CQ-DATV

dotMOBI

```
//|========================================
//| Simplest Caption Example
//| Mike G7GTN - April 2020
//|========================================

#include <TVout.h>
#include <fontALL.h>

#define W 120    // Resolution
#define H 96

TVout tv;
```

Issue 83 - May 2020

https://cq-datv.mobi

In this issue

The CQ-DATV editors gratefully acknowledge all those authors that have contributed articles for this free magazine.

Production Team

Ian Pawson G8IQU   Trevor Brown G8CJS

Terry Mowles VK5TM   Jim Andrews KH6HTV

Contributing Authors

Jim Andrews KH6HTV   Trevor Brown G8CJS

Richard Cross   John Hudson G3RFL

Mike Stevens G7GTN   Art Towslee WA8RMC

Editorial

Welcome to CQ-DATV 83

This issue was closed for publication several days ago. This is because the same people that create the magazine are also the copywriters, proof readers and layout artists. Wearing so many hats can put the team into overload. We are always looking to expand this platform and if you feel you could contribute then our email address is *editor@cq-datv.mobi* and we would love to hear from you.

In this issue the news sadly carries an announcement of another event that has had to be cancelled due to COVID 19. These are difficult times.

On the plus side, Micro Corner is back and this time it is an on-screen generator using the Arduino Nano, who else but Mike G7GTN.

No issue of CQ-DATV would be complete without a contribution from Jim Andrews KH6HTV. In this issue we have two contributions, the first is slow Scan TV. This hobby has moved a long way from the days of long persistence CRTs. These days it uses a PC and some very clever software to decode the results, Jim explains.

Jim's second contribution is a look at SPICE which is an immensely powerful, analogue electronic circuit simulator. It was originally developed in the early 70s at the University of California Berkeley. It cost several thousands of dollars back then, but Jim has found a version that can be downloaded for free.

John Hudson G3RFL has also been in the shack experimenting with the AD724 PAL coder. If you remember John used one in the last issue to display a 5-bit RGB picture captured as a Jpeg and loaded into a PIC microchip.

Trevor G8CJS is still working on his GVG 100 panel. This started off as a voyage of discovery with a simple home made dongle that replaced the panels own microprocessor, so Trevor could explore how it works. This has moved on and Trevor now has the panel talking to the popular Vmix software. Trevor has written up where he and Mike G7GTN were with this project when we closed CQ-DATV for publication, but the R&D does not stop there! Trevor now has the mix and wipe generator he proposed in the flowchart working so mixes and effects can be remotely selected by his panel. Next month this will be a fully functioning interface.

Art Towslee WA8RMC has the story of a 325m tower, sadly not his own, but a commercial mast that has been recently updated and ART was there to photograph the riggers in action.

One from the Vault is a look back at CQ-DATV issue 2 where Richard Cross looks at home etching PCB's. This is not the dialo pen approach, Richard has a different method and the results look very encouraging.

As we always say sit back and enjoy CQ-DATV. You are guaranteed not to come into contact with COVID 19, one of the advantages of electronic magazines, so we are saving the planet in more ways than one.

If you want to know more of what is happening in our Television world why not join us on the CQ-DATV Facebook.

CQ-DATV Production team.

First DATV QSO on 5.7 GHz?

Neil G4LDR and I exchanged DATV pictures on 5.7 GHz over a 9 km obstructed path between our home QTHs today. Power at each end was about 5W; Neil running 125 kS DVB-S (from a Portsdown with filter-modulator board into his narrow-band transverter) and me running 333 kS DVB-S2 (from a Portdown with a LimeSDR into a homebrew (DATV) transverter).
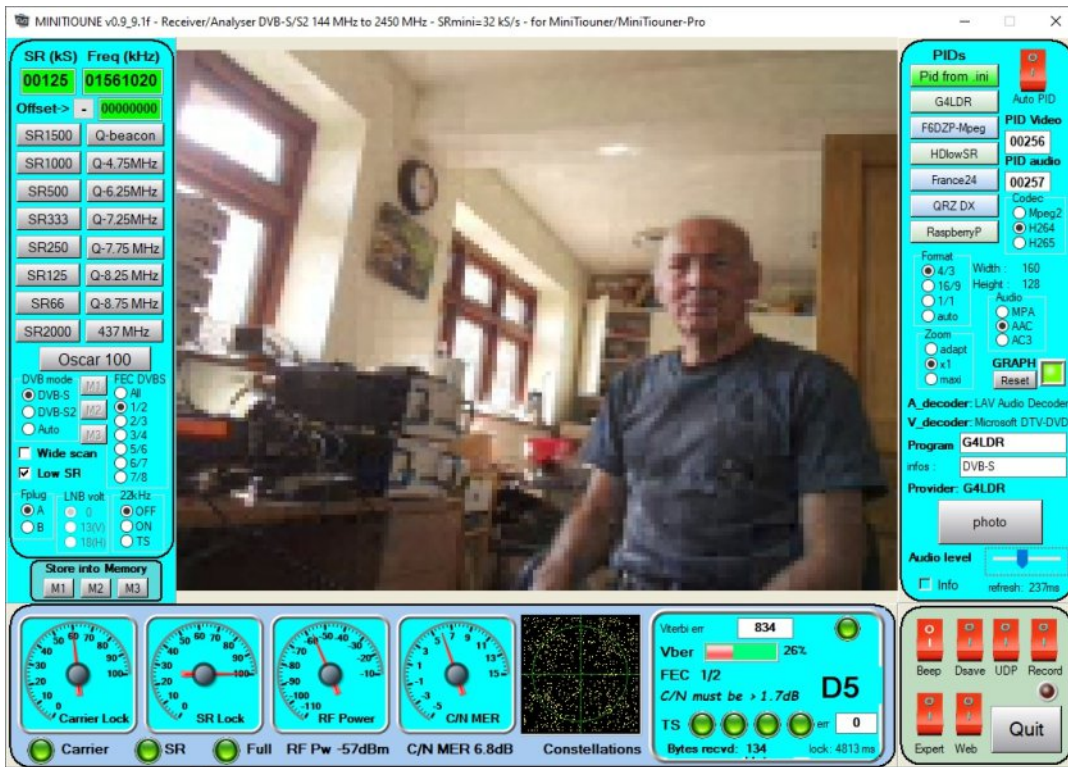
The path

We are not sure if this is a first? Has anyone else exchanged DATV pictures on this band? If so, over what distance?

Dave, G8GKQ

Source: *https://forum.batc.org.uk/viewtopic.php?t=6600*
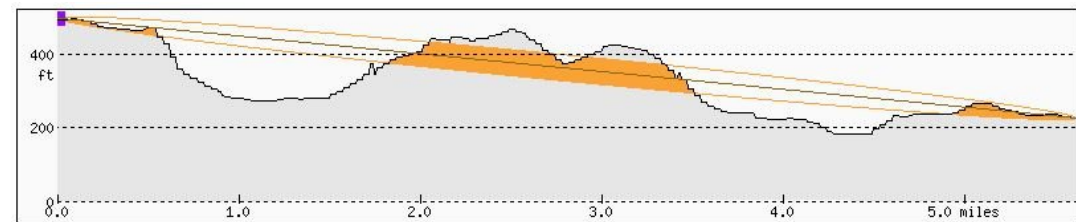
Radio silence due to coronavirus COVID-19

Ham Radio not taking place as planned

Due to current developments in regard to the spread of coronavirus COVID-19, Messe Friedrichshafen has been forced to make a very difficult decision: the international amateur radio exhibition Ham Radio will not be taking place in the planned period of June 26 to 28, 2020, but instead from June 25 to 27, 2021.

The Federal Government and the Minister-Presidents of the Länder decided yesterday, April 15 that no major events shall take place until August 31, 2020.
"Due to current developments relating to the coronavirus, we have the unfortunate duty of announcing that we cannot hold the 45th edition of Ham Radio as planned," explains Klaus Wellmann, Managing Director of Messe Friedrichshafen.

In recent weeks, it was already necessary to make the same decision in regard to other events (Aqua-Fisch, IBO, AERO, Tuning World Bodensee, and Motorworld Classics Bodensee). Project Manager Petra Rathgeber also expressed her sadness

about this turn of events: "We very much regret that this event cannot take place as planned. However, the health of all exhibitors and visitors is of utmost importance to us. Unfortunately, our trade fair calendar and the dates of other industry events leave no room for postponing this fair to another date this year."

Christian Entsfellner, Chair of the German Amateur Radio Club (DARC), adds: "Our members, domestic and foreign guests, and we ourselves have been hit hard by this decision, which now became necessary to make on short notice. Until we get together again in Friedrichshafen, we as amateur radio operators are looking forward to keeping in contact with one another using amateur radio." However, radio amateurs do not have to do without everything the Ham Radio fair normally has to offer: On the Ham Radio website, exhibitors will be presenting product innovations in the form of a virtual trade fair. DARC will also be offering presentations there. The exhibitors, visitors, and partners involved are currently being informed about this opportunity.

ARISS Celebrating Successful Launch Carrying Interoperable Radio System to ISS

Amateur Radio on the International Space Station (ARISS) is celebrating the successful launch and docking of the SpaceX-20 commercial resupply mission to the International Space Station (ISS).

