changes and the BC107 becomes an FM modulated oscillator. It should in theory have pre-emphasis and de-emphasis in the receiver, but in practice for ATV this is rarely implemented probably because we only use the audio to rag chew rather than listen to a philharmonic orchestra recital. At least that is the case up north. The audio is then added to the video in the CA3240 and goes on to drive the FET as already mentioned.

All that is left is to drive the frequency coil of the YIG. Again I used the same IFR520 FET design with no apologies for this overkill. I have a well stocked junk box and an endless supply of these, and well if it worked for the FM coil why stop when you are on a roll. These large FET's draw very little gate current and so in theory could just be fed with a potential divider and then will the produce a current proportional to the gate voltage, but as I had a spare op amp (the second half of the CA3240) I used this to buffer the potential

divider. The frequency range of these surplus YIGs is incredible and so I limited the range of the 5k potential divide with a 100k resistor otherwise the range would take it to the next ATV band. Well almost.

All that was now required was to set up the frequency of the transmitter and to achieve this you need a frequency counter and a little engineering cunning. I won't spoil it for you I have included the design for a simple frequency counter and it is also reproduced elsewhere in this issue.

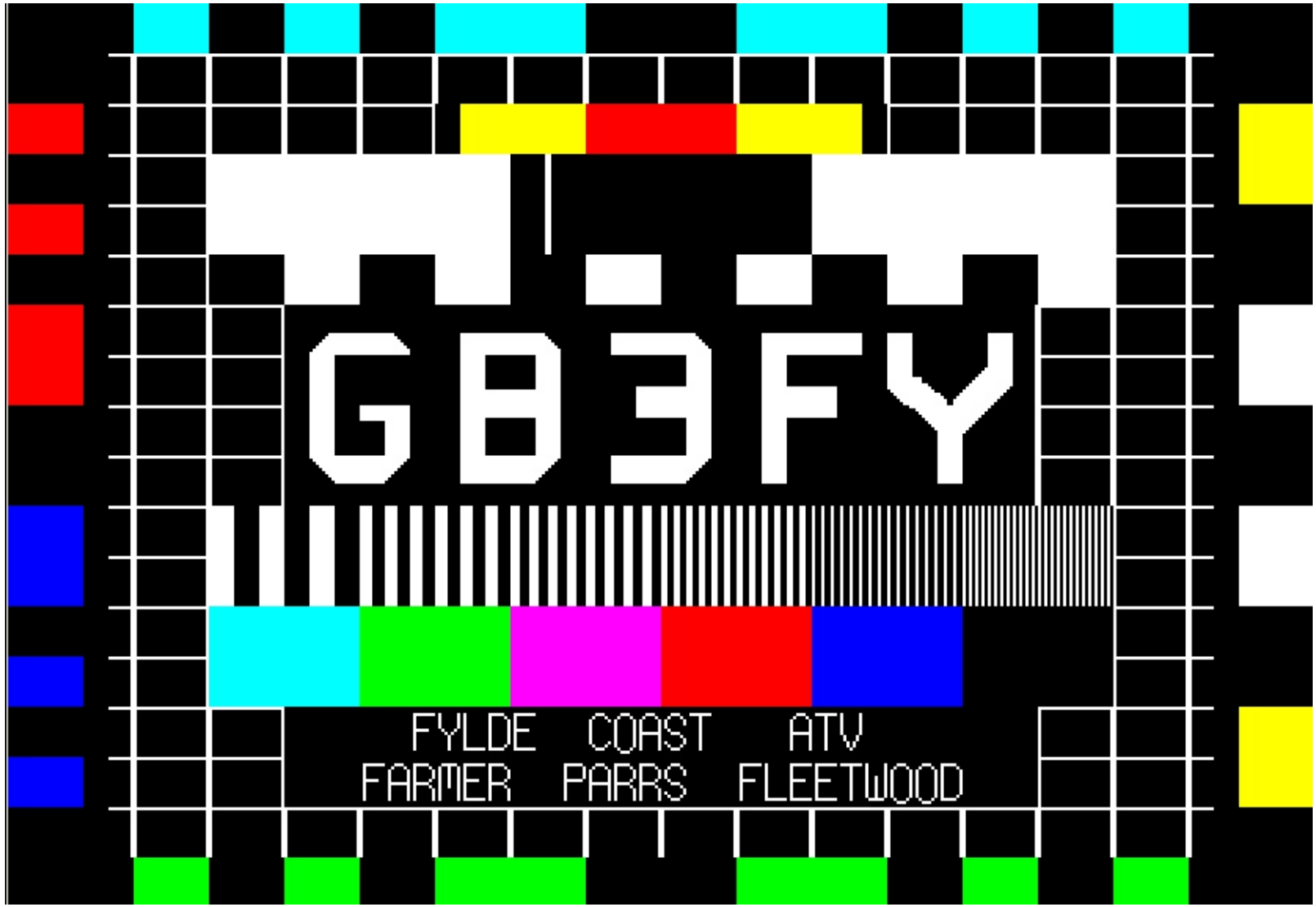
Good luck with the construction. I hope the PCB helps and you can find a surplus YIG on eBay. There were lots around when I started this project. If in doubt you can contact me via the *editor@cq-datv.mobi*

HTTP Links

1. *http://jf.fourcadier.pagesperso-orange.fr/television/preaccentuation/preaccentuation_e.htm*
2. *http://www.g8ajn.tv/videoproj.html*
3. *http://www.electronics-tutorials.ws/oscillator/colpitts.html*


ATV TEST TRANSMISSION
LOCATED CLEVELEYS LANCS
MATSUI
TFT
TOUCH SCREEN
DISPLAY

In CQ-DATV 3 I will be investigating a more elegant drive for the main coil with a PLL loop to control the YIG frequency.



