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*This area is getting decidedly sparse.  
Please consider contributing an article.*

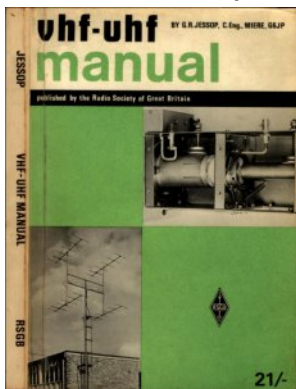
Welcome to our Christmas edition, CQ-DATV 54 of our electronic ATV magazine. One more issue and we will have been up and running for 5 years....What a brave decision it was to produce a free ATV magazine. But we believe in ATV and if we want our hobby to survive then somebody has to support it and this seemed the best way to reach the world.

We are not alone. The DKARS (Dutch Kingdom Amateur Radio Society) also produce a free amateur radio magazine <http://www.dkars.nl/index.php?page=magazine> and we reproduce an advert in every addition of CQ-DATV to give this new media as much support as we possibly can.

We also have a Facebook page, CQ-DATV, and about 10% of our readers actually subscribe. Never quite sure why that is! If you like our magazine then please join our Facebook group, if only to receive the email that lets you know another issue is available for download.

Another mystery is support in the form of copy. If you like to read what others have been up to then surely the reverse logic applies! Others would like to read about your activities. Any magazine is only as good as the people that support it, and yes from time to time copy trickles in, but more often than not it is the same people that sit down with a blank screen every month and decide to write a contribution.

Ok enough of a grumble, after all it is the time of good will to all men. There are other ways of contributing and one such contribution we found was one of the all time great publications, "VHF UHF Manual" by GR Jessop. This paper only book has been lovingly scanned into several electronic formats, <https://archive.org/details/Vhf-uhfManual>.



This was at one time everyone's favourite constructional handbook for RF projects. Long out of print, but now being preserved as an electronic archive, so you can keep a quick reference copy on your hard drive. It brought back fond memories of Varactor Tripler's, 2C39a's and QQV06-40a PA's those were the days! Some of us still have their dog eared paper version, but now we can all have a hard drive copy in our growing electronic library...long live electronic publications.

Back to our humble contribution, CQ-DATV 54. In this issue we have continued with Micro Corner and this time it's Mike G7GTN and he has contrasted the ESP8266 micro with its new bigger brother, the ESP32, which has advantages on offer for more complex project designs. Mike also proposes an ESP32 Development board to assist with developing ESP32 based projects. The proposed Euro card (100 x 160MM) sized PCB is to lessen the need to have larger breadboard configurations scattered all over your work bench area.

Brian Jordan G4EWB has created DigiTwist as a satellite dish tracking solution that emulates the Catapult dish at Goonhilly Down with two domestic horizontal rotors at right angles, so he can track ISS passes.

John Hudson G3RFL is back in the shack. Sadly his copy has been absent from the last couple of magazines, but it seems he now has a new bit in his soldering iron and is keen to try it out.

This time it's a home constructed RSSI power detector, just what every ham is hoping to find under his Christmas tree, but well those elves electronic skills are just not what they once were, so our advice is if this project is for you, let your fingers do the roaming (on eBay of course) and start building. Don't leave it to chance, one might not turn up under the tree on Christmas morning, just not worth taking the risk.



Trevor has adopted the Christmas spirit! We are not sure if it's Christmas Present or Christmas Past as he revisits making a Christmas video that can be edited in Openshot. This is a blast back to issue one, but such advice is always ongoing and needs revisiting and revising as we learn new camera tricks.

Mike G7GTN has also been investigating a button box that interfaces to a USB port to provide an external control surface for applications such as Vmix. Well pressing buttons is so much more television than cutting live video on a computer keyboard and it opens the door to breathing new life into old control panels from long ago redundant equipment.

Ken W6HCC has reported that interest in DATVexpress has waned and support has moved to two new DATV products. The Analogue Devices ADALM-PLUTO SDR Tx/Rx that may become available again in first week in January at a price of US\$100 or US\$150. The Lime-Micro mini-LimeSDR Tx/Rx is rumoured to ship in mid-January at a price of US\$140. Both of these new SDR boards will be lower priced than the DATV-Express Tx-only board (US\$300).

This along with all the DATV news completes CQ-DATV 54, our Christmas edition, so as we always say sit back and enjoy the last issue for 2017 and let's all wish for many more issues in 2018.

**A very Merry Christmas and a Happy New Year from the CQ-DATV production team and 2017 contributors.**

**Please note: articles in this magazine are provided with absolutely no warranty whatsoever; neither the contributors nor CQ-DATV accept any responsibility or liability for loss or damage resulting from readers choosing to apply this content to theirs or others computers and equipment.**

# DKARS MAGAZINE



## *In dit nummer:*

- ◊ Moonbounce from Swaziland
- ◊ FT8 mode explained
- ◊ Twee JOTA verslagen
- ◊ Samenwerking met de BDXC op (A)TV gebied
- ◊ En uiteraard nog heel veel meer...



DKARS

Dutch Kingdom Amateur Radio Society



Prijs / Price € 0,00 / \$ 0,00

November 2017 editie 37

**Check out the DKARS website at:-**  
<http://dkars.nl/>

### Antenna Switch AS-1289



### High performance remote controlled 5 way antenna switch

The switch is designed specially to be used for remote (over the Internet ) controlled systems, but can of course be used in other applications also. The switch can be manually controlled via an internal web interface.

Together with Remoterig RRC-1258 it can be setup to automatically follow your band changes (\*). The switch connects to the RRC over IP, no serial port is needed.



It is powered with 12V DC. It is made for indoor use and can be wall mounted or placed on a desk/shelf. The switch is equiped with PTFE dielectric SO-239.

The new 5-way AS-1289 has the same functionality as the 10-way AS-1269 but it's made for indoor use and has no PoE support.

(\*) with an optional RS232 Interface the AS-1289 can be controlled direct by a Radio if no Remoterig system are available.



## Specifications

- Frequency Range:.....1.6-55 MHz
- Characteristic impedance:.....50 ohm
- Outputs:(\*1).....5
- Inputs:.....1
- Supply voltage Local:.....12-15V
- Power consumption Local:.....<200 mA
- Connectors:.....PTFE dielectric SO-239
- SWR (1.8-50 MHz):.....<1.17:1
- Insert loss (1.8-30 MHz):.....<0.04 dB
- Insert loss (50 MHz):.....<0.07 dB
- Power rating (1.8-30 MHz, SWR <1.3:1).....2kW
- Ethernet connection(\*2):..... RJ45
- LED's..... ANT1-5, PWR, Link
- Operating temp:.....-40 -+60 C
- Dimensions (WxDxH):.....175x100x55mm
- Weight:.....0.7 Kg

(\*1) All unused antenna outputs are grounded, The RF card control lines are surge protected with Metal Oxide Varistors

(\*2) The control cable should be shielded (FTP) CAT-5e or better

Users manual can be downloaded from the Users manual page:-

[http://www.remoterig.com/wp/?page\\_id=97](http://www.remoterig.com/wp/?page_id=97)

Orders can be placed in the webshop:-

[http://shop.microbit.se/webshop/catalog/product\\_info.php?cPath=24&products\\_id=94&language=en](http://shop.microbit.se/webshop/catalog/product_info.php?cPath=24&products_id=94&language=en)

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## Australian Amateurs do first HamTV telebridge outside of Europe

Led by Shane, VK4KHZ in Queensland who handled the audio on 2m and video for a telebridge contact between the ISS and 3 Italian schools on 11 Nov, four stations across Australia joined together to 'chain' the live video coming down from the ISS on 2.4 Ghz.

As the ISS approached Australia from the west Martin VK6MJ in West Australia was the first to receive the video signal down from Paolo, IZ0JPA and held the signal till Joe VK5EI in Adelaide picked it up then onto Tony VK5ZAI in Kingston SE South Australia finally as the ISS headed N-E over Queensland Shane picked up the video signal in Glenden while he was handling the audio for the linkup.

The video from the 4 Australian hams was streamed live to the BATC site in GB, where it was patched together to form one long video transmission so the public could watch as Paolo answered the Italian students questions.

The URL for the British Amateur Radio Club is:

<https://ariss.batc.tv/hamtv/>

Thanks to Tony, VK5ZAI, and ANS for the above information

---

## PCB prices to rise on copper foil shortage, says broker

A shortage of copper and copper foil for use by the printed circuit board (PCB) industry is likely to send prices higher according to Raymond Goh, COO of Elmatica AS (Oslo, Norway), a PCB broker.

Goh said that the global output of copper is not increasing while demand for copper in lithium batteries for automotive applications is and that as a result a current shortage of copper foil will persist.

On top of this China is planning to ban the importation of electronic waste, a significant source of recycled copper, Goh said.

Although others will undoubtedly continue to recycle electronic waste China's exit would represent a disruption to the process creating a temporary decrease in copper supply.



Elmatica advises its customers to place orders early and plan for longer lead times particularly leading up to and beyond the Chinese New Year period in February 2018. Customers should also approve more than one type of laminate, in relation to copper thickness and insulator material, and several PCB manufacturers, to help cope with spot shortages. [http://www.eenewseurope.com/news/pcb-prices-rise-copper-foil-shortage-says-broker-0?news\\_id=100032](http://www.eenewseurope.com/news/pcb-prices-rise-copper-foil-shortage-says-broker-0?news_id=100032)

- Our thanks to Stephen, G7VFX for spotting this item

## AMSAT-UK Colloquium Talks – Videos being added to YouTube

Working satellites with Arrow Antennas Videos of the presentations given at the AMSAT-UK International Space Colloquium, which was held as part of the RSGB Convention in Milton Keynes, October 14-15, are being made available on YouTube - <https://www.youtube.com/user/AMSATUK/videos>

The first of the videos is 'An introduction to Amateur satellites' by David Johnson G4DPZ and Carlos Eavis G3VHF.

Other presentations are expected to be uploaded in the coming days.



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2017

Sonderbriefmarke der Deutschen Post mit der Illustration eines TELEFUNKEN PALcromat 728T in Verbindung mit einer zeitgenössischen Hirschmann-Zimmerantenne.