One payload on the flight is the ARISS Interoperable Radio System (IORS), which ARISS calls "the foundational element of the ARISS next generation radio system" on the space station. Amateur radio has been an integral component of ISS missions since 2000.

The Dragon cargo capsule docked successfully with the space station on March 9. ARISS-US Delegate for ARRL Rosalie White, K1STO, said hundreds of ARRL members contributed to make the IORS project happen, and ARISS is celebrating the 4-year-long IORS project.

"ARISS is truly grateful to ARRL and AMSAT for their co-sponsorship and support of ARISS since day one," White said. "ARISS greatly appreciates the hundreds of ham radio operators who have stood by ARISS, sending financial support and encouragement.

A robust ham station is on its way to replace the broken radio on the ISS, and tens of thousands of hams will enjoy strong ARISS packet and ARISS SSTV signals as a result. In addition, thousands of students will discover and use ham radio to talk with a ham-astronaut. We hope to see the trend continue where more ARISS teachers and local clubs set up school ham clubs."

The new system includes a higher power radio, an enhanced voice repeater, updated digital packet radio (APRS), and slow-scan television (SSTV) capabilities for both the US and Russian space station segments.

White called the March 7 launch, "beautiful, flawless." ARRL President Rick Roderick, K5UR, told ARISS that he had his fingers crossed for a successful launch.

According to NASA Mission Control, it will take the three ISS crew members up to a month to unload and stow the 4,300 pounds of cargo on board the Dragon capsule, and the IORS is not a priority. The actual ham equipment will be installed in the ISS Columbus module.

Another IORS unit is in line to be launched and installed in the Russian segment of the ISS later this year.

The IORS consists of a custom-modified JVC Kenwood TM-D710GA transceiver, a multi-voltage power supply, and interconnecting cables.

The ARISS hardware team will assemble four flight units and 10 IORS units in all to support onboard flight operations, training, operations planning, and hardware testing.

ARISS-International Chair Frank Bauer, KA3HDO, said earlier this year that future upgrades and enhancements to the next-generation system are in various stages of design and development. These include a repaired Ham Video system - currently planned for launch in mid-to-late 2020, an L-band (uplink) repeater, a microwave "Ham Communicator," and Lunar Gateway prototype experiment.

Source: ATCO Newsletter, April 2020

MiniTiouner-Express
Digital Amateur Television DVB-S/S2 Receiver / Analyzer

Available at DATV-Express.com

- Operates with Windows PC using free MiniTioune software from Jean-Pierre F6DZP
- Smaller than a stack of 2 decks of cards (picture above is full size)
- Two independent simultaneous RF inputs with internal preamps
- High sensitivity -100dBm @1288MHz – at 1/2 FEC
- Fully assembled/tested in aluminum enclosure
- Covers 144-2420MHz (ideal for Space Station DATV reception)
- Symbol rates from 75 KSymb/s to >20 MSymbols/sec
- Uses external 8-24VDC supply or +5V from USB-3 port (with small modification)
- Real time signal modulation constellation & dBm signal strength display
- Price: US $75 + shipping – order with PayPal

For details & ordering go to www.DATV-Express.com

(MiniTioune display above is the ATCO 1268MHz DVB-S repeater signal at WA8RMC QTH 15 miles away).

WELL READ THE WORLD OVER

CQ-DATV

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ALL BACK ISSUES AVAILABLE

## Micro Corner - Simple OSD Generator - Part One

Written by Mike Stevens G7GTN

Introduction

It was time to look at an area that has always held an interest that of On Screen Generators, of course we already have the MAX7456 or AB7456 (slightly update device) that are dedicated chips for this purpose. I was more curious to see what could be achieved using just a processor and as few external parts as possible.

The internet found an interesting project that was developed for the model aircraft flying enthusiasts, and that was going to form the basis for my own on-screen experiments *www.rcgroups.com/forums/...* whilst interesting in terms of software, would be too complex for our use case where simple becomes usable for more people . So off on a different but well trod direction of using the Ardunio TV Out library that generated video using a two resistor DAC.

Basic Hardware

SIMPLE OSD GENERATOR
MIKE G7GTN APRIL 2020
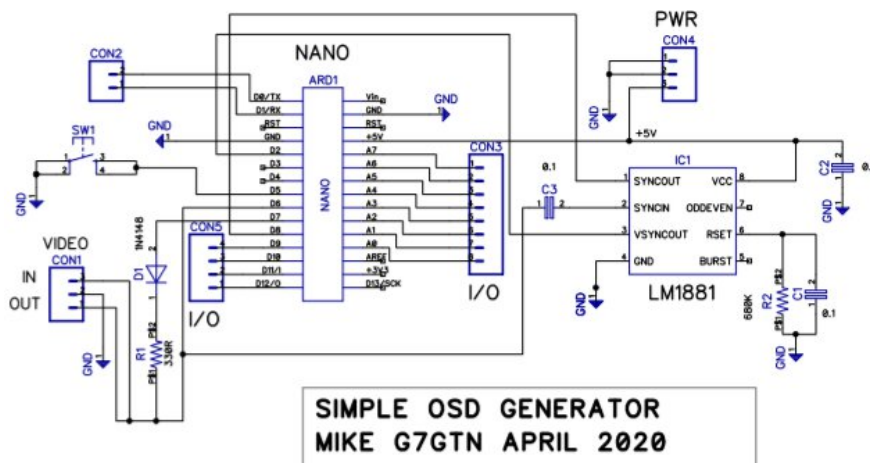
The popular LM1881 sync separator takes a composite video signal on pin 2 via a 100nf capacitor, this generates both Horizontal and vertical sync signals that are fed in to an Ardunio Nano module on I/O D2 and D8. The processor does all the character generation (including very basic graphics) and this signal is mixed with our composite video via the 1N4148 diode and resistor combination.

The unused Analog I/O pins have been taken out to an on board header allowing for some control additions further along the project. Remembering that whilst these pins are analog we can use them as digital also for things like push buttons. Using A4 and A5 we can also use I2C with some restrictions placed on us due to the video generation process. We also have four digital I/O pins D9-D12 available. Veroboard (stripboard) makes an ideal platform to construct the circuit, I went a step further and ordered a set of five custom designed printed circuit boards to get the hardware as stable as possible for the software mission to follow.
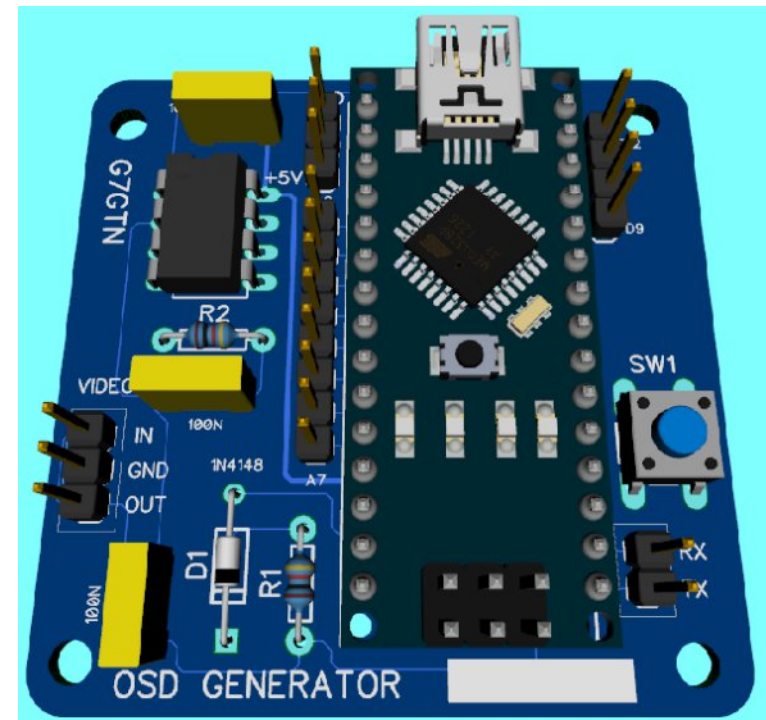
Ardunio Software

To generate a basic caption the Ardunio IDE requires a custom version of the TVOUT Library, this can be downloaded from *https://github.com/nootropicdesign/arduino-tvout-ve*
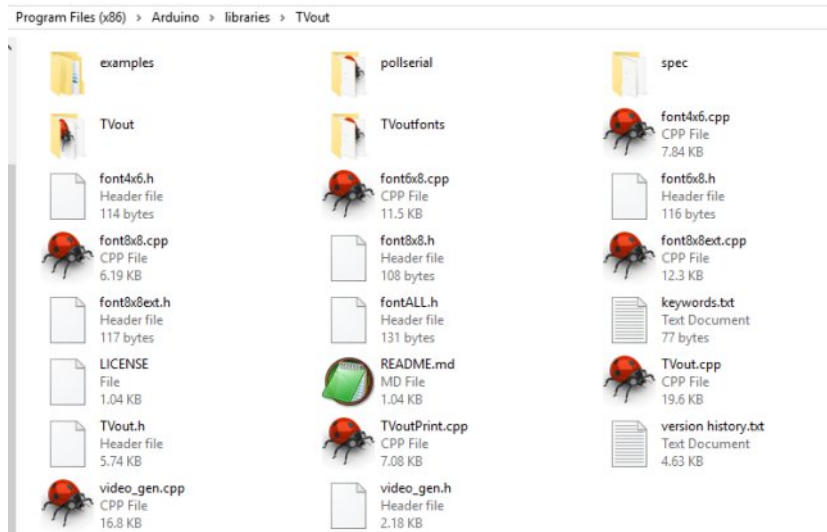
My library folder is laid out as depicted with the file unzipped. An additional library is also required to allow the use of just one push button on an I/O pin (D5 in my case) no pull up resistors are required *https://github.com/mathertel/OneButton*

Basic Operation

With the push button attached the first press will overlay your first caption, two clicks in quick succession will display your second caption. To remove the caption you press and hold the button for a few seconds.