The station test card

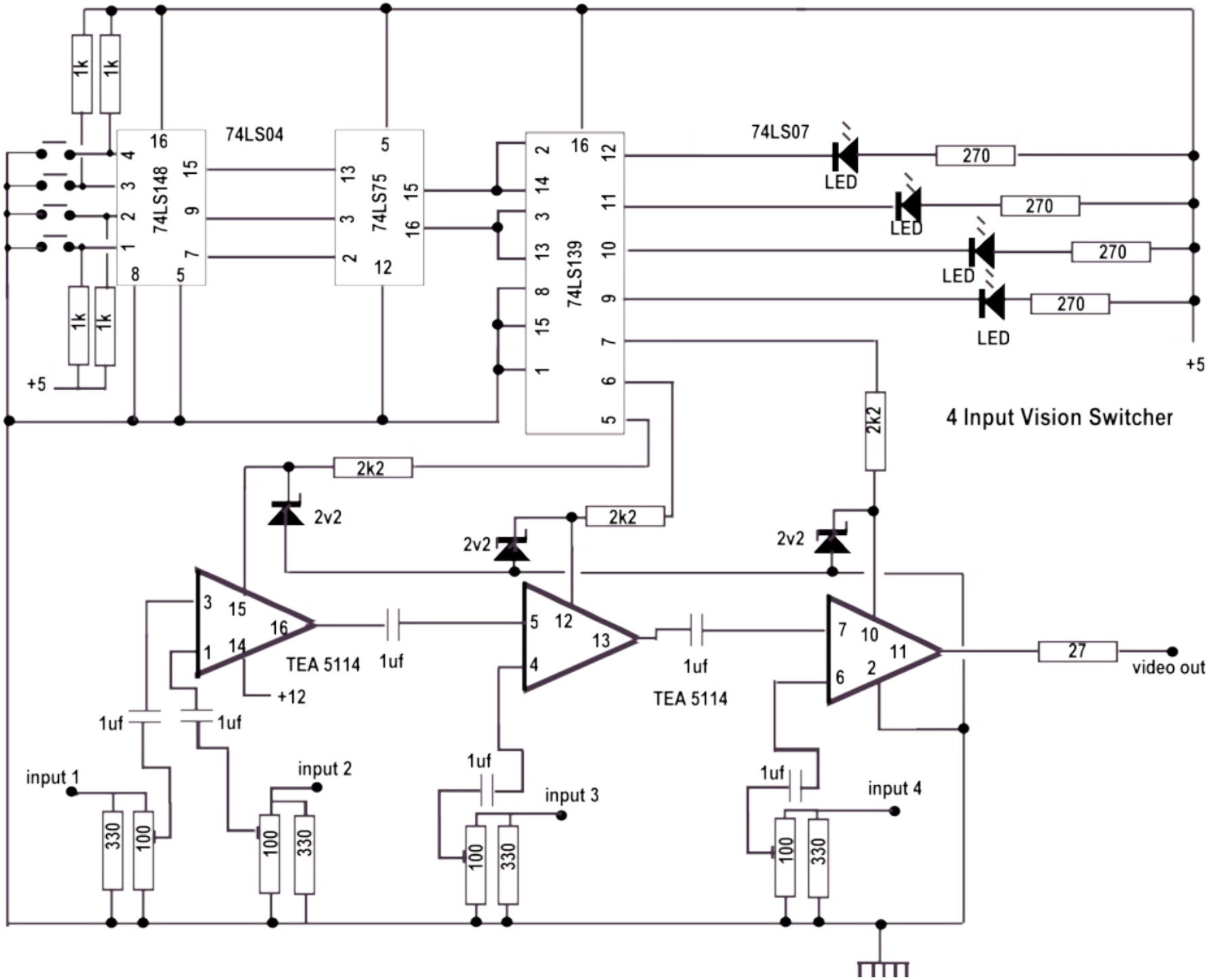
BATC online shop

Four input video switcher

by Trevor Brown

In issue 1 I reproduced a design for a simple fade to black unit using the TEA 5114, this was a very useful chip for video applications, but also a very old chip. It was introduced for domestic applications and was often used in conjunction with SCART sockets to switch the signals around in domestic TV sets. I thought they were obsolete and only existed in junk boxes. So I was surprised to receive an email say that they are still available from a company called little diode.

If this is the case then I have included another golden oldie using the same device but this time as a four input video switcher. The sources are selected by four normally open push buttons that are used to drive a priority encoder. These are clever devices that take care of more than one push button being pressed at the same time. The push buttons are coded and stored in a 74ls75 latch, so the source remains selected when the button is released. The code is then supplied to a 74ls139 decoder that provides four command lines, but the 74ls139 is a dual device. The inputs to both decoders share the same input so we have two sets of command lines. One set is used to drive the tally LEDS. The prototype used push buttons with built in LEDS. LS devices struggle a little driving LEDS so use small LEDS, not the high power kind The second set of commands drive the TEA 5114 which has three switches in one package, so only one of these is required, making the unit a very compact four chip build.


1k
1k
74LS04
74LS148
74LS75
74LS139
74LS07
LED
270
+5
4 Input Vision Switcher
2k2
2v2
TEA 5114
1uf
+12
27
video out
input 1
input 2
input 3
input 4
330
100

The TEA 5114 does have one or two quirks in that the command inputs are not TTL level hence the need for the zenner diodes and series resistors. It has some gain which is cumulative down the chain of three so the input levels need trimming with the 100ohm pots, to set the output to 1 volt. The TEA 5114 also needs coupling capacitors, but has fairly high impedance inputs, which enable 1µfd capacitors to be used and still maintain some LF performance. The output is also non standard impedances hence the build up resistor being 27 ohms.

So what it lacks in performance it makes up for in circuit simplicity and is a useful addition to any ATV shack.

Wedding Video Shoot

by Trevor Brown

In the last issue I covered some hints and tips for filming Children and in my case Grandchildren opening their Christmas presents. This issue I would like to talk about wedding videos.

Making a wedding video is a big jump from a Christmas present shoot, for two main reasons. The first is lack of control, it will happen and if for any reason things go wrong you will be presented with very little opportunity, for retakes or to pause the action, so everything needs planning beforehand and where ever possible a plan B needs to be part of your options.

The second reason is you need to produce a usable soundtrack. The S95 will record both sound and pictures, but the sound is an electret mic buried somewhere inside the camera body. I would love to open up the S95 and investigate if this could be replaced with a socket to feed an external microphone, so far I have not found the courage. I know that this has been achieved with the GoPro Hero camera's for a popular BBC TV series, but I have no details, this would be a step forward but would not produce sound monitoring which is essential for this sort of a shoot. So perhaps if funds are available then a more suitable camera ought to be sort, my first choice would be the Canon XA10, which is on the market for around £1300, depends on your budget. This would enable me to keep the S95 in my pocket as a backup.

The XA10 is touch screen operated so beware of working in bright sunlight, it does still happen in the UK. If you have any budget left this could be overcome with a LANCS zoom controller there are several available that mount on the tripod pan bar and provide smooth control over zoom and can also control on the start stop of recording. They work across a variety of different cameras and are connected by a simple three pole jack. They use a protocol called LANCS, please spend a little time on the net forums making sure the one you choose works with your camera, there have been problems.

Once you have settled on kit and are happy it will deliver, my next step would be a site reccey before the day. You need a spot for Vox pops (Latin for The voice of the people). In wedding terms this would be close family delivering short personal messages to camera. You need somewhere quiet, think the position of the sun through on the day of the shoot, you might be wise to avoid direct sun and think about some help with a Sun reflector, (hats can cause face shadows).