Entwurf / Illustration: Andreas Ahrens, Hannover

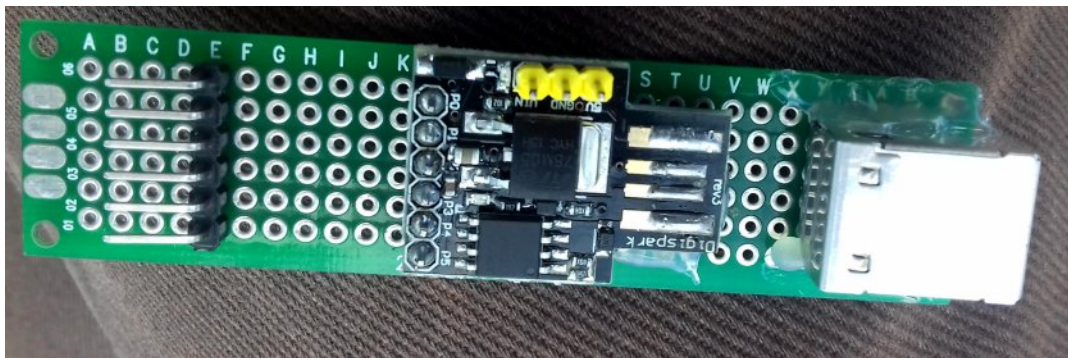
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# Simple VMIX Software USB Button Controller

Written by Mike G7GTN



Hot Glue Based test Proto-type under construction....

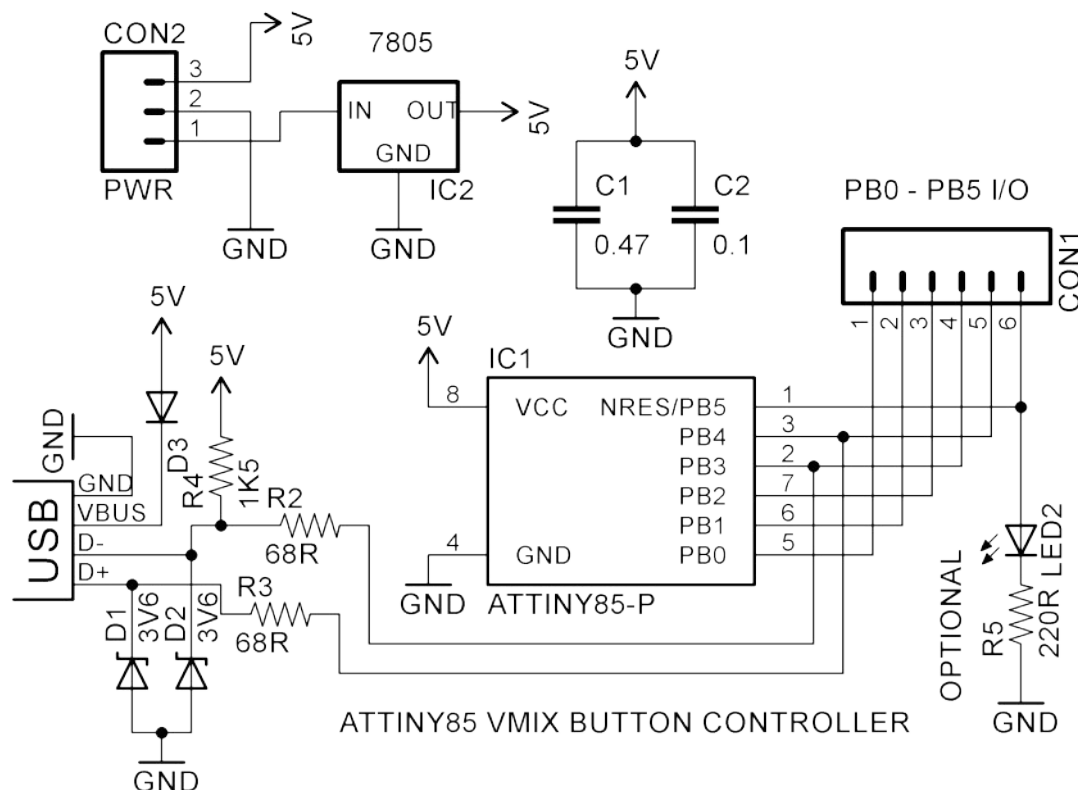
## Introduction

Using a Digispark clone ATTINY85 based board I set about to create a simple button controller to use with the popular VMIX desktop video switching and streaming software.

Using the ability to set up user short cut keys from within VMIX the project was easy to achieve with a minimum amount of easy to obtain parts. The ATTINY85 has the ability to communicate over standard USB (DATA & PWR) this comes at the cost of using 2 I/O pins on the processor.

So we are then left with just four pins that we can use for any button control logic. My first thought was to make use of an I2C port expander such as the PCF8574T or similar, but I concluded that this added an extra layer of code complexity using such a small & already quite resource limited processor.

I selected a much simpler 8 bit static shift register setup using a CMOS CD4021 controlled via a 3 pin interface on (PB0 – PB2) This reads the pressed button and decodes this



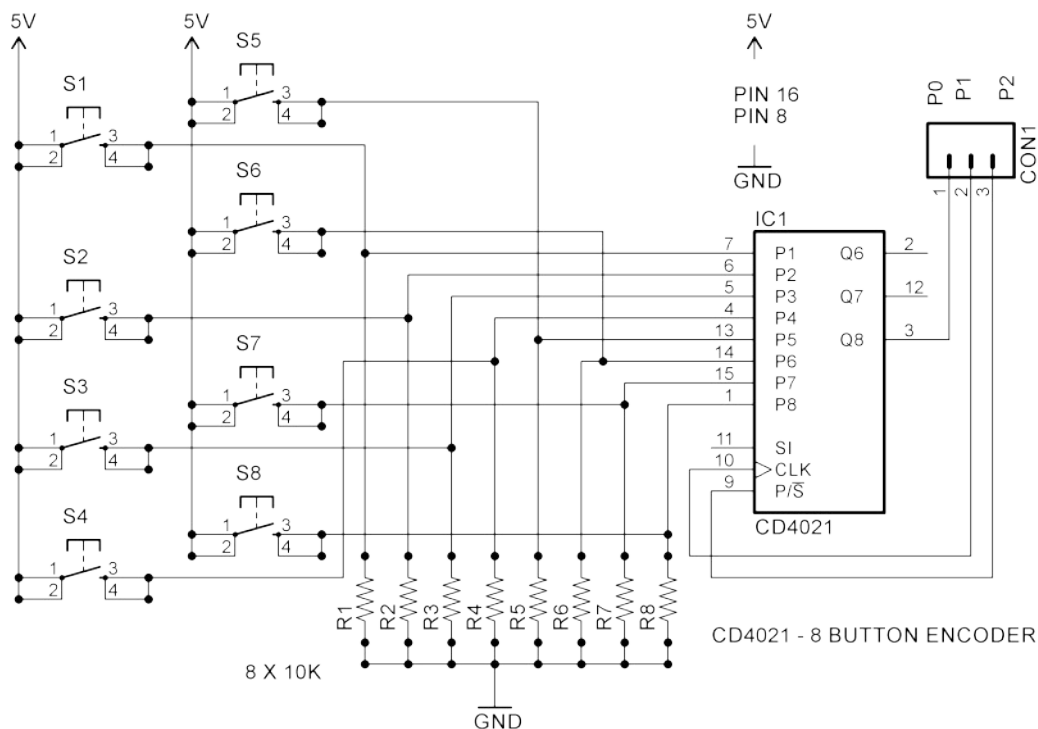
to a binary value for the micro to then process. This makes use of the ability to Shift in data using a single software command.

## Proto-type Hardware

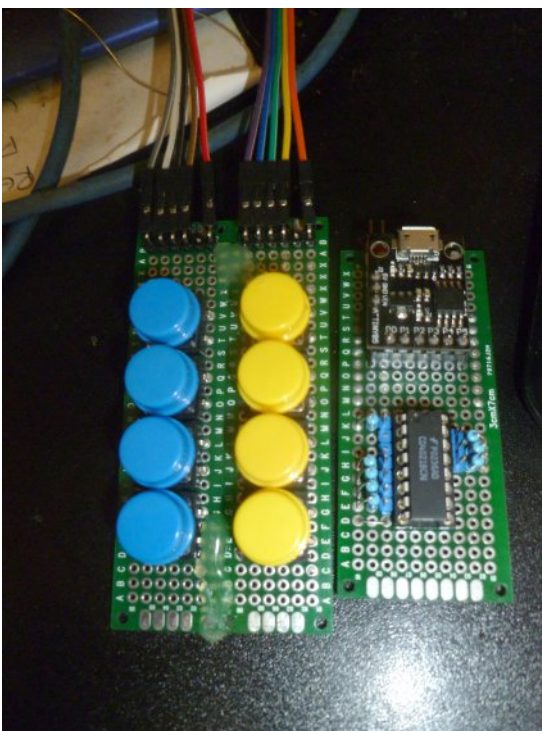
My first proto-type used one of the older Digispark boards that plug directly in to a USB port I had to resort to mounting a USB socket on the end of a proto board with hot glue. The newer type of ATTINY85 boards with a USB Mini socket made the final project even easier on a (30mmX70mm) single pad board.

The eight tactile switches were arranged across two sections of small (20X80mm) proto-type boards, these being hot glued together to make a single panel.