You can adjust the size of the font – to an extent by changing the screen resolution settings, so experiment with these numbers to see the on-screen result. As the ATMEGA328P only has 2K SRAM we have some obvious limitations on the type of OSD projects – but having time on my hands will see what project ideas and coding techniques I can come up with. We can also do primitive bitmap style graphics; these however use large amounts of our precious memory, and if the resolution is pushed too far can create screen corruptions.

```
//|===================================================
//| Simplest Caption Example
//| Mike G7GTN – April 2020
//|===================================================
#include <TVout.h>
#include <fontALL.h>


#define W 120    // Resolution
#define H 96


TVout tv;
```

The simple test code is available for download as caption.zip on the CQ-DATV website.

Conclusion

A printed circuit board has been ordered and if this should not be available in time for the next magazine issue we can continue with our breadboard setup to start to delve in to the software and think of some other simple projects using this as the basis. The MAXIM MAX7456 is obviously a better choice for a higher quality OSD – this is more of an experiment to learn about the software video signal generation whilst also using up some time.

References

www.rcgroups.com/forums/showthread.php?t=1473207

https://www.arduino.cc/en/Main/Software

https://github.com/nootropicdesign/arduino-tvout-ve-

https://github.com/mathertel/OneButton

Slow-Scan TV on HF

Written by Jim Andrews, KH6HTV

Reprinted from Boulder Amateur Television Club TV Repeater's REPEATER April, 2020

The exact opposite of our Live, fast-scan TV can be found on HF. Tune your SSB rig to 14.230 MHz and just leave it there. You eventually will hear some funny warbling tones.

That is a Slow Scan TV (SSTV) picture being painted out. Whereas our FSTV is live, moving pictures, SSTV is the transmission of a single frame of video, i.e. a slide show, one slide at a time.

In years past, it took dedicated equipment to decode or transmit SSTV. No longer. Your PC will do it for you very easily. The "de-facto" program most SSTV hams are using is MMSSTV. The MM stands for Makoto Mori, JE1HHT, who wrote the program. You can download MMSSTV free from the MM HAMSOFT web site: *https://hamsoft.ca/pages/mmsstv.php*.

If all you want to do is decode & watch, then simply connected the audio out from your HF rig and plug it into your PC's sound card. To also be able to transmit, you use the same in/out connections between your PC and your rig as you use for all of the other digital modes, such as PSK-31, FT-8, RTTY, etc. I found the setup of MMSSTV for my Icom IC-7300 to be very easy. MM HAMSOFT also has available a SSTV Primer to help you get started.

SSTV is basically an FSK audio tone transmitted over your SSB rig. With a 1200 Hz tone being sync, a 1500 Hz tone being black and a 2300 Hz tone being white. Over the years, there have been several different variations of SSTV developed, but MMSSTV supports them all and does it automatically for you.

The time to transmit an image varies with the particular mode selected, ranging from perhaps 10-15 seconds to a minute or two. The above photo is an example of a 20 meter, SSTV QSO I had with K4XTT, in Virginia. It actually includes down in the lower left corner a copy of my previous picture to him, which he then pasted onto the photo he wanted to send me along with my call sign, signal report and his call sign.

MMSSTV also can work in the background on your PC, simply listening and decoding pictures as they come in and then storing them in a file. You can then easily go back by clicking on "History" and review all of the day's SSTV activity on 20 meters.

Experimenting with the AD724 PAL Coder

Written by John Hudson G3RFL

The AD 724 is a dual standard encoder, eg it will produce NTSC or PAL. This may be useful for future designs and while I had it on the bread board developing my new testcard I thought it might be worth testing it as a dual colour standard switchable encoder. I have no plans to develop my new testcard as anything other than a 625 line source, but I have no idea what I might develop in the coming months and finding out how the AD 724 can be switched is worth exploring. The data sheet explains how this can be achieved by changing the logic state of pin 1 and switching xtals, but there is no substitute for checking things out for yourself.
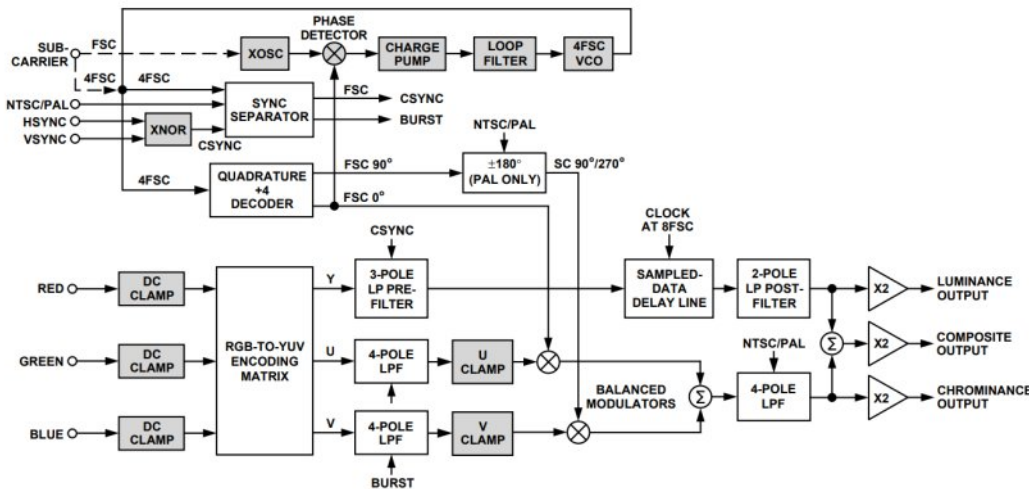
Inside the AD724 encoder chip

Pin assignment of the AD724

1. STND A Logical HIGH input selects NTSC encoding. Circuit A Logical LOW input selects PAL encoding. CMOS/TTL Logic Levels.

2. AGND Analog Ground Connection.

3. FIN FSC clock or parallel-resonant crystal, or 4FSC clock input. Circuit B For NTSC: 3.579 545 MHz or 14.318 180 MHz for PAL: 4.433 619 MHz or 17.734 480 MHz CMOS/TTL Logic Levels for subcarrier clocks.

4. APOS Analog Positive Supply (+5 V ± 5%).

5. ENCD A Logical HIGH input enables the encode function. Circuit A Logical LOW input powers down chip when not in use. CMOS/TTL Logic Levels.

6. RIN Red Component Video Input. Circuit C 0 to 714 mV AC-Coupled.

7. GIN Green Component Video Input. Circuit C 0 to 714 mV AC-Coupled.

8. BIN Blue Component Video Input. Circuit C 0 to 714 mV AC-Coupled.

9. CRMA Chrominance Output.* Circuit D Approximately 1.8 V peak-to-peak for both NTSC and PAL.

10. COMP Composite Video Output.* Circuit D Approximately 2.5 V peak-to-peak for both NTSC and PAL.

11. LUMA Luminance plus SYNC Output.* Circuit D Approximately 2 V peak-to-peak for both NTSC and PAL.

12. SELECT A Logical LOW input selects the FSC operating mode. Circuit A Logical HIGH input selects the 4FSC operating mode. CMOS/TTL Logic Levels.

13. DGND Digital Ground Connections.

14. DPOS Digital Positive Supply (+5 V ± 5%).

15. *VSYNC Vertical Sync Signal (if using external CSYNC set at > +2 V). CMOS/TTL Logic Levels. Circuit A 16 HSYNC Horizontal Sync Signal (or CSYNC signal). CMOS/TTL Logic Levels. Circuit*
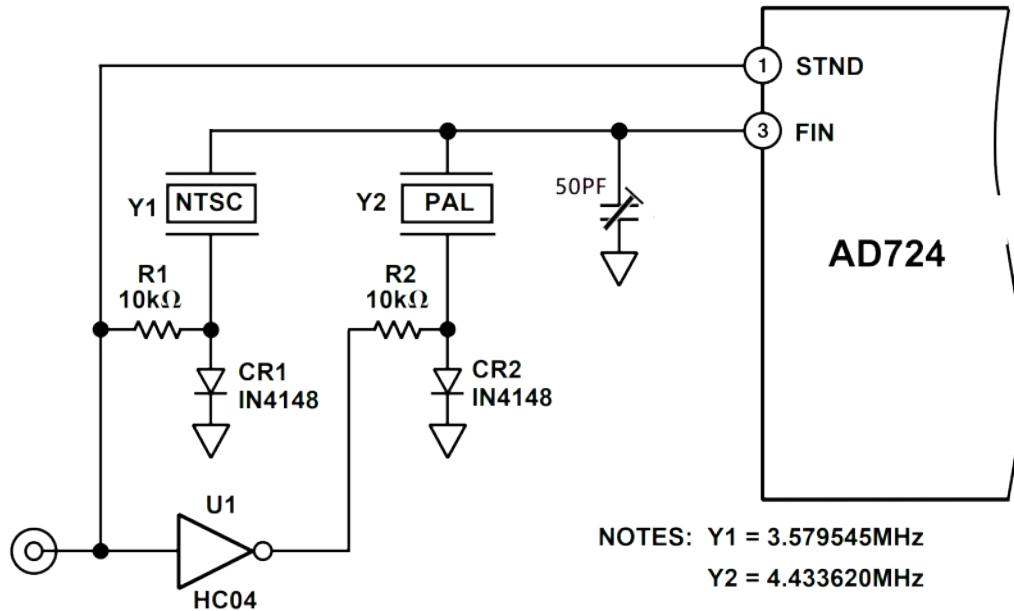
Added Crystal Selection Circuit

Switching the xtals with a simple logic change is much better than opening the box and plugging in a different frequency xtal, which might not even fit the same base.