When shooting VOX Pop remember you need the arrival of the bride, particularly if it's a nice open topped vintage car, so don't get carried away with the VOX Pops allow time to be in place to film this important arrival.

Also on the reccey shoot lots of GV's (general views) if the light matches the actual day these can be used in the edit. If it was sunshine on the reccey and rain on the day, then you might need another less clement day to re-shoot the GV's.

Filming the actual service may or may not be possible find out well in advance and factor any restrictions into the shoot. In an ideal world I would have every bit of hardware I own rolling, two camera's providing two views would be ideal and if a S95 is part of the shoot then remember a full battery will deliver around 25 mins. Sound will be a killer on this phase. At best any on camera mics will be meters away, if you can add a lapel mic and DAT recorder to the groom, any results would be a blessing in the edit despite lip sync problems. If you are not allowed to film the service then a DAT sound track and GV's will have to suffice.

After the service collect as many on the hoof shots as possible and the drive away by the happy couple. You will then have the reception to deal with and the dreaded speeches. The golden rule is try to avoid the traditional horse shoe table for the speeches, speakers popping up around it, usually back lit by the windows, is a filming nightmare. The ideal situation is a central podium for the speaker to walk out to deliver their speech and then return, this gives you a few seconds to adjust the camera and a central point to light and place your mic if you are shooting with an external mic.

If you are unlucky you might be able to choose a cue that lets the speakers know you are rolling and up to speed. The windows will be a problem as will getting any external mic into position. I can only say if you were not up for a challenge you would not have taken on the shoot.

Remember always, if it was easy anyone would do it.

Amateur Television Quarterly

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VHF Communications Magazine

A guide to making your own PCB

By Richard Cross

This article is not meant to be a step-by-step instruction on how to make a PCB, but a general outline to the processes involved.

If you want the make a PCB from either your own circuit diagram, one from a magazine, or use a published foil layout, there are simple and not so simple ways to achieve this.

If you are starting from scratch then it makes sense to use circuit design software to layout your diagram. Advanced circuits (*http://www.4pcb.com/*) provide the 'PCB Artists' free design software and also checking, free Gerber PCB files checker, and Gerber-to-PDF conversion!

Currently, only the Windows operating system is supported. One of the advantages of using this system is that, if you decide not to make your own PCB, you can order a professionally made one from within their software. Once you have your PCB layout on your computer as either a pdf or image file, it needs to be transferred onto the copper board.

There are several methods to achieve this.

Method 1

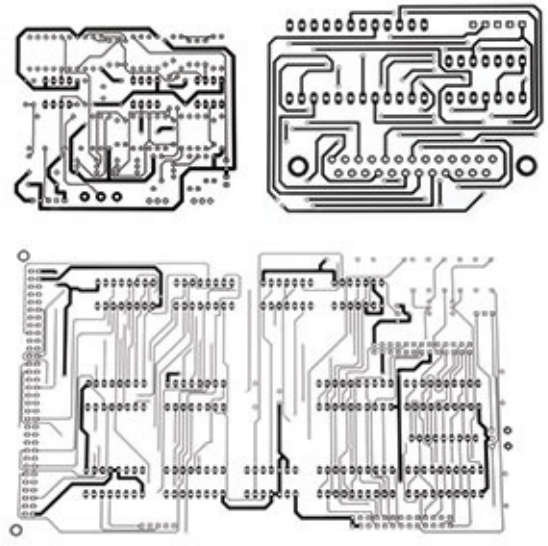
Use a transparent sheet (LaserStar PCB Printing Film - Maplin Order Code: N43KT) and print the layout onto it. Then place this over a photo sensitive copper board, expose and develop. (Universal PCB Developer Maplin Order Code: N44KT). Note that exposure will require a UV light source.

Method 2

Print onto a sheet of heat transfer paper then place this onto the bare copper board and use the heat from a domestic iron to transfer the pattern.

Method 3

Use a cold transfer system such as the Press-n-Peel PCB Transfer System Maplin Order Code: AB15A.



This is an update of the Letraset dry transfer system that I used to use many years ago, but is no longer available.

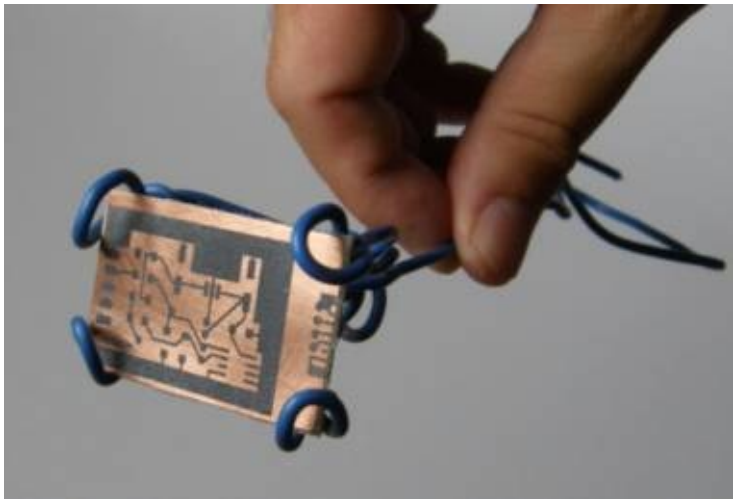
Cleaning

Thoroughly wash the board under running water, then remove any resist from the board with fine emery paper.

Etching

Whichever of the above methods you choose use, the excess copper needs removing from the board. (Ferric Chloride Solid Granule Maplin Order Code: XX12N).

Copper Etchant - Sodium Persulfate is a good replacement for Ammonium Persulfate. Like Ammonium Persulfate crystals, they are used as an alternative to the traditional ferric chloride to produce a cleaner copper etchant solution. Mixed product must be stored in a ventilated container.



Etching is most effective if the board is placed face down in the solution and gently agitated. ***Please note: Safety gloves and eye protection should be worn when using the chemicals.***

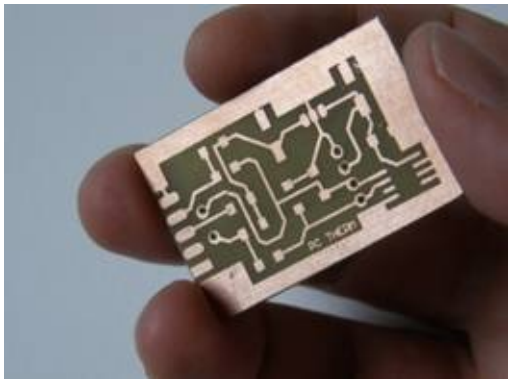
Cut to size

Trim excess material from your PCB with a linoleum knife and a straight edge. Score lines in the material until it is a sufficient depth to snap a clean break on the board. (Do this on both sides). Snap the board —using a vice will hold the board firmly while you make the break. Sand the edges with fine grit sandpaper.