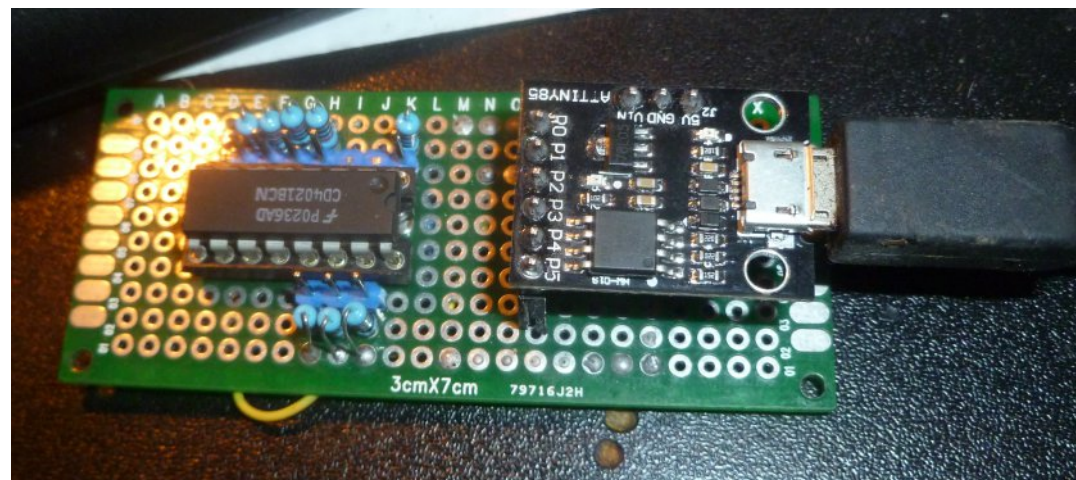




**Above: CMOS CD4021 Shift Register Button Circuit**

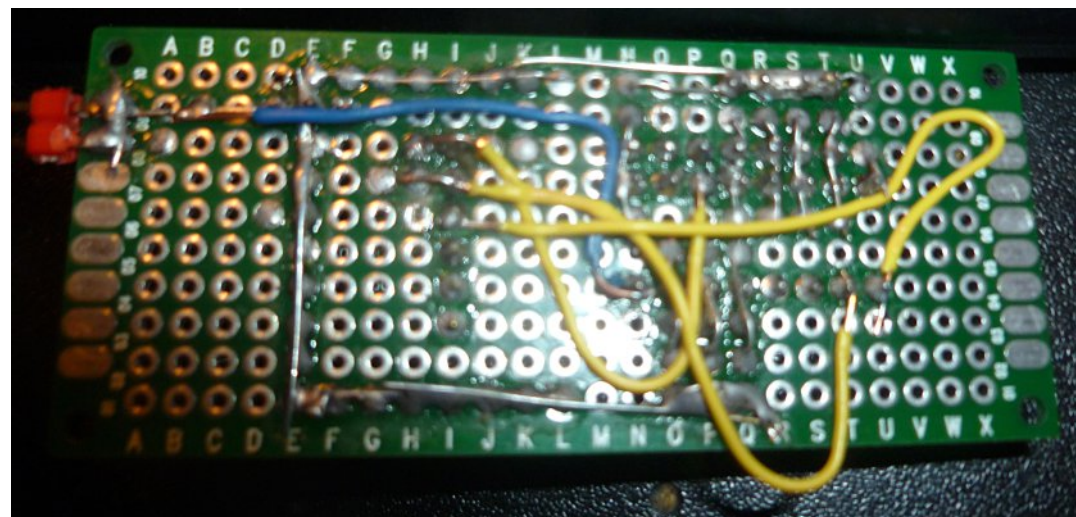


**Left: Project ready for fitting in an enclosure**



**CD4021 & Processor Module**

All of the proto-type construction was driven by the selection of components that were in stock; of course you can select different switches to create the style you wish. Not having an available plastic ABS type case large enough in stock I will spend an hour making a simple wooden desktop type enclosure from some scrap beech wood with MDF panels to fully complete the project.



**Back of the micro & encoder proto board**



## Module Programming Preparation

My description of the programming that is required will just focus on the code that runs on the microcontroller as many readers will already be very seasoned VMIX users.

If you are not sure how to set up short cut key combinations a nice tutorial is included as a link from the software authors.

The micro is programmed from the Arduinio IDE and hence you require this to be installed as a first step. Next we need to include the Digispark board definition and library files.

This is done via the file preferences option panel. With this open paste in the following URL to the additional board's manager field and select OK.

[http://digistump.com/package\\_digistump\\_index.json](http://digistump.com/package_digistump_index.json)

This will install the required files ready for use. Next you need to download and install the Windows USB Device driver from the link at the end of this article.

Unlike any of the other Arduinio boards the ATTINY85 should not be connected to the USB port to start with, when you select upload sketch you will be told when to plug the module in on the status panel at the bottom of the IDE screen.

A tutorial page written by Digispark covers all the required steps in more detail and is worth a quick read if you are uncertain about any of the required steps mentioned above.

## ATTiny85 Microcontroller Code

Using the USB keyboard library we will send keystrokes to the running Windows application (VMIX in this project) the buttons are labelled in the source code from 1 to 8 and have been programmed to send A – H as the shortcut keys.

An optional external Power LED is controlled by an additional port pin (PB5) to provide an indication of being powered up from your PC.

Using the Arduinio IDE and selecting the upload option will get the required code on to the module. The code can be downloaded from the magazine software page as VMIX.ZIP.

## Conclusion

The ATTINY85 modules make for an interesting USB connected processor, where limited I/O and also code space (6K) available after the installed Bootloader.

If this is not a problem for your own simple project then they are certainly worth checking out further. If you want to make bigger button encoders for your own particular project you can use the ability of daisy chaining the CD4021 shift registers to build a bigger setup. You should be able to easily have 16 buttons with the code space still available for use.



## Modules I/O pin out

- All pins can be used as Digital I/O
- Pin 0 - I2C SDA, PWM (LED on Model B)
- Pin 1 - PWM (LED on Model A)
- Pin 2 - I2C SCK, Analog In
- Pin 3 - Analog In (also used for USB+ when USB in use)
- Pin 4 - PWM, Analog (also used for USB- when USB in use)
- Pin 5 - Analog In

## Helpful links

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

<http://digistump.com/products/1>

<https://digistump.com/wiki/digispark/tutorials/connecting>

<https://github.com/digistump/DigistumpArduino/releases/download/1.6.7/Digistump.Drivers.zip>

<https://github.com/micronucleus/micronucleus>

<http://www.ti.com/lit/ds/symlink/cd4021b-q1.pdf>

<https://www.arduino.cc/en/Tutorial/ShiftIn>

<https://www.vmix.com/>




<https://www.vmix.com/knowledgebase/article.aspx/83/shortcuts>



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Written by Brian Jordan G4EWJ

## Overview

DigiTwist is an experimental two axis satellite tracker, primarily for the HamTV transmitter on the ISS. Two broadcast satellite dish positioners are connected together and are controlled by a dual Diseqc PCB, which is in turn controlled from a PC.

It is experimental, in the sense that the satellite dish positioners were never meant to be used in this way and may fail. Development is continuing, particularly as to the size of the dish that can be carried. At the time of writing, it has not yet received the ISS, mainly due to lack of opportunity.

I was interested in receiving the Tim Peake transmissions from the ISS, but the available solutions seemed complicated and expensive. I looked at a system similar to the one described below, but the mechanic aspects proved too difficult and I let the project lapse.

When I heard that Tim Peake would be returning to the ISS, I resurrected the project and thanks to Rob M0DTS helping me with the mechanical aspects, it has moved forward.

The estimated cost for 2 positioners, the joiner bar and the controller is £130.

## Positioner Choice

The Technomate TM-2600M3 satellite positioner was chosen for its reasonable torque of about 2.1kgm and its sturdy construction. Satellite receivers generally provide up to 500mA on their F connectors and the positioner limits itself to this to avoid blowing a fuse in the receiver.



**Left: 40cm dish for demonstration purposes**  
**Right: Positioners connected by a custom joiner bar.**  
**Photo and CNC milling: M0DTS**

It is possible that the current detector in the positioner could be changed so that more current could be taken, to allow more torque and a bigger dish.

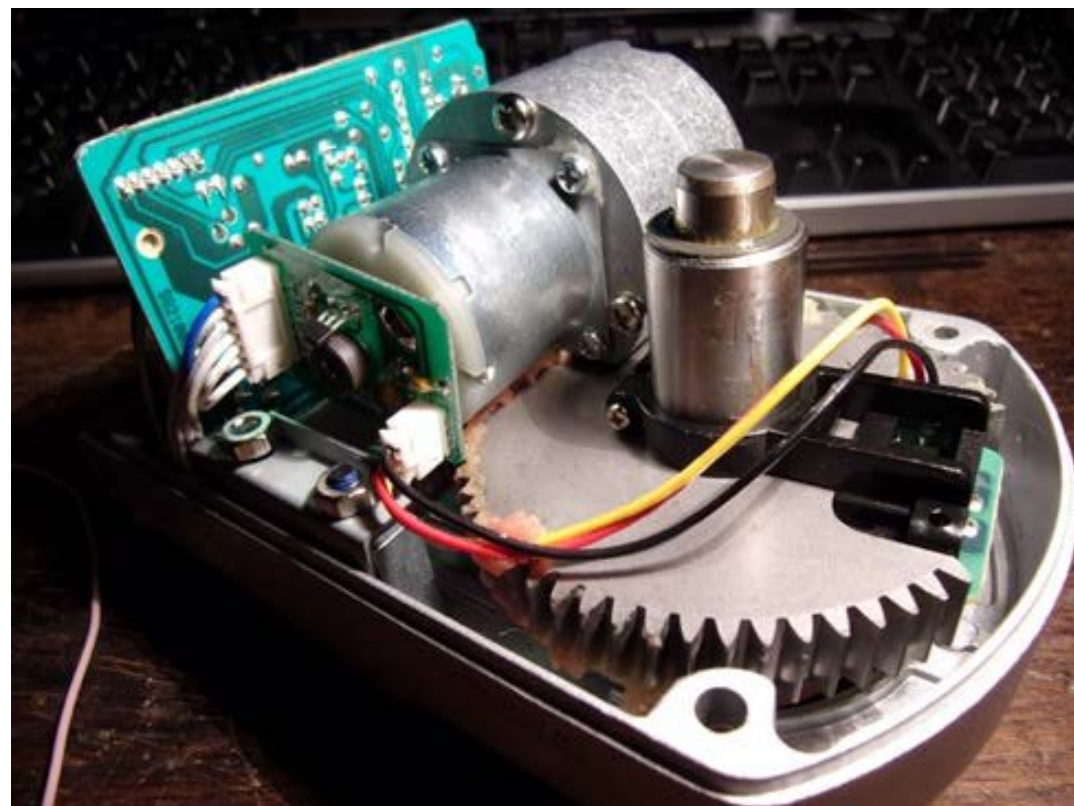
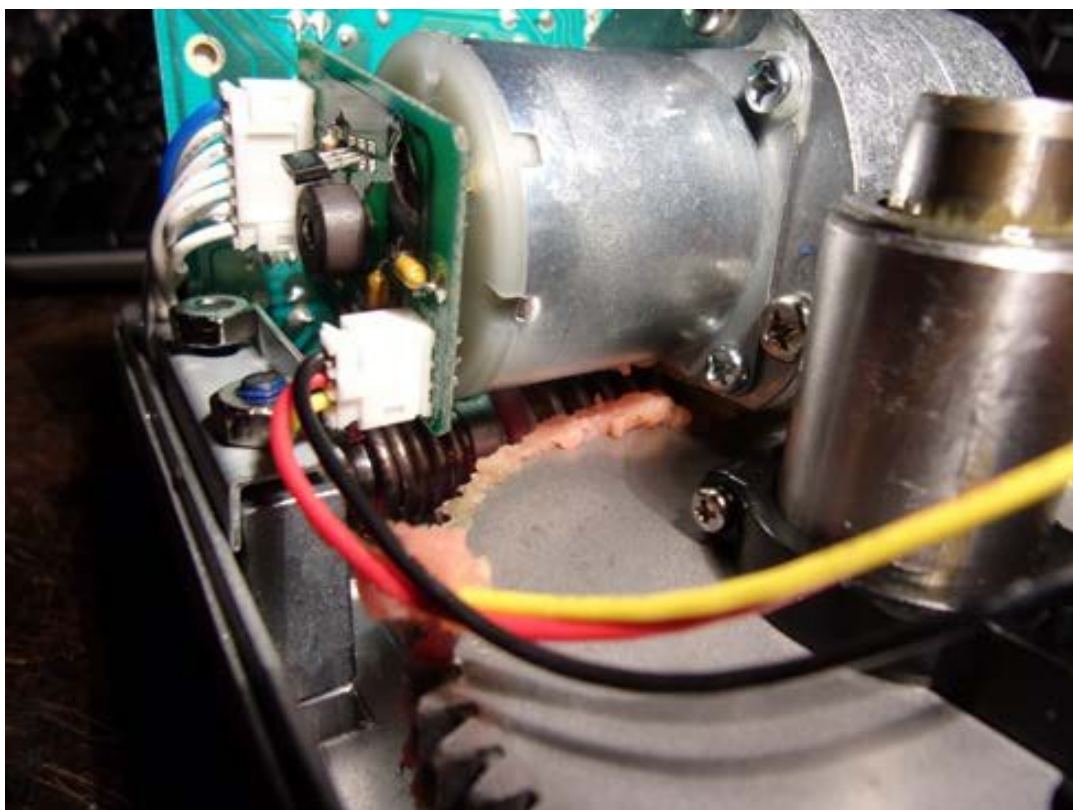
The TM-2600M3 has adjustable hardware stops which limit movement to up +/- 74 degrees. These stops can be removed by opening the positioner housing.