Pin 1 (STND) of the AD724 is used to program the internal operation for either NTSC (HIGH) or PAL (LOW). For NTSC operation in this application the HIGH signal is also used to drive R1 and the input of inverter U1. This creates a LOW signal at the output of U1. The HIGH (+5 V) signal applied to R1 forward biases CR1 with approximately 450 µA of current. This turns the diode "on" (low impedance with a forward voltage of approximately 0.6 V) and selects Y1 as the crystal to run the oscillator on the AD724. The bias across the diode does not affect the operation of the oscillator. The LOW (0 V) output of the inverter U1 is applied to R2.

This creates a 0 V bias condition across CR2 because its cathode is also at ground potential. This diode is now in the "off" (high impedance) state, because it takes approximately 600 mV of forward bias to turn a diode "on" to any significant degree.

The "off" condition of the diode does, however, look like a capacitor of a few pF. For PAL operation, the STND signal that drives Pin 1 is set LOW (0 V). This programs the AD724 for PAL operation, deselects the NTSC crystal (Y1), because CR1 has no bias voltage across it and selects the PAL crystal (Y2) by forward biasing CR2.

In order to ensure that the circuits described above operate under the same conditions with either crystal selected, it is important to use a logic signal from a CMOS type logic family whose output swings fully from ground to +5 V when operating on a +5 V supply. Other TTL type logic families don't swing this far and might cause problems because of variations in the diode bias voltages between the two different crystal selection modes.

Frequency Tuning

A parallel resonant crystal, is the type required for the AD724 and is the one most commonly found and can be trimmed to the correct frequency with a small optional capacitor (50pf), if the xtal is off frequency you will be presented with a black and white picture, so in the absence of test equipment adjust for colour lock, sorry I cannot test if this has to be re adjusted when you change colour standard.

The subcarrier at pin 4 changes frequency and Pin1 changes logic state. The picture monitor as you would expect. goes to black and white. The vector scope unlocks so it is a little difficult to see if it has now got an NTSC colour burst. The only way to test this was to put a 4.43361875 xtal in both sockets and yes, we do get an NTSC colour burst.
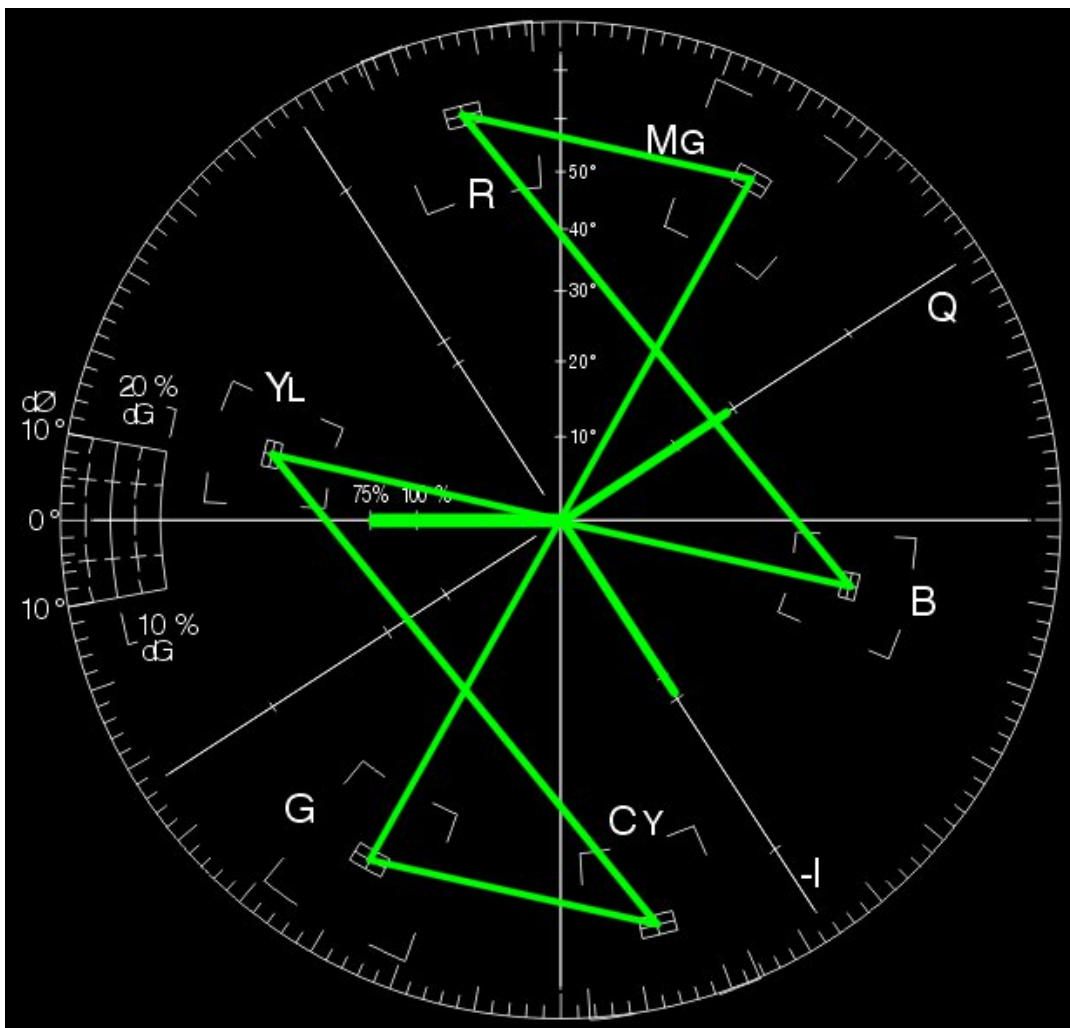
Colour Bars fed into the AD724 and coder set to NTSC

Not a lot of use for 625 NTSC, but if anyone is disposing of a dual standard vector scope (if one exists) in the Fleetwood area I am interested.

I will perhaps now order some more AD724's to stock up my Junk box while they are still available. PAL has stood us in good stead and I know it has now disappeared from broadcast, it did not make the jump into wide screen, I will be sad to see it go, but in this digital world I am afraid it was inevitable, but I feel happy to have a few encoder chips in my junk box if nothing else as a comforter, providing that nice warm feeling that I can add PAL to future project if only as an option.

Before you all start emailing the editor yes, I know there is an AD725. It has slightly better filtering but instead of an onboard xtal oscillator is needs an external oscillator. This might be an advantage if you use an old-fashioned vision mixer and want to make all your coders use a common subcarrier generator, which can enable sources to be timed up and made synchronous for mixing.

I did not, why? I live in a world where I normally just switch around sources on a simple switcher which yes does cause minor disturbances or you could build my fade down, cut and fade up unit or for the more ambitious there is a Vmix where all this is taken care of in software, but if you are using dinosaur mixing kit this may be the choice for you. Just watch out for flying pterodactyls, fortunately there are none in Fleetwood (that I know of).

## Grass Valley Mixer Conversions - Part 16

Written by Trevor Brown G8CJS and Mike Stevens G7GTN

OK, in the last issue we explained the plan to interface the GVG panel to Vmix. If you have never used Vmix then there is a link at the end of this article. There are various options as explained in the last issue.

I downloaded the 60-day full version, but unfortunately the 60 days have now expired. I have now downloaded the free version and was emailed an unlimited life key, but as you would expect, the programme is not the full version as it only has four inputs. I am sure more restrictions will reveal themselves as we work through this software, but it is probably the version most of you will be using. The interface between the GVG Panel dongle and the Vmix software will be via the Arduino Pro micro which is being programmed by Mike G7GTN in C to accept I2C commands from the GVG panel and then convert them to MIDI commands to control Vmix.
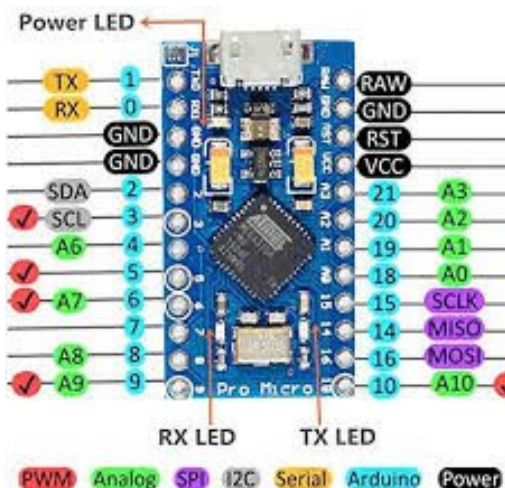
We only have the one Arduino Pro module and it is in Leeds with me for testing. Mike is revising the C code and skyping updates to Leeds for testing. The results are then screen grabbed and fed back to Mike for revision. Not the best way of working! Another module is on order to open this pinch point in the testing. The results so far are very encouraging.