Drilling

Use a drill press and solid carbide small drill bits (usually 1mm). Place the board on a piece of wood. Having the wood underneath helps to keep the tear-away to a minimum when you penetrate the bottom side. Check that your pads are truly aligned.

The finished board



Maplin stock codes are quoted here as an easy source of product within the UK. However, there are other suppliers available, ask Mr Google!

Making a simple Frequency Counter for 10GHz - 3cm

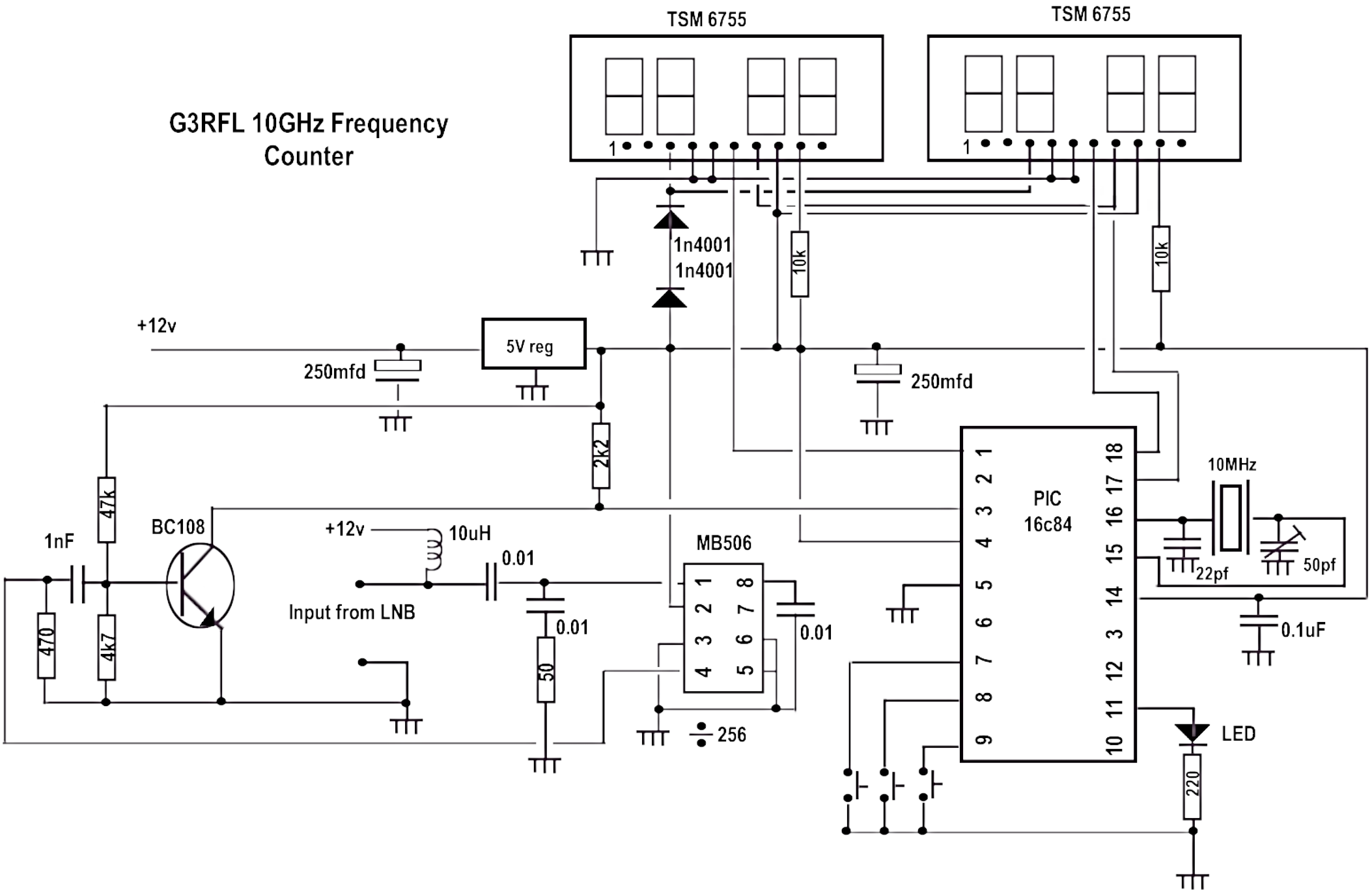
Having built and tested the video transmitter for GB3FY, I needed some way to accurately check its frequency and to monitor its stability, looking around the shack all I had was a simple frequency counter built back in 1997. It was a little limited and would not cover the 10GHz band, but perhaps I could add pre-scaler and extend its range.

Quick look at eBay and I found a plentiful supply of MB 506's, for around £2, which could easily be configured to divide by 256 and be capable of working in the 10GHz band. So I committed myself to a £2 investment and a rebuild for this old unit. I also decided to add an optional phantom power feed so LNB's could be driven directly from the counter. The end design was a very sensitive frequency counter that could be connected to an LNB, and used to receive GB3FY, across the shack.

Setting up GB3R

The frequencies counter displays (TM 6755's are the older displays using LED's yes they are bright, but I am old and this is a definite plus! The circuit revolves around a PIC16F84 with a 10MHz XTAL. This needs calibrating to a known 10MHz source once built, otherwise the accuracy is impaired.

The LNB 900MHz input divided by 256 gives 3.515625MHZ so it's just a pure maths calculation, something that micro processor do well to get to 900MH.