The TM-2600M3 is a Diseqc 1.3 positioner, also known as 'GotoX'. It can be commanded to go to a certain angle and it does this autonomously without any further interaction with the controller. Diseqc 1.x is an outgoing protocol only, so there is no way to tell what the current rotor angle is, or whether the rotor is moving.

The TM-2600M3 (and other positioners that have been tested) ignore 'GotoX' commands outside the range +80 to -80 degrees. A workaround is to reset the lower rotor so that it goes from 90 south to 70 north. This is advantageous for the UK, as the ISS passes mostly to the south, but may not be suitable for lower latitudes.

Another drawback is that the positioner will stop moving briefly when it receives a 'GotoX' command, even if it was going in the correct direction. This reduces the effective speed of the rotor when it is moving at its quickest for an overhead pass.

The long angled arm that attaches to the dish in normal operation is not required and can be removed. This leaves a short rotor arm which has a complicated oval shape with two different tapers.



### Positioner Configuration

The ISS moves at about 1 degree per second at its fastest when overhead. The positioners have a speed of about 2 degrees per second, but they would not be able to cope with the rapid movement needed for an overhead pass in the standard 'rotate then elevate' configuration.

Instead, the positioners are connected together in a similar way to the Catapult dish, with two horizontal rotors at right angles. The lower rotor is aligned east-west.

This is effectively 'elevate then rotate' and there is no problem with an overhead pass. There are other problems near the east or west horizon, but ISS reception is difficult anyway when low down.





**3.8m Catapult dish at Goonhilly used for tracking the ISS.**  
**Photo: G8GTZ**

Satellite tracking software generally outputs azimuth and elevation information.

In the 'elevate then rotate' configuration, a change in either azimuth or elevation can result in a change of both lower and upper rotor angles, so some conversion trigonometry is required.

If the rotors are both considered to be at the zero position shown above and move +/- 90 degrees, it reduces down to these two equations:

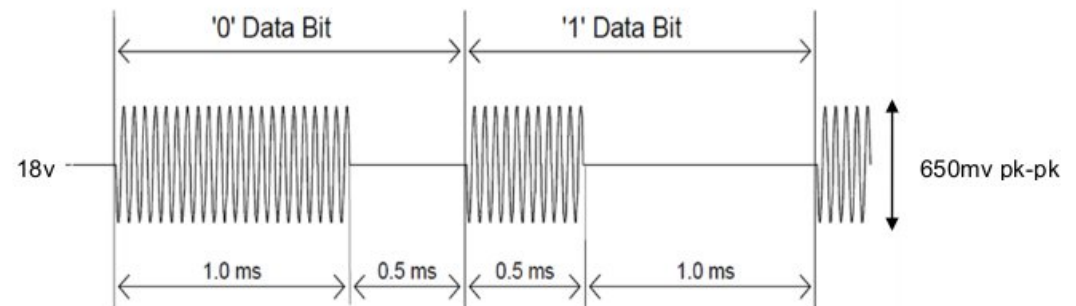
$$\text{UPPER} = \arcsin (\sin (\text{AZ}) * \cos (\text{EL}))$$

$$\text{LOWER} = \arccos (\sin (\text{EL}) / \cos (\text{UPPER}))$$

## DiSeqC Positioner Control

Digital Satellite Equipment Control, devised by Eutelsat, is a means of sending commands over the signal cable from satellite receivers to remote devices such as LNBs, switches and positioners.

The 13v or 18v that is usually on the cable is modulated with pulses of 22kHz. Each byte transmitted has a parity bit.



FRAMING	P	ADDRESS	P	COMMAND	P	DATA	P
---------	---	---------	---	---------	---	------	---

E0		31		6E		Ex xx	CLOCKWISE
E0		31		6E		Dx xx	ANTI-CW

## Voltage Regulator / Diseqc Modulator

The RT5047A is a switched mode voltage regulator for LNBs. It provides 13.3v or 18.3v for vertical or horizontal polarisation from a supply of 8-16v.

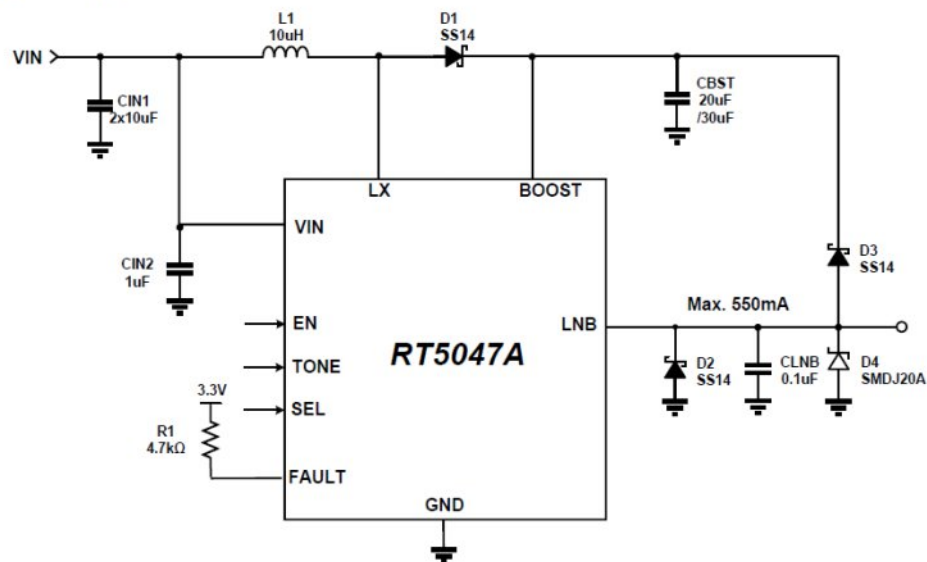
The 22kHz modulation is fed in on the TONE pin. It has short circuit protection with a fault status output.

Extra circuitry has been added on the DigiTwist controller PCB to measure current on the supply to each of the chips. This allows the PC control program to know when the rotor is moving and mitigate the effect of the rotor stopping briefly whenever it receives a command.

**RICHTEK**

**RT5047A**

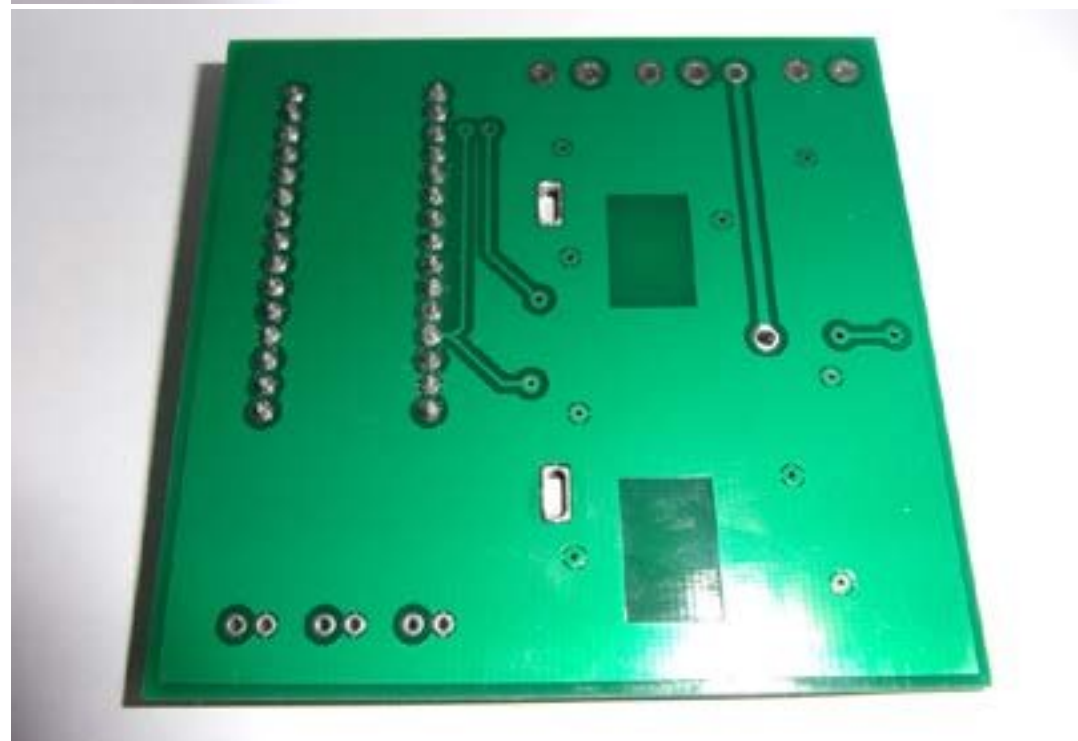
#### Typical Application Circuit



**LNB Voltage Regulator: surface mount 1.27mm pin spacing with underside ground pad**

#### DigiTwist Prototype Controller PCB

The controller uses an Arduino Nano module which receives position commands from the PC control program and translates them into Dseqc modulation for the two positioners.