The Arduino Pro is connected to the GVG dongle using just three connections - Ground, SDA, SCL (I2C bus) and these need connecting across to the I2C bus of the dongle. The power and Vmix control data are via a single USB connector. Power-up brings on the Red LED, followed by two green LED's that I assume are programme controlled.

We have also been using the free Midi monitoring software MIDI-OX (link at the end), but to be honest Vmix makes the best test jig. More later.

The first stage was to check the I2C interface by opening the Annex editor and pasting in the following BASIC programme (Same PC as Vmix) and run it. This is the I2C scanner programme which will reveal the address of any devices on the I2C bus.

```
I2C.setup 4, 5              'I2C RX and TX pins need to be
configured as appropriate
goto I2Cscanner           'uncomment to use I2C scanner
I2Cscanner:
wlog "Scanning for I2C devices..."
for c = 1 to 126
 I2C.begin c
 if I2C.end = 0 then
  wlog "found " + str$(c) + string$(5," ") +  hex$(c)
  pause 50
 end if
next c
wlog "Finished"
end
return
```

The addresses of the devices on the I2C bus are in decimal and hex because we are programming the panel dongle in Annex BASIC, we use the first column. In this instance 7 is the same in decimal and hex.

Scanning for I2C devices...
 found 7 7
 found 32 20
 found 37 25
 found 39 27
 found 57 39
 found 60 3c
 Finished.

The new address is 7. Disconnect the Arduino and re-scan and it disappears. We have a new I2C device and its handshakes back to our bus. The next problem is to see if it is seen via Vmix at the other end.
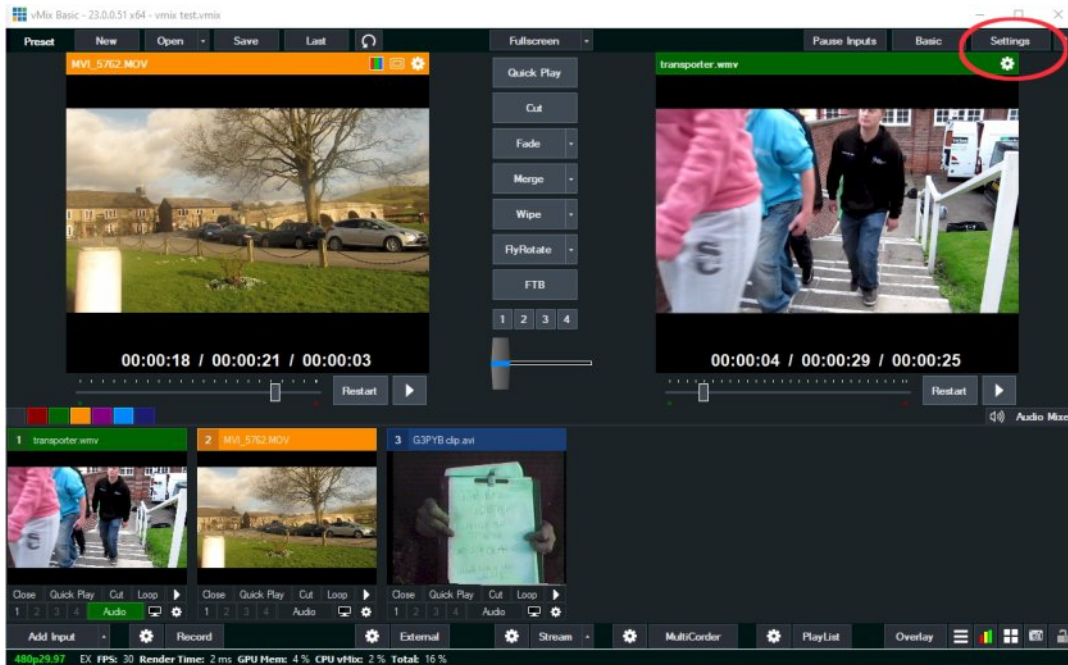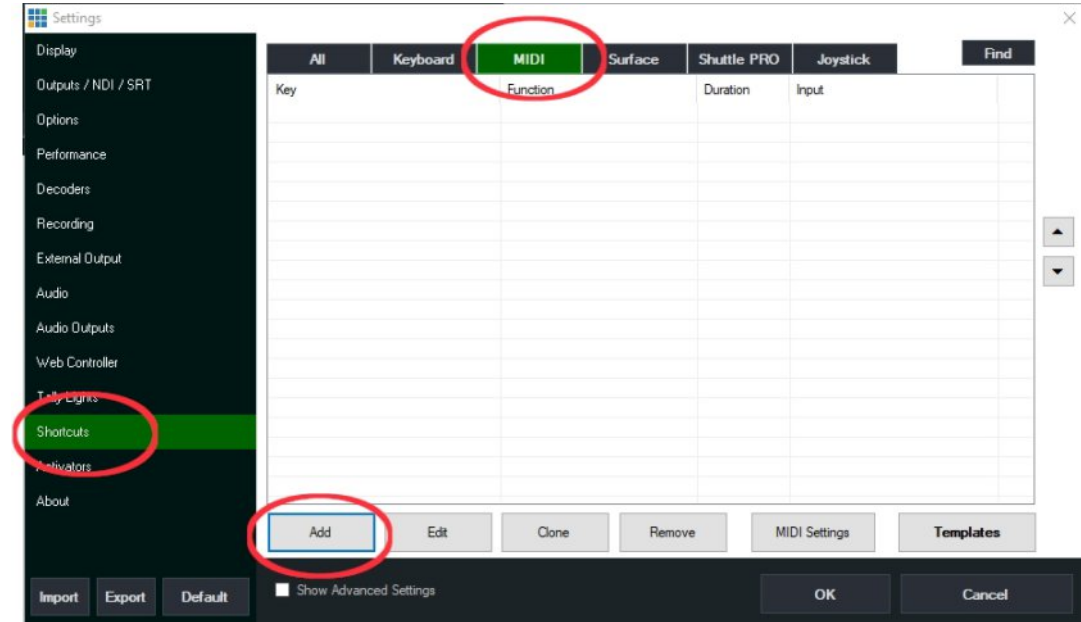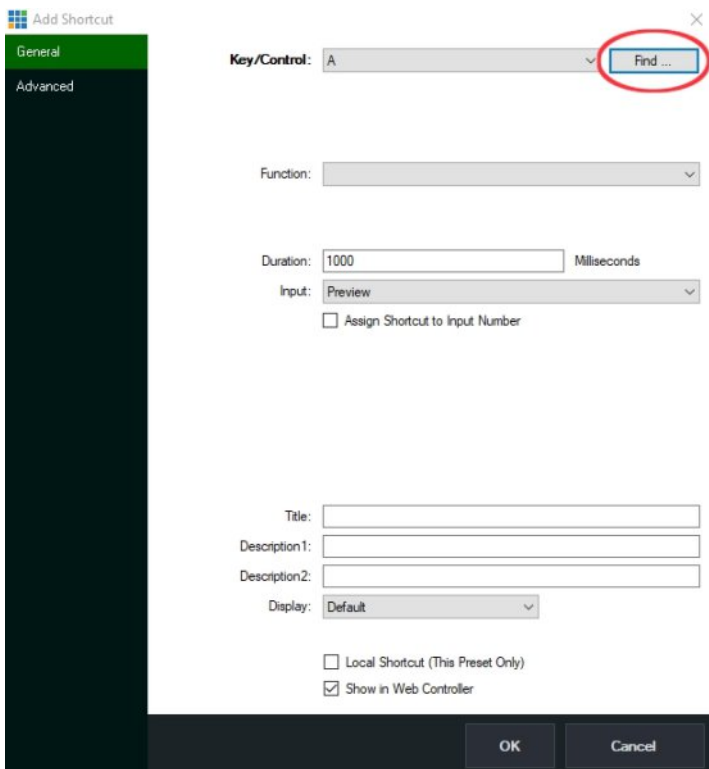

Open Vmix and select settings.

