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Editorial

Four years ago we published the second edition of CQ-DATV, we still could not believe that issue one had been downloaded over 9000 times.

We knew the ATV community were hungry for an electronic magazine and we were desperate to set the focus of our publication on TV engineering, not just getting pictures from A to B, but all the home construction and self learning that many of us have gone through.

I hope we have kept that focus and produced a world wide ATV magazine, that can be downloaded and enjoyed every month anywhere in the world at no cost.

This issue starts with the sad passing of Alan Critchley G3SXC, this was a devastating blow, Alan has been a supporter of CQ-DATV and a contributor from day one. He was an ATV pioneer, an engineer, and constructor who brought enthusiasm to our hobby, he will be missed.

CQ-DATV would like to offer its condolences to his wife Ruza and family.

We have grown another issue of our learning and experimental section, Micro Corner. This time Trevor has taken the step expanding his planning of an internet controlled ATV repeater, by developing an I2c interfaced motor control, suitable for rotating a small aerial.

Trevor has put a short video together so you can see it in operation on our front page *http://cq-datv.mobi/*. Again all the software is in ESP BASIC so you can cut and paste, directly from our electronic magazine into the edit page of the NODE MCU micro, then save and run.

When BASIC first appeared in the 70's all the magazines were paper and many of us will have experienced the frustration of copy typing software from the magazines of that era into our micro of choice, where were the electronic publications when you needed them?

Ken W6HCC has been looking at DATV repeaters in the USA, where there are now 14 active DATV repeaters including 12 DVB-T repeaters. Ken has also produced his February DATV-Express update and is pleased to announce that boards are now back in stock after a close inspection by Art WA8RMC. The team was unexpectedly flooded by orders, when they tried to run down the supply as they thought the demand was waning, so now DATV-Express is once again available.

Dave G3ZGZ has been looking at modern monitors and the annoying blue screen they produce when there is no video input, making it very difficult to peak up weak signals, that the monitor will not allow to be seen. Dave has come up with a very simple fix that can eliminate this undesirable effect.

Darko OE7DBH has produced some useful hints regarding DVB-T MER (Modulation Error Rate), which is a ratio of the average signal power to the average error power, we had best let him explain.

Rudi S58RU has asked the team to remind everyone about the IARU ATV contest that will be held from 10 June 12:00 UTC to 11 June 18:00 UTC. I hope this is enough warning for you all to get your ATV kit working and in particular your portable ATV kit, we know, most operators do not really consider it as a contest, more so an activity weekend, either way lets get out there and put our respective countries on the ATV map.

If you missed it there is full report on the 2016 activity at *https://www.iaru-r1.org/images/VHF/newsletters/Newsletter_70.pdf*

We cannot close the April issue without a fun item and I hope Tools Explained provides you with just that, although in all humour there is an element of truth.

The publication team would like to thank everyone who has contributed, without your input there would be no magazine and ATV and TV engineering would be the poorer for it, if you have something you would like to share with our readers then please email it to *editor@cq-datv.mobi*.

CQ-DATV 47 is now officially open for copy and will be available late April 2017. You can be sent an automatic reminder from either our main website or by joining the CQ-DATV Facebook, no junk mail we promise just a notification that you can download the next issue.