The Arduino has a PC IDE (integrated development environment) to develop the software and program it into the Nano. The language used is C.

The surface mount components are the largest SMD category: 1206 and 1.27mm pin spacing on the chips. The only complication is the ground pad on the underside of the chips. The PCB has large plated through holes underneath the chips, which can be filled with solder to ground the pads on the chips.

This is a prototype PCB. The final PCB will have connections brought out from the Nano to a header, so that a display or other device may be used.

## PC Control Software

The Control program receives satellite position information from tracking software, works out the angles for the two rotors and sends the commands to the controller PCB.

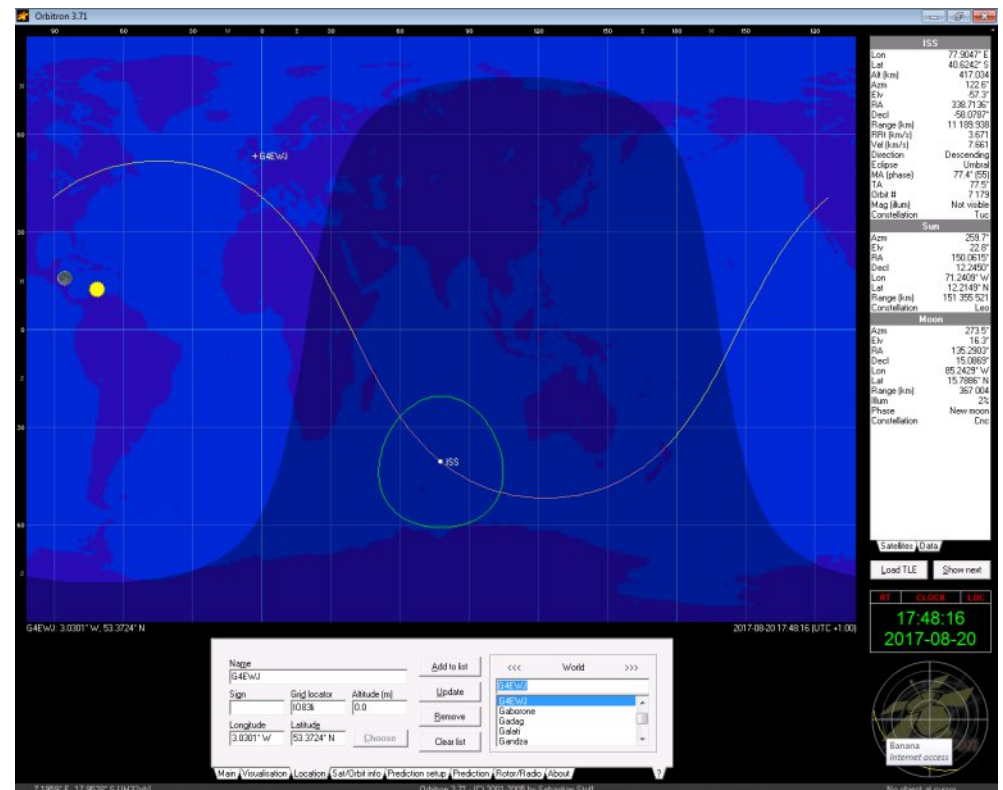
It is written in VB6. The program works on Windows 7. W8 and W10 have not yet been tested. It may be necessary to manually install an OCX file for W7, W8 and W10.

## Tracking Software

Orbitron is used to determine the position of the satellite. It broadcasts the satellite data using the DDE (dynamic data exchange) protocol which is received by the DigiTwist PC control program. It should be possible develop the PC control software to interface with other tracking software.

## DigiTwist Advantages

- Rather cheaper than a G5500 (£130 vs £650)
- Uses the 'Goto Angle' Diseqq command
- 12/18v operation - no mains voltages



- *No feedback pots or turns counters (see disadvantages)*
- *Elevate then rotate configuration like the Goonhilly Catapult dish*
- *2 horizontal rotors at right-angles - no drama when the satellite goes overhead*
- *Arduino Nano based positioner controller*
- *PC control program accepts DDE position data from Orbitron tracking software*

## DigiTwist Disadvantages

- *Unknown if the positioners will survive with loads and orientations they weren't designed for*
- *End mounted antennas only*
- *Antenna cannot be counterbalanced – it may be possible to counterbalance at the rotor*
- *Only 2 degrees / second rotation speed - but this is usually fast enough to track the ISS*
- *Low torque - about 2.1kgm - but this may be enough*
- *Basic rotor range is only +/- 80 degrees so operation near the horizon is restricted*
- *No feedback – you don't know where it is - only where you've told it to go*
- *Stops and starts when receiving a command, even if it was going the correct way*

## Progress

At the time of writing, ISS passes are occurring in the middle of the night. More live testing will be done as they move back into the evening.

For the ISS transmitting on 13cm, lighter wire mesh dishes would be suitable and are being investigated.  
A few prototype controller PCBs were distributed at CAT17.

Quotations are being sought for a batch of joiner bars.

## More Information

<https://www.youtube.com/watch?v=qC8CSi8kZTs>

<http://www.batc.org.uk/forum/viewtopic.php?f=2&t=5181>

<https://wiki.batc.tv/DigiTwist>





**Written by Trevor Brown G8CJS**

I am still persevering with the Openshot editor, I have to confess to not getting the blender animated titles running yet and I think I may have run into a compatibility problem with my video card. I have uploaded the latest drivers, but still all I get is error messages.

Every cloud has a silver lining and mine was a monitor update in the form of a DELL 30" monitor, there was a snag it was passed down the family because it stopped working. It was completely dead and not even the front LED would indicate power. A quick search on the internet, revealed I was not the only one with D22 being the likely culprit.

I eventually found out how to pull it apart (not easy) remove the PSU and locating D22 a three legged diode screwed to a heat sync. Three legs on a diode was new to me and I was working out what to expect when I threatened it with a multi meter, every leg was connected to every other leg, whichever way around you measured it by something less than one ohm. I located one online and parted with around £8 and well sufficient to say there was nobody more surprised than me when it arrived, I fitted it, put the monitor back together and it burst into life. Now several weeks later it is still working. So I might be useless with getting Blender to run, but I am Ok at fixing monitors, so look out for non working 30" Dell monitors on eBay, definitely worth a punt.

Hardware sorted and I started to plan a Christmas shoot for my grandchildren. Interesting that one of the first articles I wrote for CQ-DATV issue 1 was how to make a Christmas video, the advice I gave then is still good, but now we have Openshot which is a better editor than the Wondershare I was using back then see <http://cq-datv.mobi/1.php>.

In CQ-DATV 30 I added some more hints on the same subject <http://cq-datv.mobi/30.php> and now in CQ-DATV 54 I have again expanded on the subject, well it is Christmas or soon will be.

I started again with a search of the internet for free downloads of any motion backgrounds or opening titles. The word free often produces animations which are royalty free, but have to be purchased. I persevered and found a couple totally free ones and stored them in my Christmas Animation folder on my Video Drive. This is a separate drive in my PC for all video related material, it helps if I update my PC as it can simple be moved across.

What I was looking for was short animated clips of just a few seconds to separate scenes, where I had stepped along the day from present opening to relatives arriving to Christmas dinner and any messages to camera from those on the day. I hate fade down and fade up to create a movement of time.



<https://www.videezy.com/backgrounds/4913-christmas-santa-sleigh-motion-background-4k>

The next plan was to storey board the shoot, at least in my mind, my family like to put presents under the Christmas tree, and I planned to put the camera on a tripod lock it off and shoot the present pile as it grows, preferably with nobody in shot. I don't stop and start the camera, but I add the presents one by one moving out of shot after everyone and then remove in editing any trace of me so we have just short clips of the pile growing as a live animation.



<https://videohive.net/item/santa-claus-sleigh-background/3569867>

If the tree has lights that flash I switch them to non flashing, if possible, so I don't have to worry about an erratic sequence in the edit.

The same treatment often works for the dinner table, I usually get given the task of laying it, so start with an empty table and as you lay it out keep moving out of shot between each addition and put the shots together that are without you present. Providing the camera is locked off and you don't disturb it this works, disturb the camera and it's start again time.

This ruthless editing often leaves the sound track in tatters so I usually cover it with music. You can ether cut the animations to music or just slow mix them together, depends on the music.

Just a few points on the choice of music..Yes if it is over 70 years old it is out of copyright, that is as far as the writer is concerned, but unless you performed it yourself, then it is not yours to do with as you like.

Artists' will often have been paid to perform the music and someone somewhere would like to recover this cost from you for the privilege of allowing you to use it, this might be a one off fee for what's called library music or it might be a more complex royalty agreement .

If the end video is just a private showing to friends. well enough said.



<https://www.premiumbeat.com/blog/>



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<https://www.audionetwork.com/playlists/christmas%20classics>

But if you want to upload it to social media or you tube for others to see, you might be in trouble and the sound may get removed by your service provider or the site host if they suspect a breach of copyright, so plan your music carefully.

Point of View or POV's as they are known are always worth a thought, any flying model helicopters or such toys, it's not too difficult to put the camera lens to wide, mount it on a selfie stick or mono pod and swoop it gently along the same path. The same goes for any bikes that get ridden or pedal cars. The old cheesy shot of putting the camera in an empty box and getting your present openers to open the box still hold good. You only need a few short shots to cut in to the external shoot to really bring it to life.

The trick is recognise the opportunities when filming and then to recreate the required shots that will work when cut into the real footage. Yes some of the shots won't work and don't be afraid to discard them in the edit.

Good luck with your shoot, let me know what works for you in the final cut and what you left out.



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## Micro Corner - ESP32 based modules

**Written by Mike G7GTN**

Leaving aside our normal ESP8266 based modules for this column; it seemed a good time to take a very quick look at the newer ESP32 based modules to see what advantages they might offer us for more complex project designs.