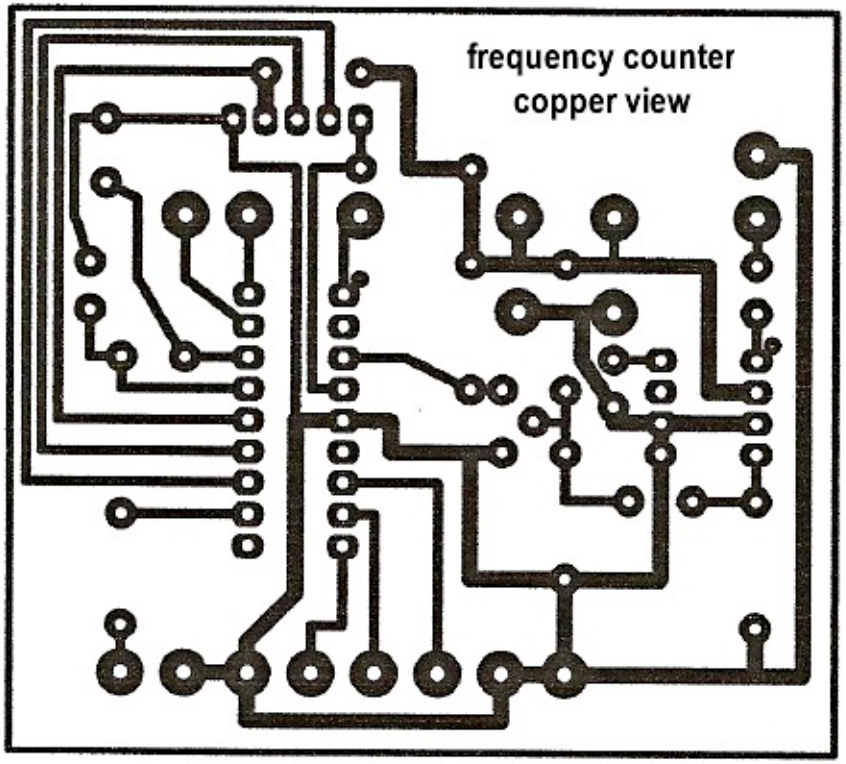


The new three additional push buttons provide a choice of LNB PUCK offsets, Button 1 resets it to no offset button two sequences through software presets and the third button is a spare, you can never have enough

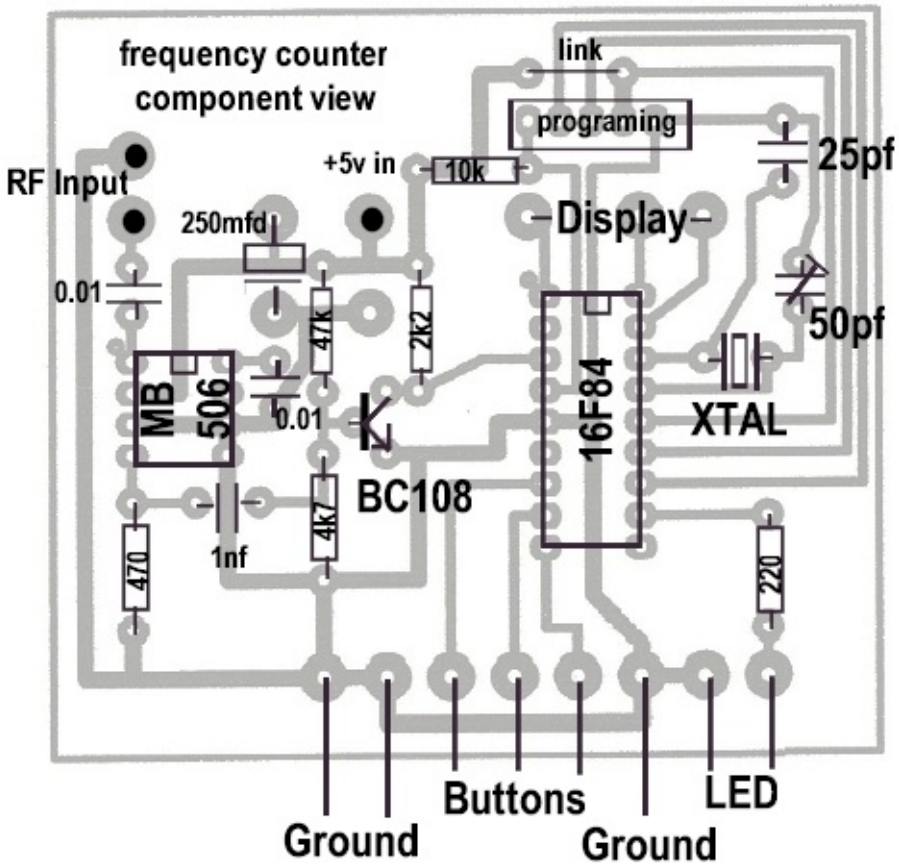
buttons. Switching off will NOT reset the offset, it is stored in EEPROM

Other things going on are converting the Counter to Decimal digits adding offset and serially sending up to the two LED displays and adding some decimal points leading zero blanking was added as well.

The rebuild was on a new PCB and for the constructors with home photo etching I have reproduced the single sided PCB foil and component layout, which can be *http://cq-datv.mobi/downloads.php*). It was relatively simple build and could easily be built in a single evening. I omitted the 10uH choke from the PCB as not everyone will want to feed phantom power to an LNB's, this can easily be added, off the PCB



PCB foil layout



Component overlay

(A copy of the above images can be downloaded from *http://cq-datv.mobi/downloads.php*)

The New Software

The PIC Software has avoided interrupts and the lower freq goes into TMR0 timer counter with a DIV 4 pre-scaler via PORTA, 4 TOCK1

A background software counter counts for 1 SEC and keeps polling the timer for an overflow situation. This overflow feeds three counters Count0 Count1 and Count2 also the remainder in the TIMER is added. After it has stopped we take all the 24 bits and start to add them up in a 5-byte register starting with bit 0 in freqtab.

- *Bit 00 = 0.000,001,024 GHz*
- *through to*
- *Bit 23 = 8.589,934,592 GHz*
- *Then add the offset, in this case 9.1GHz*

Software is called picfreq3.asm run it under MPLAB to produce HEX code.

This software is download-able from the eBook site *http://cq-datv.mobi/software/picfreq3.asm* so for those of you with an understanding of PIC code the hardware can be customised to your own requirements.

The home-made PCB, and software, can be downloaded from *http://www.cq-datv.mobi*

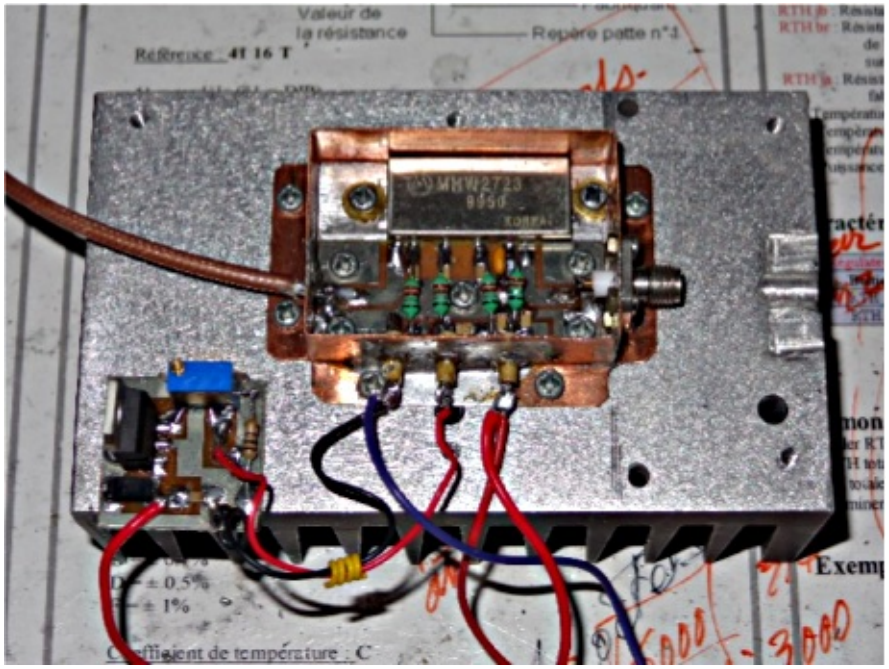
Cheers - Have fun, I did!