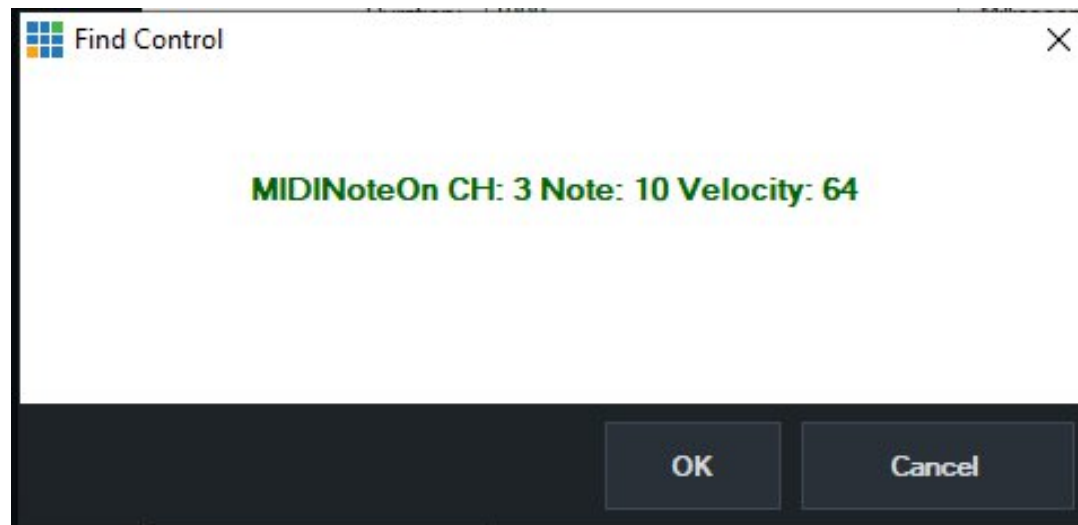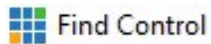Select MIDI settings and we are connected to the Arduino Micro, so looking good.
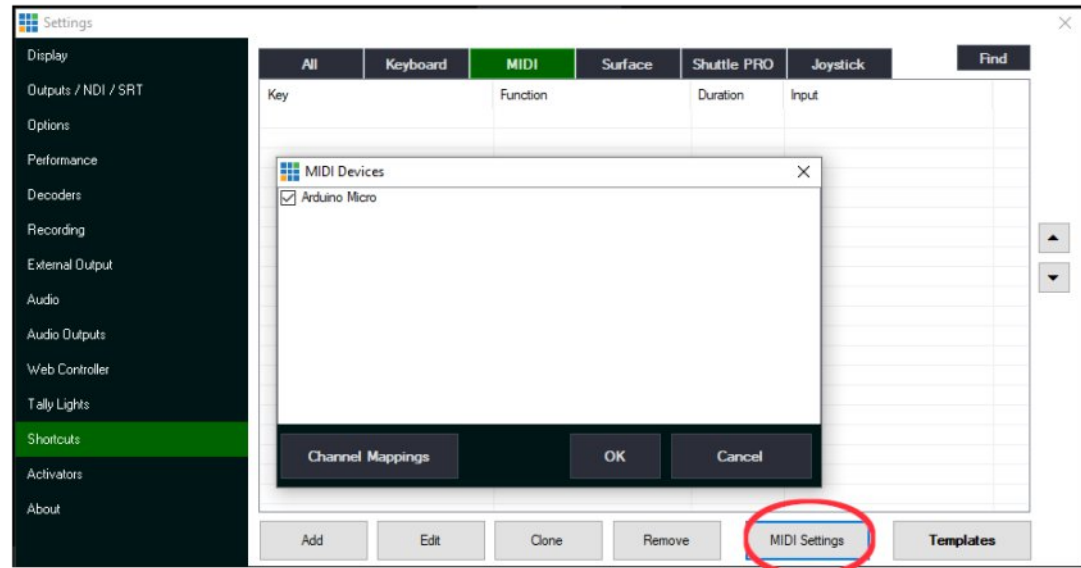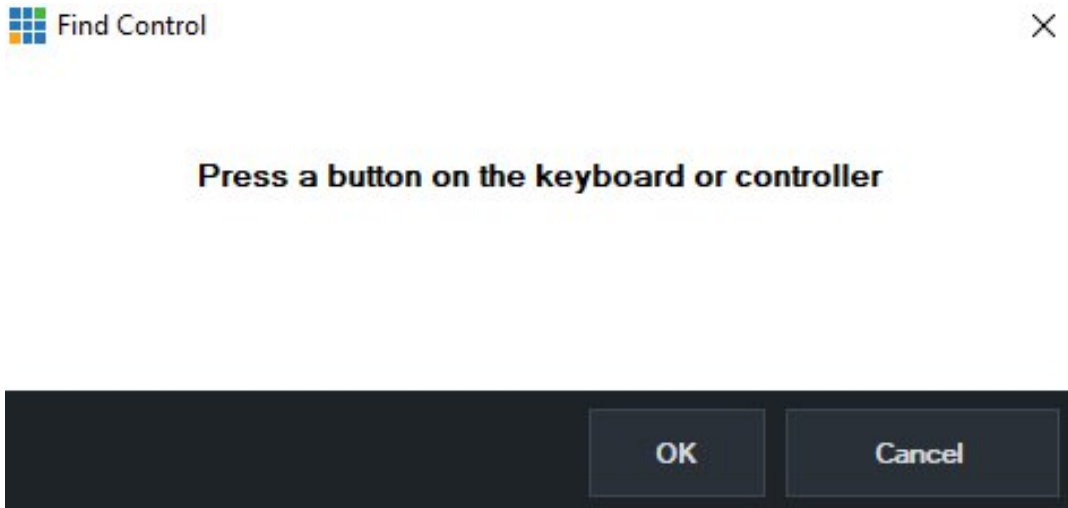

Select the Add button and choose to find on the next screen

This pop menu will be seen

Mike has written a simple programme to send a repeating series of MIDI notes to Vmix from the Arduino. They are displayed on the above menu.

Another successful test! Vmix and Arduino are now talking to each other. The next stage is to assign some functions. Select OK to a passing note and you will be returned to the find menu with the note displayed in the top box. Select the drop down on the Function menu and you can choose the function you want to assign to that MIDI note. I chose flyRotate as transition effect. If you then clone it and edit it, you can assign another note to another effect. Once you have a few notes set, return to the front screen.

Set up some inputs to the front screen and run Mikes test software and all these transition effects are presented every few second: let's call that a win for the Arduino interface. The next stage is to send I2C commands from the GVG panel to I2C Address 7 and get Mike to revise his programme from a sequential list to sending the desired command under GVG panel control.

While Mike works on that we can start planning the next revision of the GVG software. Remember this is Annex BASIC and is used to control the dongle we built around an ESP 8266 Micro which in turn replaces the custom micro that handled communication between the GVG panel and the original GVG crate, (now retired).
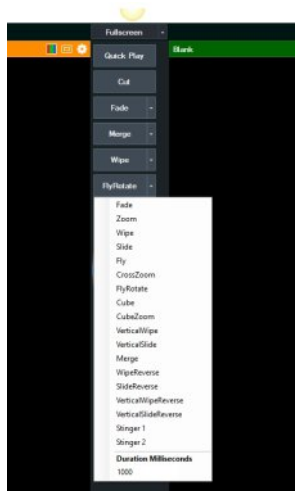

The centre of the GVG panel has several buttons that will control the transition between the preview source and the on-air source. Ignoring the cut function there are 18 effects and four buttons that can be pre-set to any one of these functions, from the simple cross fade to the more impressive fly zoom or flyRotate. These are more than just wipes, they are impressive digital effects. These outperform what was available via the GVG crate and remember the sources do not need to be synchronous in Vmix and can be just video files on the hard disk.

The GVG wipe panel has 10 buttons, only one can be selected at once, if we can convert the reverse button to be a key shift we can select any one of 20, slightly more than we need to select any one of the effects in Vmix.
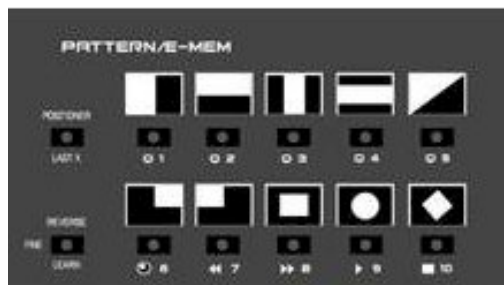
The legends will be incorrect, but perhaps we can use the LED screen to indicate the GVG effect we have selected. We do not want the effect to take place when we press these Keys, we want it to happen when we press the Auto Transition Button. We will start with a pre-set duration for the effect but at a later date it may be possible to adjust the speed of the effect as set by the Auto Transition rate in the internal LED display. Lets learn to walk before we run so speed of effects is on hold until we have control over all the the Vmix functions. The following flow chart is the starting point. I have not included the I2C LCD display which will guide you through the effects control, but this is not difficult to implement.
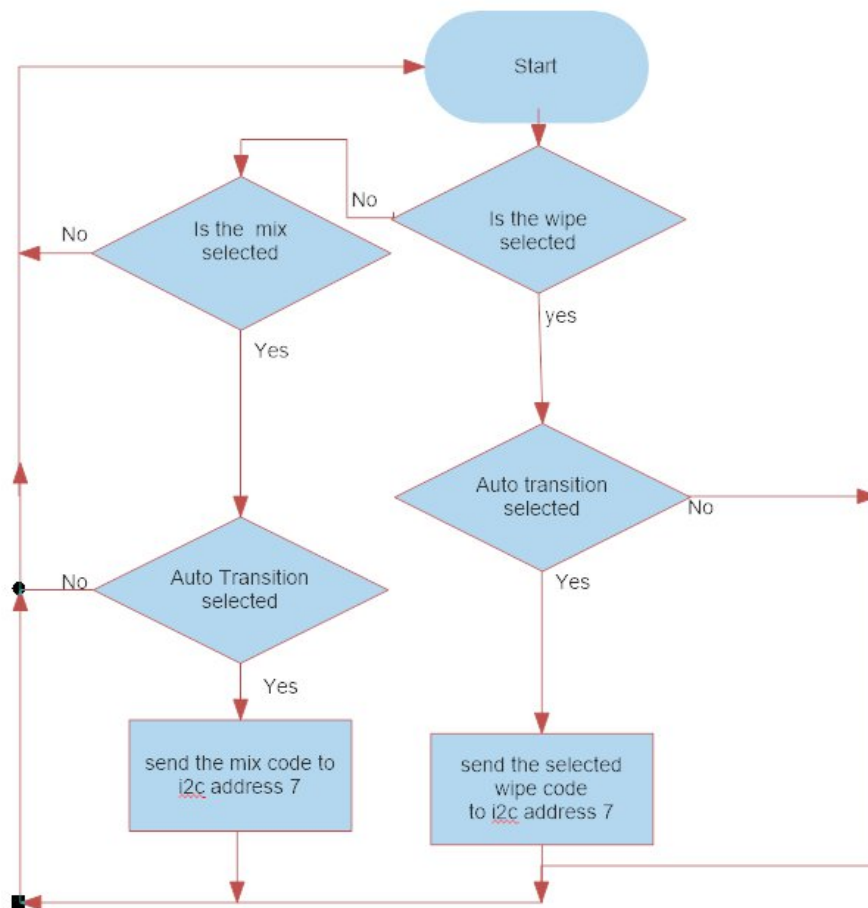
The bottom line is there is still some considerable way to go with this project. As expected, all the work is in the coding and having the C written in Plymouth and the BASIC programming and testing in Leeds does not help. We have a second Arduino Pro module on order. I cannot see any point of releasing Mikes simple sequential MIDI note generator, but if you are keen to experiment drop the CQ-DATV editor an email and we will see what am be done.