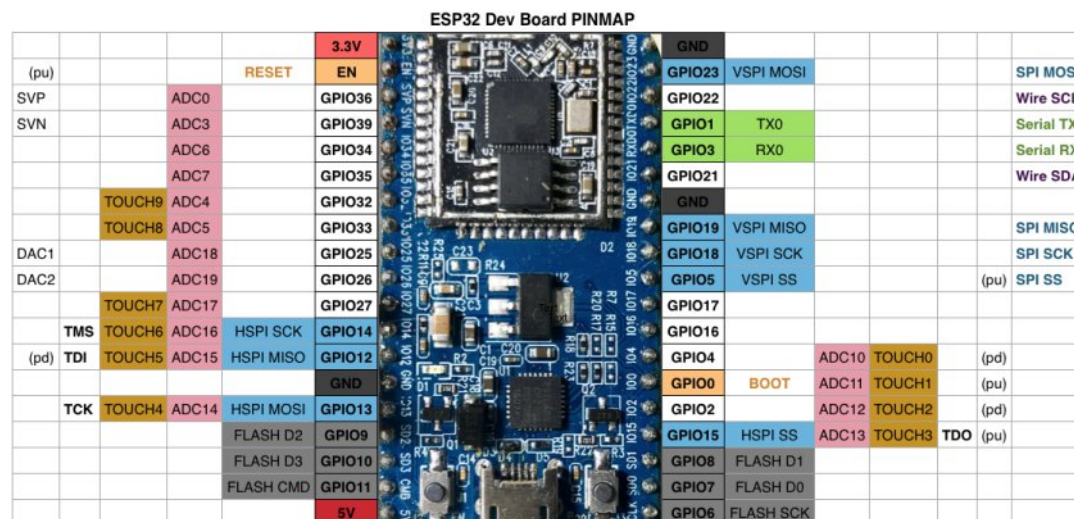
Price compared with the original ESP8266 modules is now just an extra UK Pound when purchased from Far East eBay sources. Where we require additional functions & I/O these are now viable even for one off type projects.

The specifications shown in Table 1 give a quick indication of the additions Espressif have managed to squeeze in to the small (15mm x 15mm) metal cans.

Specifications	ESP8266	ESP32
MCU	Xtensa® Single-Core 32-bit L106	Xtensa® Dual-Core 32-bit LX6 600 DMIPS
802.11 b/g/n Wi-Fi	Yes, HT20	Yes, HT40
Bluetooth	None	Bluetooth 4.2 and below
Typical Frequency	80 MHz	160 MHz
SRAM	160 kBytes	512 kBytes
Flash	SPI Flash , up to 16 MBytes	SPI Flash , up to 16 MBytes
GPIO	17	36
Hardware / Software PWM	None / 8 Channels	1 / 16 Channels
SPI / I2C / I2S / UART	2/1/2/2	4/2/2/2
ADC	10-bit	12-bit
CAN	None	1
Ethernet MAC Interface	None	1
Touch Sensor	None	Yes
Temperature Sensor	None	Yes
Working Temperature	- 40°C ~ 125°C	- 40°C ~ 125°C

### Table 1 – Data Courtesy of Espressif

The main area of interest will probably be the extra I/O that we gain from this newer generation module. Alongside this we now gain some quite interesting built in peripherals, such as capacitive touch sensors.



### Picture 1 – ESP32 Module I/O pin out information

As with our original ESP8266 based modules all I/O are still only 3V3 tolerant and level shifters will be needed for 5V based modules.

## Programming Language Options

A range of options are available, probably the most popular being the Arduino IDE and the C like language that we are already using on the original ESP8266 modules. This option provides us with a good selection of available and mature libraries for our programming projects. The ESP32 modules have support already and this is a moving target that is being developed. To check on the current status you can use this link <https://github.com/espressif/arduino-esp32>

Another option that might be interesting to check out is Micro Python, this as the name suggests is Python version 3.4 that we can use on our ESP32 modules. Another option in the 100% free category is <https://www.b4x.com/b4r.html>. This is slightly different in that we write our code in a version of Basic very similar to VB.NET compile and then download to our modules.



This is quite an interesting development system as the compiler IDE generates actual C code which is then processed by the Arduino command line based tool. A good solid collection of additional libraries are becoming available to assist us with writing code for our projects.

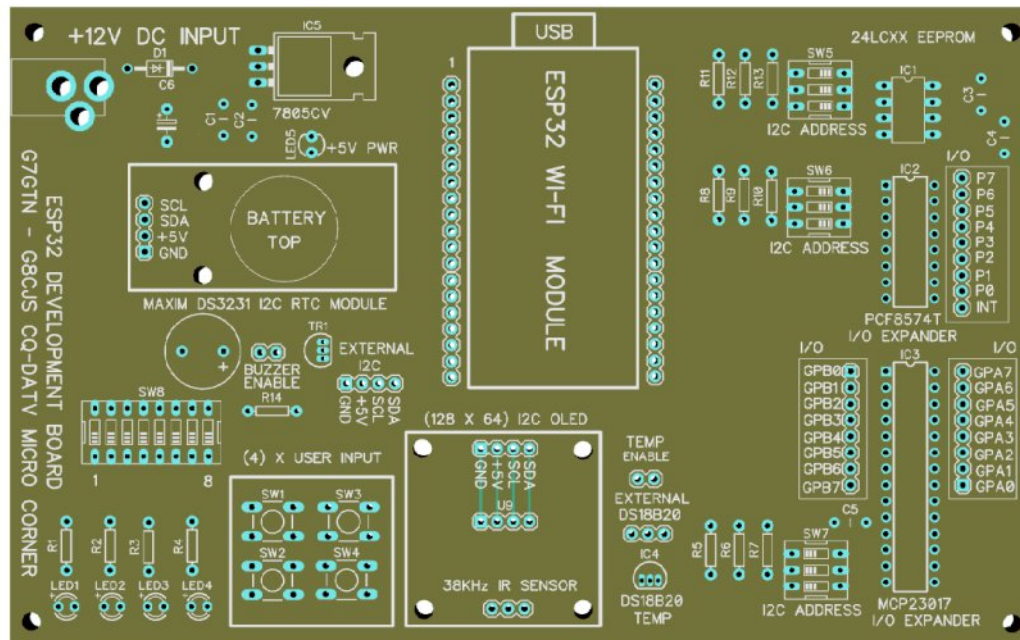
## Our ESP32 Development board

To assist with developing ESP32 based projects faster we have started to layout a Eurocard (100 x 160MM) sized PCB.

We have tried to include options for both input and output sections to lessen the need to have larger breadboard configurations scattered all over your work bench area.

A circuit diagram and final PCB layout created with Diptrace will be made available to download from the magazines software page.

We envisage being able to supply these PCB's to any readers that are interested in due course.



## Useful Links

<https://github.com/espressif/arduino-esp32>

<http://espressif.com/en/support/download/documents>

<https://github.com/micropython/micropython-esp32>

<https://www.b4x.com/b4r.html>

<https://www.b4x.com/android/forum/forums/b4r-libraries.78/>



## DATV-Express Project - October update report

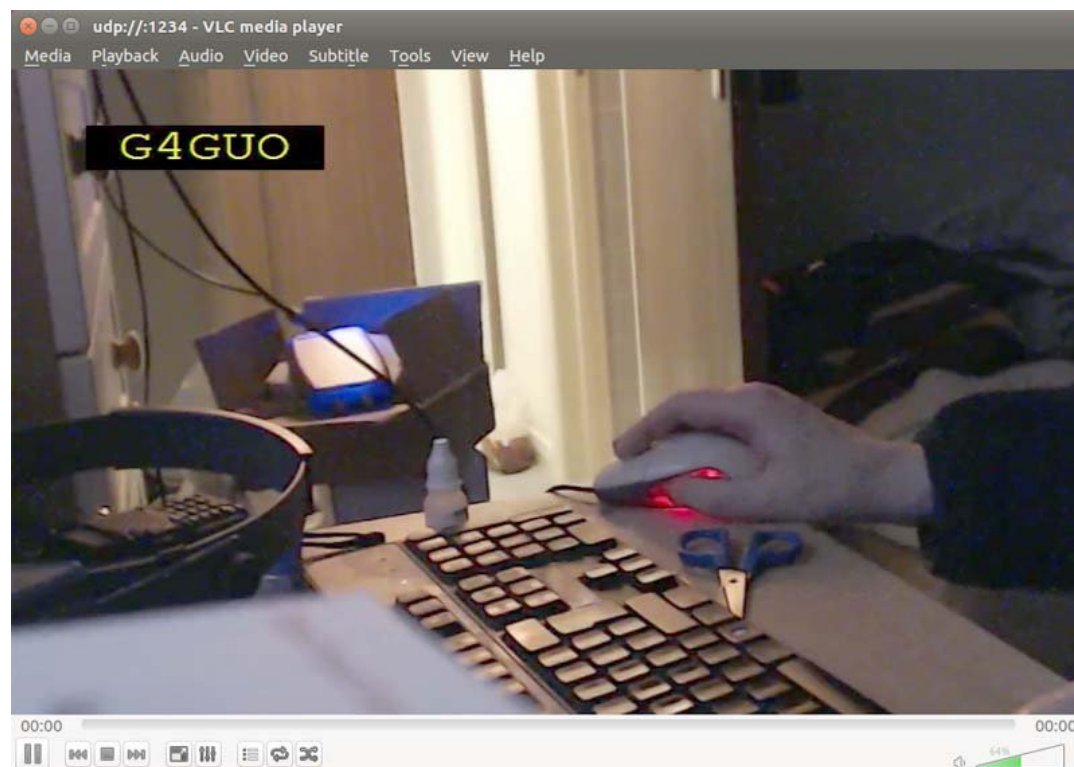
Written by Ken W6HHC

As Art WA8RMC reported in the September Report, the DATV-Express boards have sold out and are no longer available until the project team decides IF we want to make another production run. If you want a board, send a message to [support@datv-express.com](mailto:support@datv-express.com) and we will put your name on the list of those hams wanting boards. But no requests for boards were received during October.

The PayPal BUY button has been REMOVED from the PURCHASE NOW page on the [DATV-Express.com](http://DATV-Express.com) web site.

Two new DATV products are getting ready to appear on the market. The Analog Devices ADALM-PLUTO SDR Tx/Rx may become available again in first week in January at a price of US>\$100 or US\$150. The Lime-Micro mini-LimeSDR Tx/Rx is rumored to ship in mid-January at a price of US\$140. Both of these new SDR boards will be lower priced than the DATV-Express Tx-only board (US\$300).