John G3RFL Cleveleys

5 Watt 70cms Linear power amplifier suitable for DATV

by F1DJO

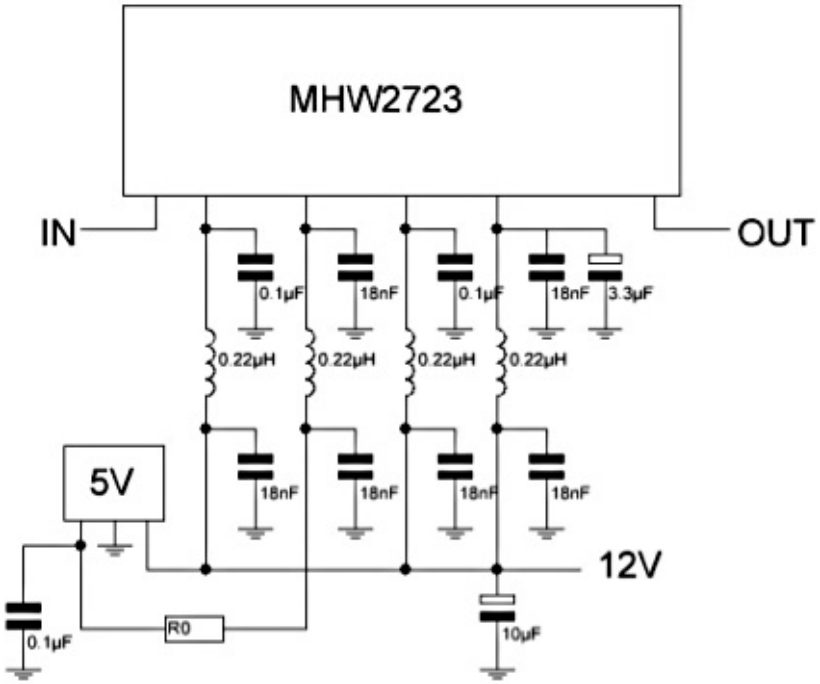
This very simple 70 cms power amplifier, using the MHW2723 module. It was designed by F1DJO. The MHW 2723 was designed for the Tetra digital 3w mobile radios and has a gain of 28db, so with a power input of 9.0dbm it will deliver 5 watts with harmonics -30dBc max @fo, over a frequency range of 380MHz to 470MHz.



An early F1DJO prototype using an external bias supply and inductors that were not etched onto the PCB.

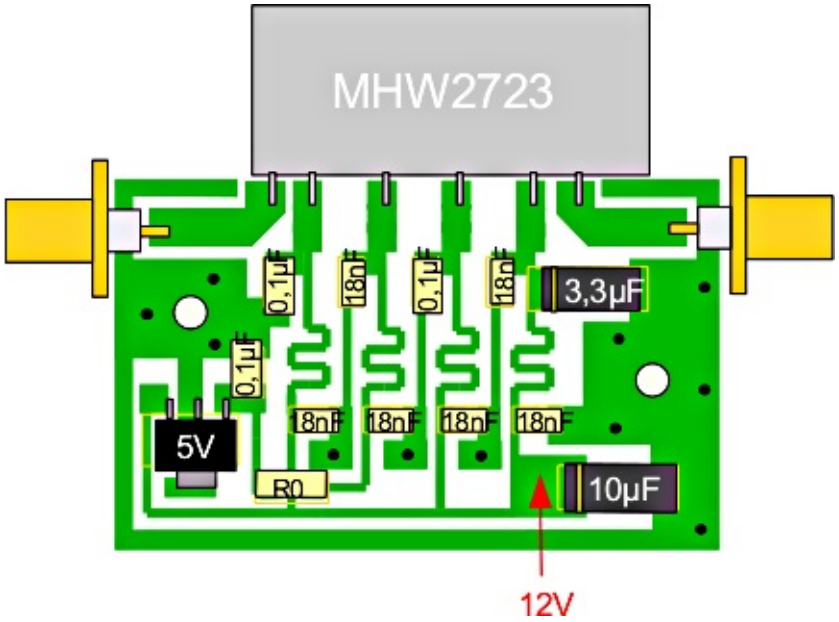
It is a simple build using surface mount components on a single sided PCB with a ground plane underside. The inductors are now etched onto the PCB design and the +5 bias regulator is also accommodated on the PCB. The capacitors are cms0603, so take care and use a fine tipped soldering iron. The 0 ohm resistor or link, which can be an actual resistor should you need to reduce the bias voltage. Bias voltage is a trade off, of output power verses linearity, so check your linearity on a spectrum analyser (see the data sheet) *http://rfplus.co.uk/data/mhw2723.pdf* (it may be necessary to reduce the +5v delivered by the on-

board regulator.



The circuit diagram

Good heat sink is required as with all PA chips, and to this end it is necessary to put a small piece of aluminium sheet 1.5 mm thick 15 by 45mm under the chip to raise it to be flush with the PCB.



Component overlay

Components

Capacitors CMS0603:

6 x 18nF 3x 0,1µF 1 x 3,3µF 1 x10µF

Regulator:

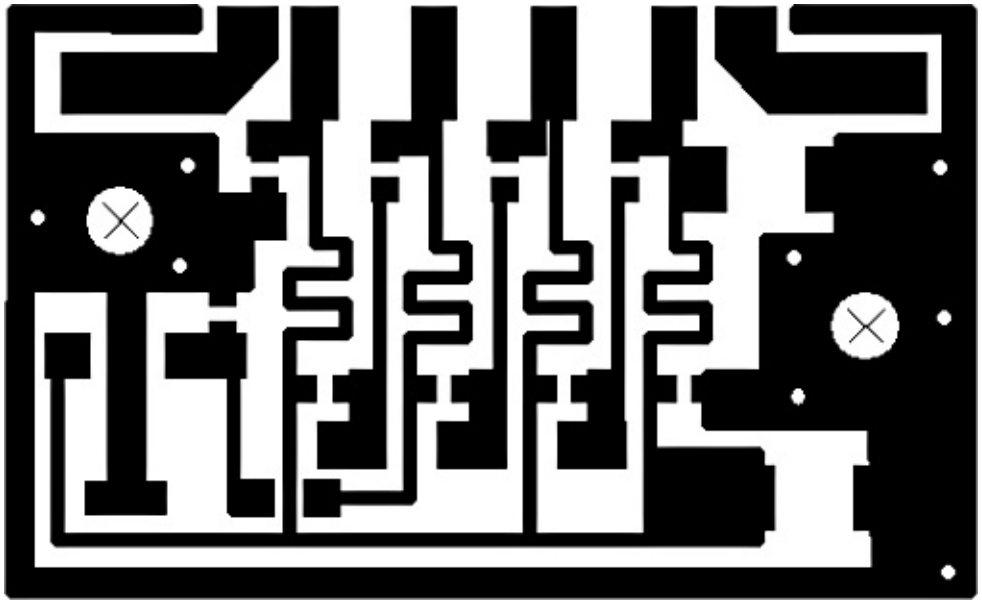
LDO5VCMS, Farnell: LD1117S50CTR

Resistor R0:

0 ohm (jumper) or a value to adjust for the bias voltage.

Amp Hybrid Motorola MHW2723:

http://cgi.ebay.fr/Motorola-MHW2723-UHF-380MHz-470MHz-5W-12V-30dB-RF-Amp-/120919730712 (SMD)



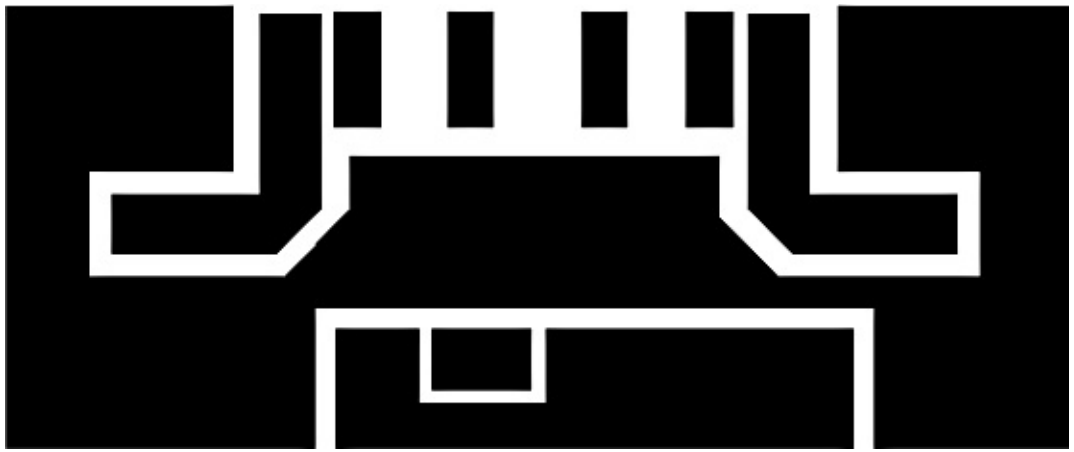
The PCB

Dimensions of PCB: 25mm x 41mm

This PCB is also available at the batc on-line shop if you do not have photo etching facilities, *https://batc.org.uk/shop/hardware-and-kits*

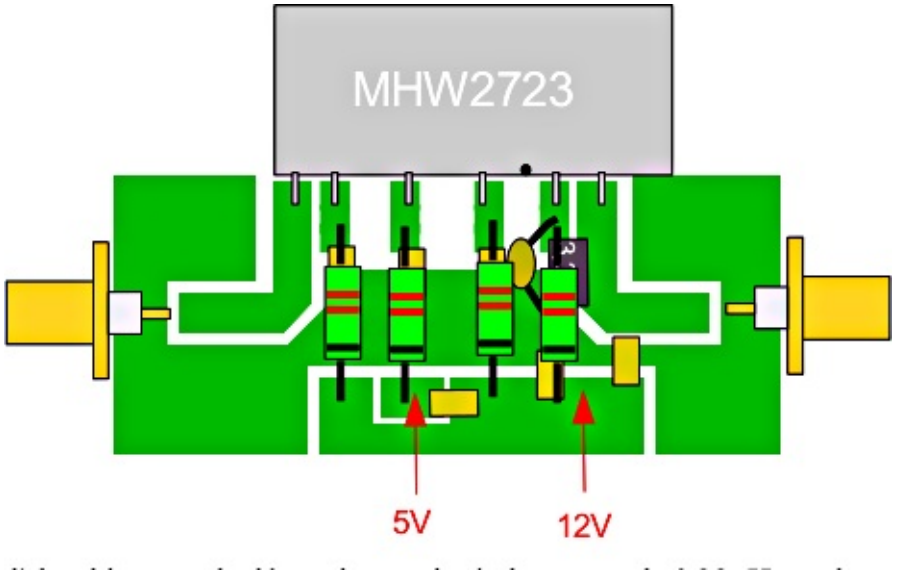
Data sheet hybrid *http://rfplus.co.uk/data/mhw2723.pdf*

Diagram power prototype



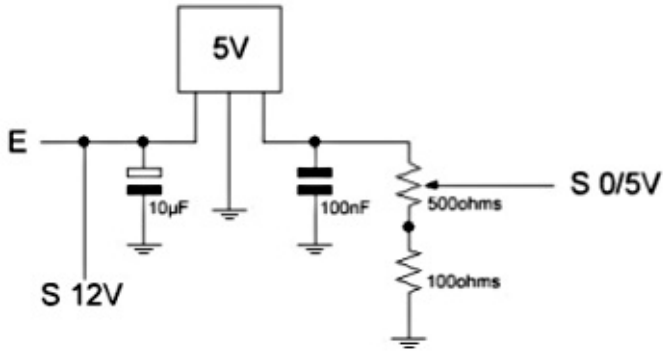
Protoype, inductors not etched onto the PCB

Dimensions CI: 19mm x 45mm



Component overlay

Power supply


5V
E
10µF
100nF
S 0/5V
500ohms
100ohms
S 12V

Caption contest

Just for fun….

Last issues picture is shown below.

“One of our trains is missing” - Trevor Brown

“The boss said that the project was on the right lines!” Ian Pawson

“No I don’t think we can get away with leaves on the lines again” - Trevor

“Miscarriage” - Tony Leigh

“Ballanced load on a Wilkinson Divider”? - Mike G8CPF

“WELL I TOLD YOU A COALITICIAN WOULD NOT WORK”…..Hi - John G3RFL

And the winner is Tony - congratulations.

This issues picture is shown below (Thanks Trevor).