Once again, sorry if you feel this has been a long drawn out article. As I have said before, it is real time development, so you are reading it warts and all every month, which is I think brave for something that at the beginning we did not know if it would be possible. But we are both feeling more confident now, though we have to confess there have been one or two stumbling blocks that may not have made it into this column.

Download site for a copy of the Vmix software
https://www.vmix.com/

Installing Vmix
https://www.youtube.com/watch?v=OssMN5y86hQ

MIDI Utility
http://www.midiox.com/

THAT AWKWARD MOMENT WHEN
YOU COME FACE TO FACE WITH THE CORONA BUG.

LT-SPICE

Written by Jim Andrews, KH6HTV
Reprinted from Boulder Amateur Television Club TV Repeater's REPEATER April, 2020

SPICE is a very powerful, analog electronic circuit simulator. It was originally developed in the early 70s at the University of California - Berkeley. Over the years, it has been marketed in various versions by commercial software companies. In the mid 80s, my company, Picosecond Pulse Labs, bought our first P-SPICE program to run on our first IBM PC. We paid several thousand dollars for it at the time. Big money then, even bigger today with inflation. But it was well worth it. It allowed us to design and debug all sorts of electronic circuits. Wikipedia has a good summary of the history of SPICE. In the 80s, with my first P-SPICE program, I had to design the circuit by writing a text file, with each line of code describing a single component and the nodes it was connected to. Today, more modern versions of SPICE give you a graphical interface to design with your mouse an actual schematic diagram, such as shown in the figure below.
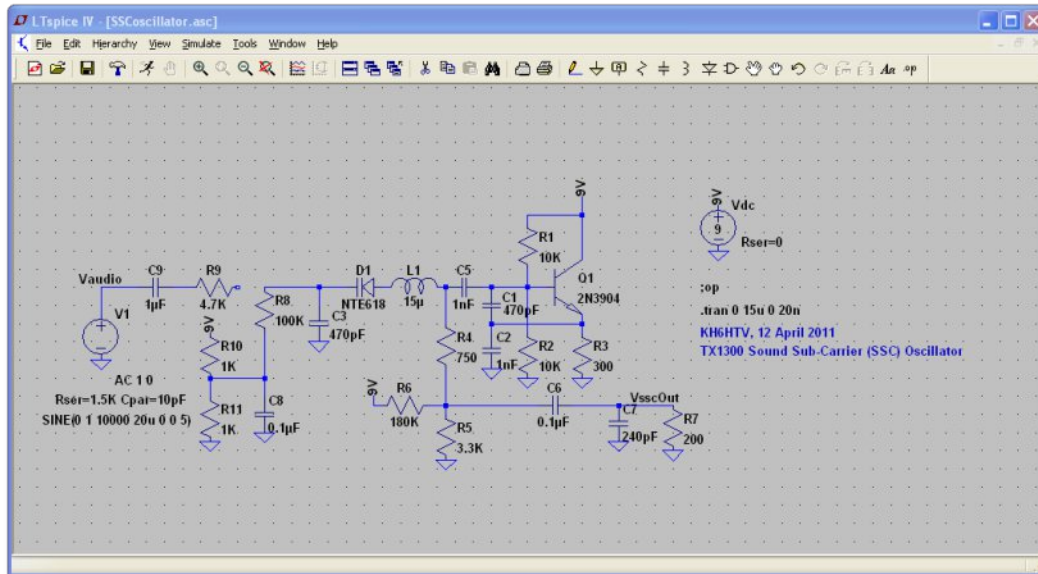
Today, there are still software companies selling their versions of SPICE for big bucks. But you really do not need to pay a single dime! Several years ago, the semiconductor company, Linear Technology, made available FREE!!, their version of SPICE. It is called LT-SPICE. Note: Linear Technology is now part of Analog Devices, so you will find it now on the AD web site. Go to:

https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html#

From there you can download the FREE program to either your Windows or Mac computer. Also download their Getting Started Guide.

So what can you do with LT-SPICE. Well for starters, you are given a schematic drawing worksheet. You select various components from the top task bar, and then click and paste them onto your worksheet. You then drag connecting wires between your components. Each component is automatically assigned a unique designator, such as R1, Q3, etc. You then select each component and give it the desired numerical value, such as 1K, 10uF, 1nH, 2N3904, etc.

You do usually need to add some input excitation source such as a signal generator. You then determine what kind of analysis you want to do. It can either be a frequency response plot, like using a network analyzer or a transient response in the time domain.

With the frequency response, a small signal analysis is performed using a sine wave of varying frequency as excitation. For the transient response, it can simply be just turning on the DC power or the power can already be applied and you apply some other type of waveform as an input.

LT-SPICE example: a 4.5 MHz, Sound-Sub Carrier (SSC), varactor tuned oscillator
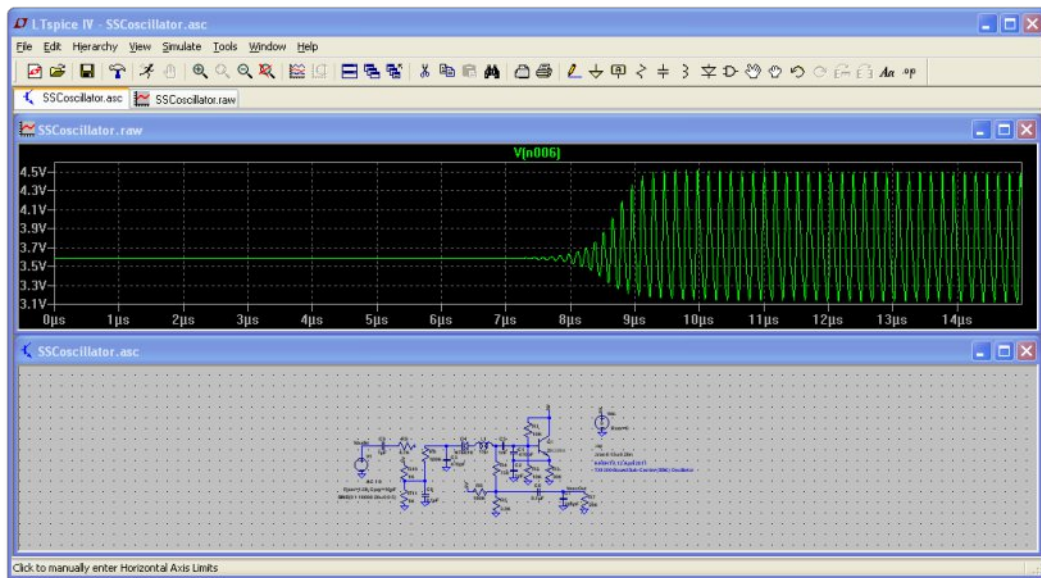
LT-SPICE example: Transient DC power turn-on analysis of the 4.5 MHz SSC oscillator. Voltage probe on the emitter of Q1

If you move your cursor to a particular component, it will become a clamp-on amp meter probe, and when you click on the component, it will then display the current flowing through that device. The above example shows the DC power turn-on transient analysis of the SSC oscillator.

The last example is showing the network analysis in the frequency domain of the design of a 2 meter, Band-Pass Filter. The swept frequency plot is of the transmission, insertion loss, S21. It shows both the S21 magnitude and also the phase.

LT-SPICE – try it, you will fall in love with it and say "I can't live without it !"

You have a selection of various waveforms, such as a pulse, step, pulsed RF, or you can create your own waveform.

After creating your schematic etc, the last thing to do is execute the analysis of your new circuit. This is done simply by clicking on the little figure of a Runner on the top task bar. After running the analysis, the program then reduces the size of your schematic and displays a graph (either with a frequency or time axis, depending upon the type of computation).