Charles G4GUO is working on RECEIVING DVB-S2 protocol with the PLUTO-ADALM unit in Linux software. The most difficult portion of the effort is to implement a fast version of the LDPC decoder for Forward Error Correction functions. So far, Charles can currently decode 500 KSymb/sec using an expensive CUDA graphics card from nVidia to provide hardware acceleration of the LDPC algorithm. He still has a lot of work to now optimize the speed of LDPC by rewriting the algorithm to use the GPU's memory in the most efficient way. Charles explained that he can foresee some cheaper GPU's than the CUDA board doing a reasonable job with this FEC task. Note that this need for a GPU does not exist if receiving DVB-S protocol.



**First PLUTO Rx Screen Capture of DVB-S2 at 500KSymb/s by G4GUO**

Finally, Art WA8RMC reports that the first draft PCB layout files for the MiniTiouner-Express version of the MiniTiouneV2 board design have completed by Tom WB6P and have been reviewed with just a few simple changes. An PCB update will be started by WB6P when he returns from a short vacation.

The intent is to produce a smaller and assembled and tested version of the Serit NIM PCBA design at an affordable price.

**"Project speed set to slow" .... de Ken W6HHC**



## 10.5GHz RSSI Power Level Detector

Written by John Hudson G3RFL

Power levels have always been a little speculative in my shack and I suspect I am not the only one that works this way. So I set about researching the definitive power level detector. The end result was an inexpensive eBay module using the AD8318 chip that produced a flat response from 0 to 8GHz plus or minus 1db and was still usable at 10.5 GHz, it may go on further but alas I have not the available kit to sweep it beyond this point.



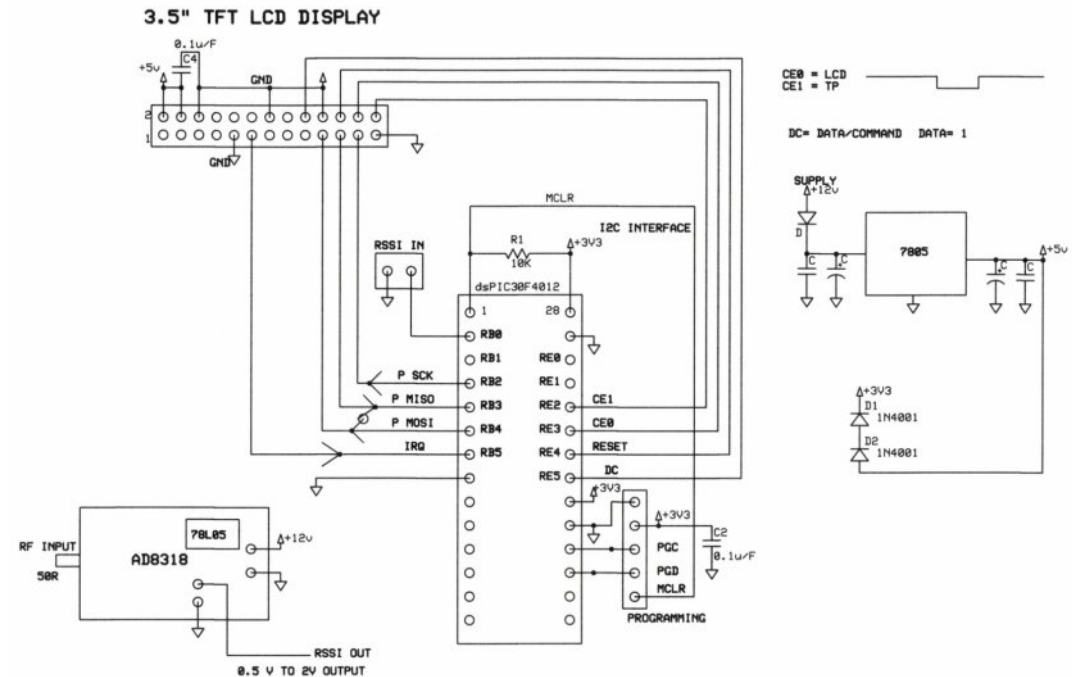
**The AD8318 module**

I interfaced this module to a TFT display with a simple PIC solution. All the old analogue meters have now disappeared from my shack, they served their purpose, but now looked a little dated and TFT screens are so inexpensive and once you get your head around them, easy to interface and are the shape of things to come.

They do require a software interface and that invariably leads to a micro and my micro of choice is always a PIC, in this case the dsPIC30F4012. This device is now becoming a frequent building block of many of my designs.

It requires some custom code writing and programming into it, the hex code I used is available as a download on the CQ-DATV website, so no excuses for not putting this very potent project together.

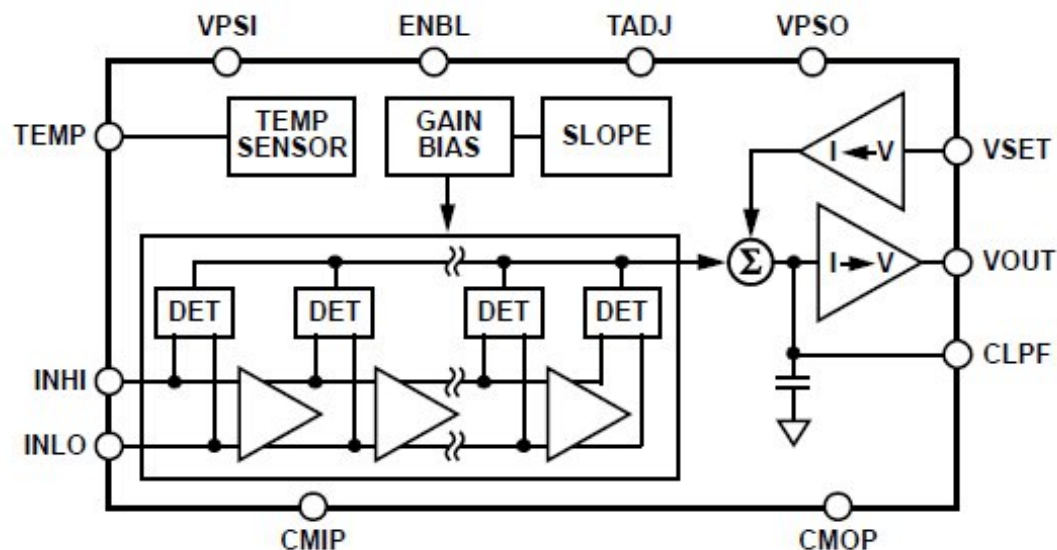
The TFT screen I used is actually a touch screen, but I have not as yet implemented this into my design, something for perhaps a future addition.



**The Final Design as committed to my home etched PCB**

The circuit design I used is based on the AD8318 device that can be purchased as a complete module.

This is a demodulating logarithmic amplifier, capable of accurately converting an RF input signal to a corresponding decibel-scaled output voltage. It employs a progressive compression technique over a cascaded amplifier chain, each stage of which is equipped with a detector cell.



**AD 8318 Block Diagram**

The AD8318-EP maintains accurate log conformance for signals of 1 MHz to 6 GHz and provides useful operation to 8 GHz. The input range is typically 70 dB (re: 50 Ω) with error less than  $\pm 1$  dB. The AD8318-EP has a 10 ns response time that enables RF burst detection to beyond 45 MHz.

As a measurement device, Pin VOUT is externally connected to VSET to produce an output voltage, VOUT, which is a decreasing linear-in-dB function of the RF input signal amplitude. The logarithmic slope is nominally  $-25$  mV/dB but can be adjusted by scaling the feedback voltage from VOUT to the VSET interface.

The intercept is 20 dBm (re: 50 Ω, CW input) using the INHI input. These parameters are very stable against supply and temperature variations. The AD8318-EP is fabricated on a SiGe bipolar IC process and is available in a 4 mm × 4 mm, 16-lead LFCSP. Performance is specified over a temperature range of  $-55^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$ .

## Additional application and technical

The AD8318-EP is a demodulating logarithmic amplifier, capable of accurately converting an RF input signal to a corresponding decibel-scaled output voltage. It employs the progressive compression technique over a cascaded amplifier chain, each stage of which is equipped with a detector cell. The device is used in measurement mode.

The AD8318-EP maintains accurate log conformance for signals of 1 MHz to 6GHz and provides useful operation to 8GHz. The input range is typically 70dB (re: 50Ω) with error less than  $\pm 1$ dB. The AD8318-EP has a 10 ns response time that enables RF burst detection to beyond 45 MHz.

The device provides unprecedented logarithmic intercept stability vs. ambient temperature conditions. A 2mV/°C slope temperature sensor output is also provided for additional system monitoring. A single supply of 5V is required. Current consumption is typically 68mA. Power consumption decreases to  $<1.5$ mW when the device is disabled.

This AD8318 module does however require more than +5 volts as it has on board regulation so I have incorporated a 78L05 into my interface board so 7 to 12v is all that is required as an external supply.

The sensor was hardwired as it would have cost me another £10 to make a dedicated pcb when I had several spare ready built up PCBs.

The TFT internally has a 3V3 regulator so I had to make the PIC run on 3V3 hence the two diodes in series with the 5V Regulator output

The unit has a dynamic range of 0dBm to minus -70dBm, to go above 1m/W you just need to add attenuators, but they must be able to cope with the power.



The accuracy is very good and follows a LOG LAW. The volts out the unit vary from 0.5V to 2V over this range. With no signal you get 2V, it will go up to +5dBm but note I limit the top end to 0dBm WARNING MAX INPUT is +12dBm so beware..

The whole unit takes a fair bit of power (about 300mA) at 12V, it should work on 7V. The detector input is an SMA female.

I also added a red signal bar going left to right by 480 pixels, this helps when tuning things up or tweaking for maximum smoke as they used to say.

Very pleased, it took a couple of evenings to put together, I used a home etched PCB and included what is now my standard 5 pin PIC programming socket, you never know when I might want to revisit the software.

Really impressed with the performance of the AD8318. If you mounted the head unit in a small box and fitted a whip antenna it would make a good BUG detector or QRM locator

I am now thinking of a box to house it in. Like all test equipment it will now undergo some extensive testing before it becomes a reliable asset in the shack, but so far so good.