“Nothing good ever came out of a cloud, but a cellar now you are talking” - Trevor Brown

“Well chaps that,s what a Micro Brewery looks like” ….Hi G3RFL being a “Northerner”

Please send your entries to *caption@cq-datv.mobi*

DATV-Express Project – March update report

by Ken, W6HHC

Art, WA8RMC, has finished performing the basic electrical tests with the "testing software" on the new "first-article" prototype PCBA and found everything working as planned. Art was successful in producing 18.6 dBm of output on 1.3GHz in early March…and then sent the board to Charles, G4GUO, to begin more thorough testing and to begin making some software changes.

Charles had the new board transmitting DVB-S and DVB-S2 video within a couple of hours after Parcelforce delivered the box to his QTH. Charles's first reports included:

- *Min operating frequency 72.5 MHz*
- *Max operating frequency 2.48 GHz*
- *Noise sidebands -55db (about 30db better than previous board) Very clean QPSK constellation*


SAMSUNG
HDTV
HDTV

Fig 1 – First DVB-S pictures received from new board layout

Fig 2 – On the left is the clean QPSK Constellation from new second board layout; on the right is the noisy QPSK Constellation from original board etch layout

During March, Charles was able to accomplish quite a lot of improvements to the DATV-Express software design, as he has summarised below:

Host code

Now being compiled under Ubuntu 12.04 LTS Development environment has been updated to Qt5.01 Creator

FX2 code

Added proper support for USB2 VBUS monitoring

FPGA code

- *Interpolation increased from x4 to x8*
- *Pulse shaping filter increased to 95 taps (root raised cosine compensated response).*
- *Programmable symbol rate generator added current range 2 MS/sec to 6 MS/sec in fractional steps.*
- *I^2C configuration of modulation parameters has been added*
- *Delayed IQWRT clock added*
- *DAC has so far been tested up to 48 Msamples/sec*

No etch errors were found in the second layout, so huge compliments are deserved by our PCB layout guru, Tom WB6P. Art WA8RMC is busy building up a second prototype board. Charles also has plans to get the entire DVB-S protocol to run on the FPGA rather than on the Linux host PC. That way…the whole host thing can also be run on a small ARM-based computer, like a Raspberry Pi or perhaps the MK808.

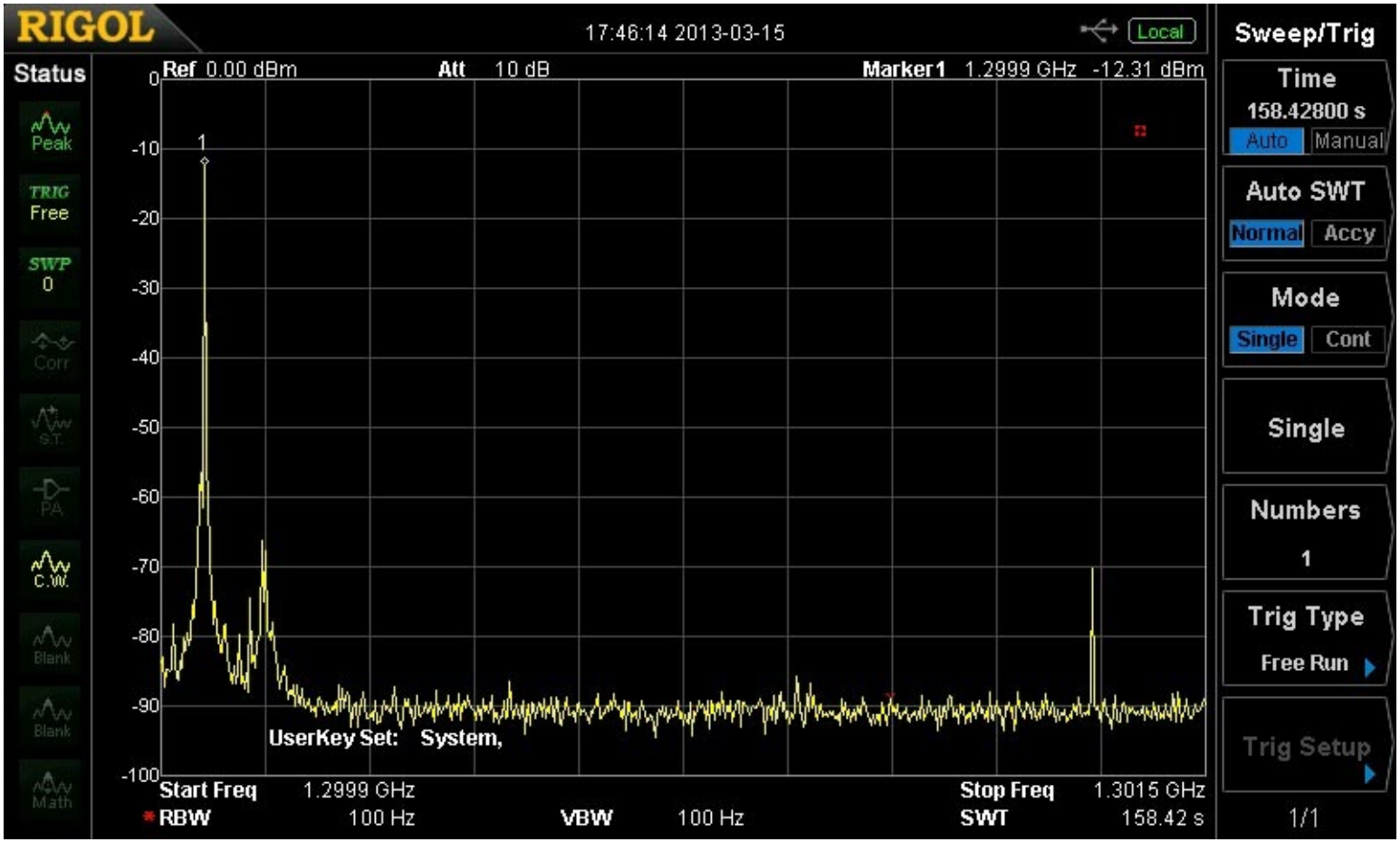


Fig 3 – Spectrum from new board with unmodulated carrier signal

In his spare time, Charles G4GUO has completed a new YouTube video to describe the DATV-Express Version 2 PCBA at *http://youtu.be/OXh-anABYaU*

"full speed ahead"…de Ken W6HHC, email *W6HHC@ARRL.net*

Information

External links

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But if you have a Kindle 3G then yes, but only to Amazon, and there is not a lot of ATV material on their site.

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Next issue…

- *10GHz Frequency scanner*
- *Trevor looks at a multi camera video shoot*
- *eBook formats explained*
- *and much more*

If you would like to contribute then please contact *editor@cq-datv.mobi*