Now you then proceed to look at your circuit's responses using an oscilloscope probe. You will see on your schematic a small red symbol of either an o'scope's voltage probe, or a clamp-on amp meter probe. You move this around with your mouse. If you rest the voltage probe on a wire or connecting node and click on it, the program will then display the voltage at that point.

LT-SPICE example: The design of a 2 meter, Band-Pass Filter

This is your free ATV magazine.
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On Top of the World

Written by Art Towslee WA8RMC
Reprinted from ATCO Newsletter, April 2020

Looking around for something else I can do while staying in compliance with our quarantine, I noticed activity on the local Channel 34 PBS TV tower close to me. I figured as long as I stay the required distance away from the workers, I figured it was OK to watch them remove their antenna and install a new one on top of their 1065 foot (325M) tower.

BOY!!! I just found something else I definitely do not want to do. Those guys are crazy swinging around there at the top. In addition to the antenna they had to remove the top tower section and replace it with a stronger one to support the new antenna. The old antenna is about 2 feet in diameter and 30 feet long. The new one is almost 3 feet in diameter, 55 feet long and weighs 8800 pounds (40,000 kg). Looking at the old antenna I noticed spikes going up the antenna about 2 feet apart. I was told those are the climbing spikes needed to get to the beacon on top. In addition, he said they can't use their safety harness while climbing those. They must do it without any safety protection… and was told they did it once at 3AM in the winter. It gave me chills just listening to that.

The workers are hoisted to the top with a free hanging cable held away from the tower about 10 feet. Looking at that, it seemed they were actually flying there without any help. I watched 4 of them go up each hooked to the higher person's safety harness. It looked like a single line of people "floating" to the top. See photo on next page.

All is well now. Channel 34 is back with 1MW high power using their new antenna. WOW! See pictures on following.

That's all for now. More later, Stay tuned!

The tower with the gin pole at the top. It's the yellow item clamped to the 1065' tower side ready for the new antenna

The 4 workers being hoisted to the top with the winch cable. Not my idea of a fun thing to do

The winch used to hoist the antenna and workers up and down the tower. It holds 5000' of 3/4" cable

The removed old antenna. Notice the climbing spikes.

A closeup of the feedline feed point for the 6" coax hardline. Too big for my QTH!

The new 55-foot-long multiple slot antenna. It's 32" in diameter and weighs 8800 pounds. Check out the ladder improvement over the old antenna. It's a standard Werner fiberglass ladder bolted to the antenna intermediate steel flanges

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TV·AMATEUR

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Zeitschrift für Bild- und digitale Daten-Übertragung im Amateurfunk

Vorstand und Redaktion wünschen allen Mitgliedern und Freunden der AGAF ein besinnliches Weihnachtsfest und ein erfolgreiches Jahr 2020
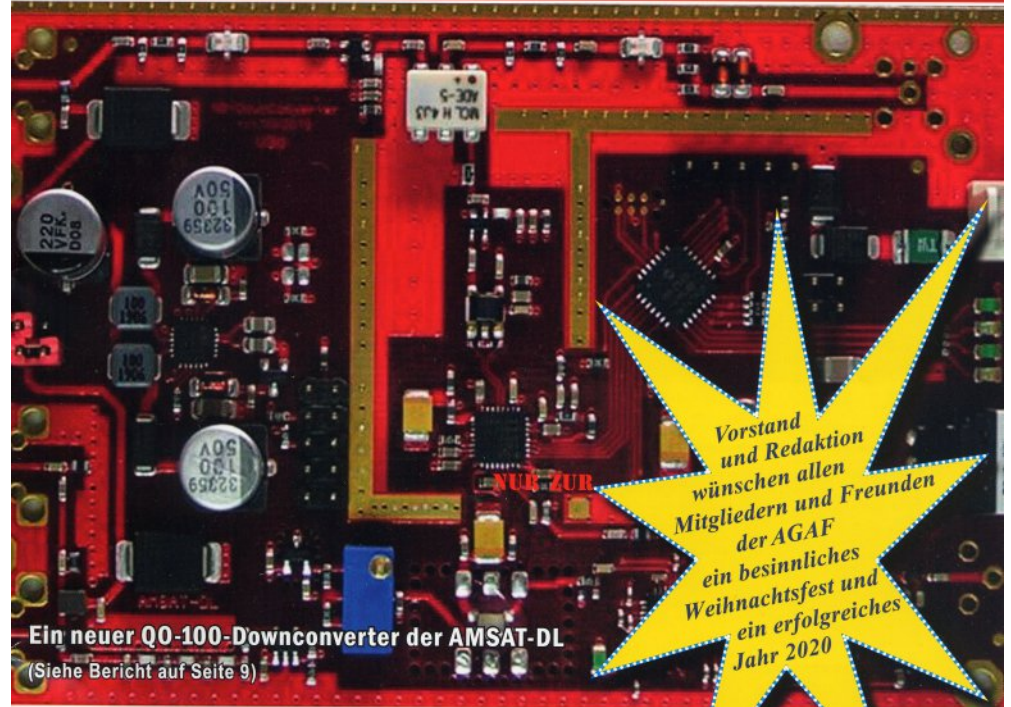
Ein neuer QO-100-Downconverter der AMSAT-DL
(Siehe Bericht auf Seite 9)

Aus dem Inhalt: Rückblick auf das AGAF-Jahr · 47-GHz-ATV-Versuche · Bericht vom AMSAT-Symposium in Bochum · Ein neuer QO-100-Down-Converter · Medientage in München · Kapazitätsmessung an Alkaline-Batterien · ATV-Nachrichten · Blick GB: DATV-Demo in Ostfrankreich

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One from the Vault - A guide to making your own PCB

First published in issue 2
Written 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.
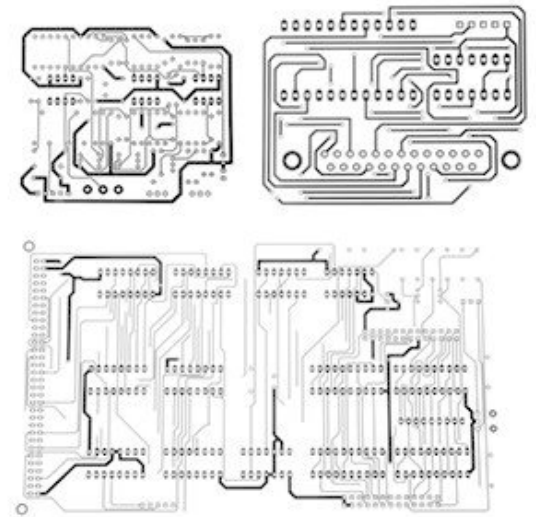
Method 2

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.
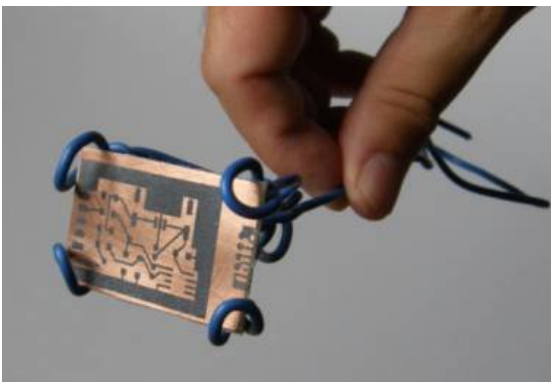

Cleaning

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!
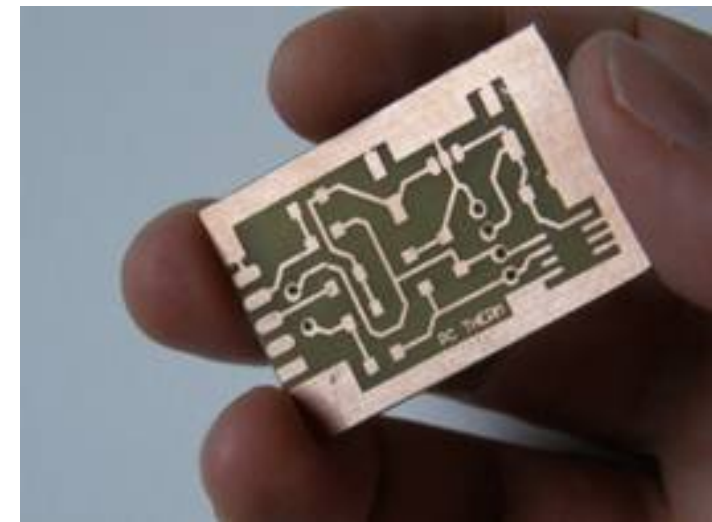
(**Ed Note:** Maplin is no longer in existence)

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Images should be in PNG format if possible and the best quality available. Do not resize or compress images, we will do all the rework necessary to publish them.

If you are sending a construction project, please include the dimensions of any pcb's and make the pcb image black and white, not greyscale.

CQ-DATV reserves the right to redraw any schematics and pcb layouts to meet our standards.

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CQ-DATV is published on the last day of the month. The cut-off day for submissions/corrections/alterations is 5 days before the day of publication.

Have you ever just looked at someone and knew the wheel was turnin' but.. the hamster was dead?

CQ-DATV

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