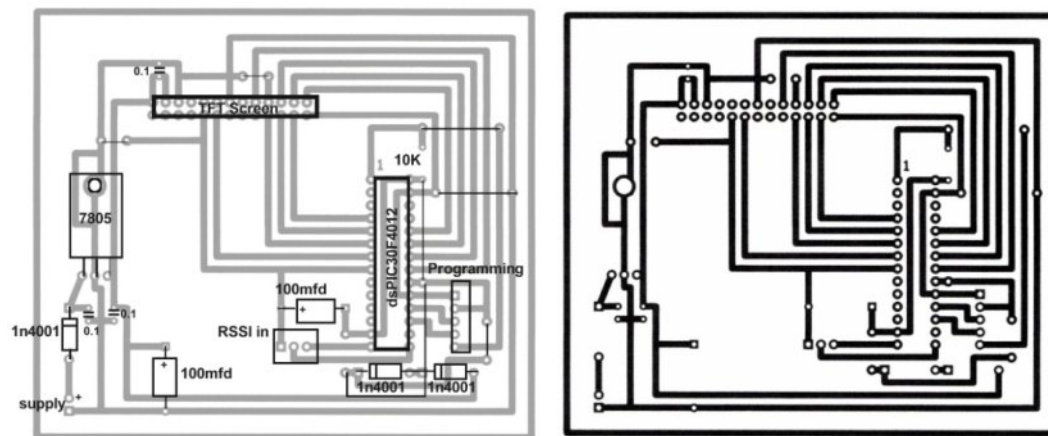
So my recommendation for Christmas is treat yourself to an AD8318 module and a TFT screen, just as a backup in case those reindeer just leave the usual socks and Pullovers under the tree, useful as they are, they just don't cut the mustard when it comes to power levels.

Merry Christmas to all you home constructors

**John G3RFL**

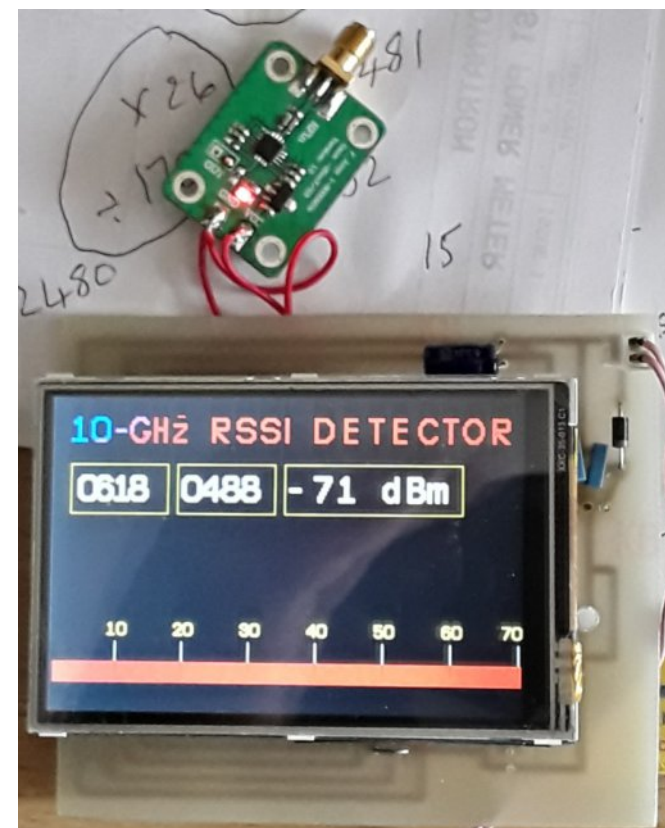
(The source and binary files for this project are available for download from the CQ-DATV web site [downloads page](#) - ED.)

**RSSI Module source:** <https://goo.gl/RMXnxh> or search Ebay for AD8318 module (but make sure it is the same as the pic at the beginning of this article).



**The RSSI Detector home etched PCB**

**Working Power Level detector, the display is 320 x 480 and the small pre assembled detector head**



## Christmas Lights

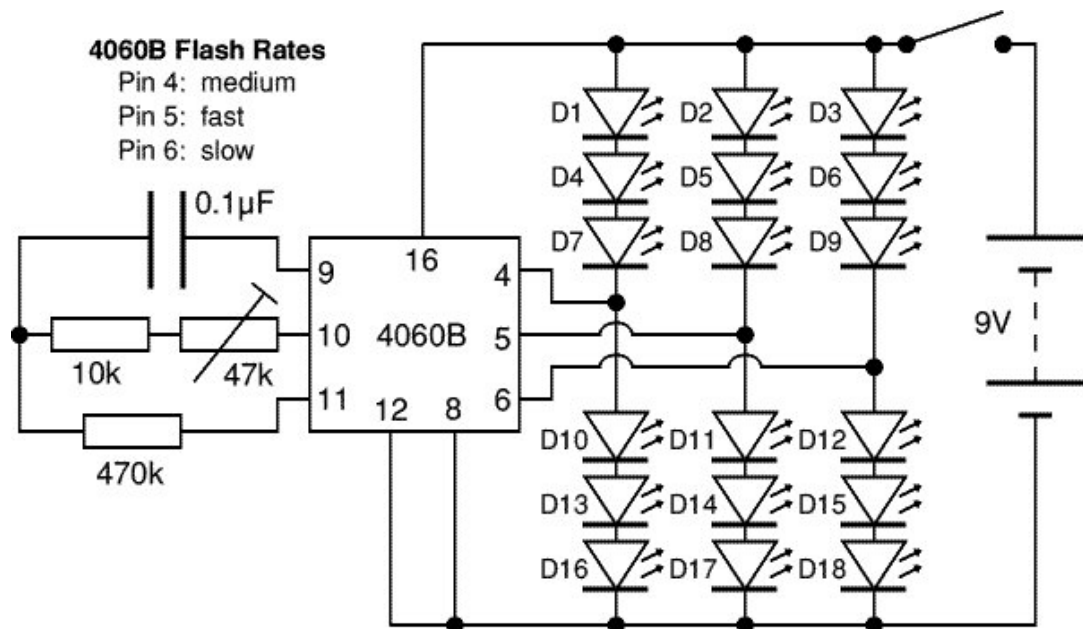


### From the web

Well it is Christmas and we really need a good Christmas circuit, we thought about a YIG powered reindeer detector, or some Santa landing lights, or a Santa homing beacon to guide this elusive chap across the sky on this special night, but in the end we settled for this circuit from the web so no originality is claimed, but it's a simple build, most of the required components are already available from your junk box and well its colourful, just not DATV but perhaps next year we will think up DATV project or kit him up for an Earth Santa Earth contact

The project flashes 18 LEDs at three different rates and creates an eye-catching Christmas Decoration. The circuit is kept simple (and low cost) by using the 4060B IC which is a counter and oscillator (clock) in one package. This project must have a 9V supply, such as a PP3 battery. It will not work with lower voltages and a higher voltage will destroy the LEDs.

The preset variable resistor can be used to adjust the oscillator frequency and this determines the flash rate of the LEDs. The IC limits the current to and from its outputs so the LEDs can be safely connected without resistors in series to limit the current.





### External links

If you have an eBook reader that does not have WiFi then you will not be able to use the hyper-links in this publication. If you have an eBook reader that has WiFi then you will be able to providing you are in a WiFi zone.

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. Smart phone reading apps are ok providing that you have a 3G data connection.

Note: These links will fire up your devices browser and if you are using 3G/4G then you will incur data usages charges.

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Although a formatted article showing the layout can be sent, we prefer an unformatted text file of the script, along with annotations of where important images should be placed. All images should be identified as Fig 1 etc and sent seperately.

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.

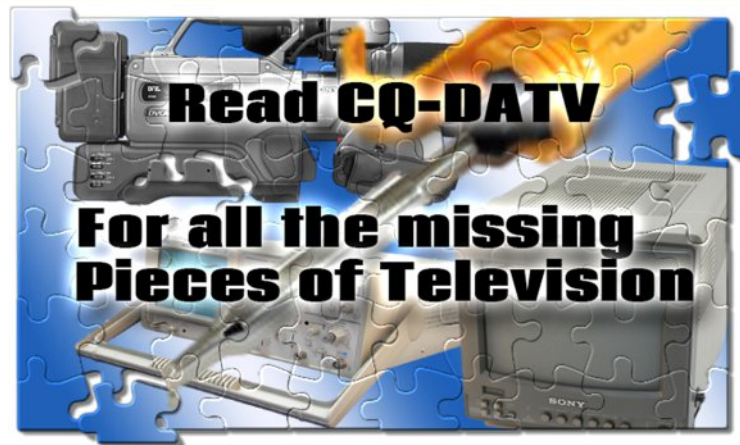
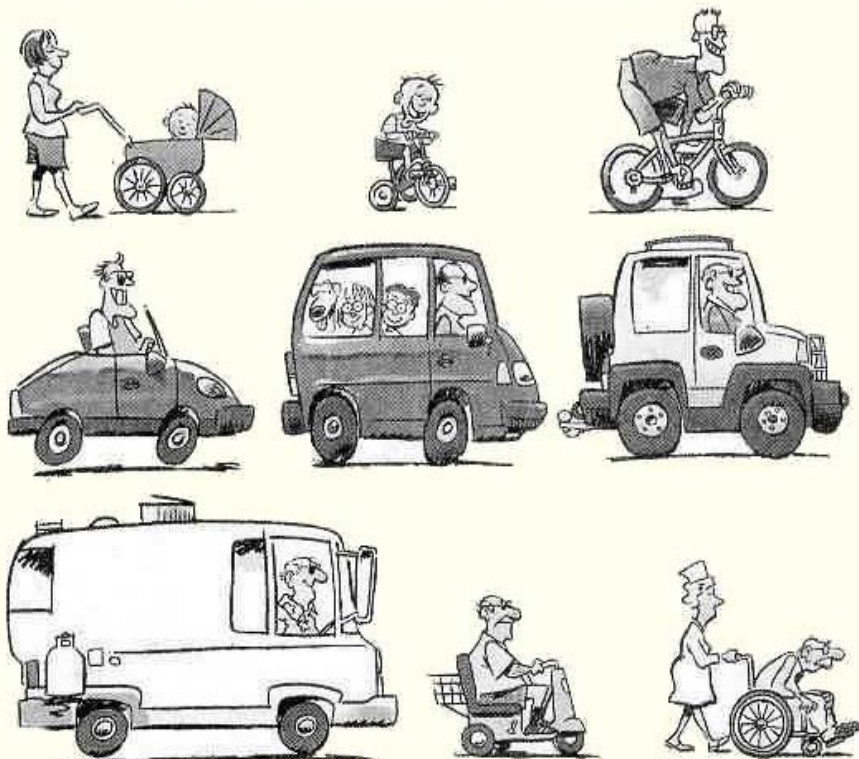
If you are sending a construction project, please include the dimensions of any pcb's and make the pcb image black and white, not greyscale.

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

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### The Wheels of Life



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A dish called Arthur

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