Now please sit back and enjoy CQ-DATV 46

CQ-DATV Production team

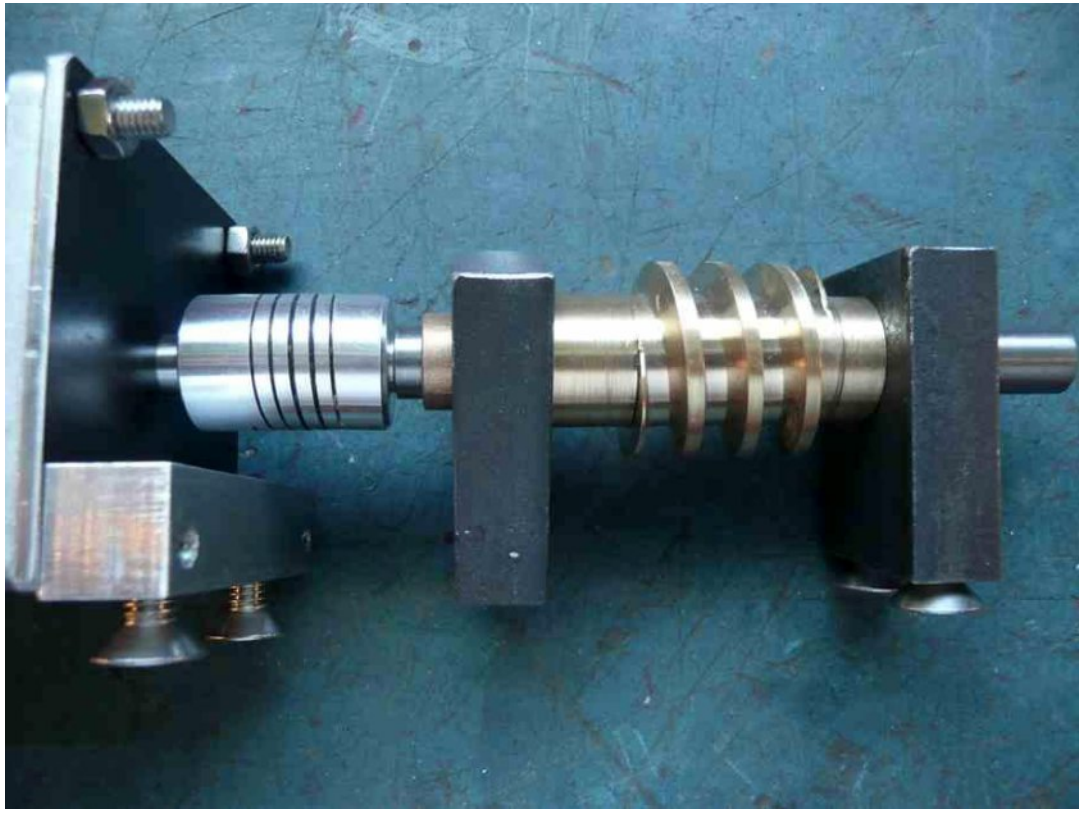
Silent Key - Alan Critchley G3SXC

It is always sad to report the passing of an ATV enthusiast, but it does happen. Alan Critchley G3SXC died at 5.20am on the 16th of March leaving a beloved wife Ruza a son and two grandchildren, all who were with him at the end.

Alan with his granddaughter Jessica

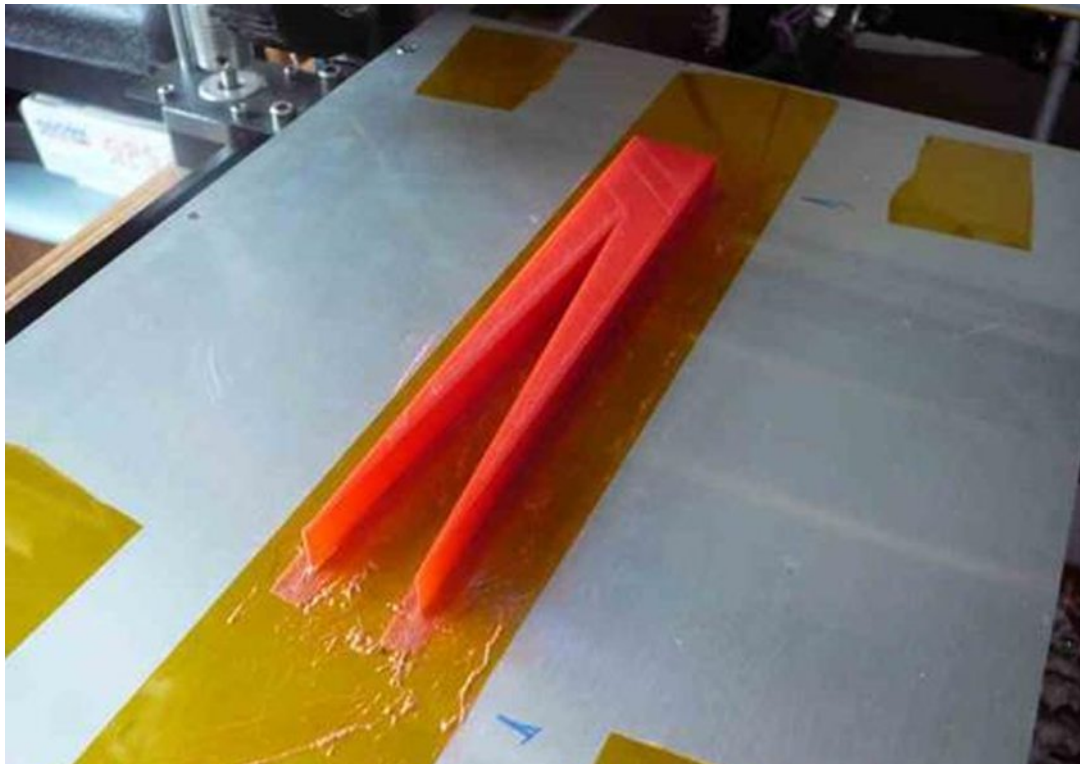
Alan was a senior design engineer by profession working at Shorrock-security for almost 50 years, before that he was a Student Apprentice at Mullard's Blackburn, he retired in April 2009.

CQ-DATV readers will remember him for is mechanical work on John G3RFL's aerial rotator, he manufactured all the mechanical parts.



This was not his only contribution, remember the 3d printed horns, or the copper aerials he put together.

Little is known of the experimental digital colour TV system he developed other than that it did deliver P5 pictures over a difficult path from his QTH in Great Harwood to John G3RFL's QTH CLEVELEYS with a big hill in the way, at his end and ANALOGUE always had noise P3 to P4.



When he was not working on ATV Alan restored a classic E type Jaguar.

This was a complete rebuild and involved making special tools to form metal panels for the doors, he later took this car on a grand tour of Europe, happy days.

He also entertained his follower on Facebook with the story of the nesting coal tits at the bottom of his garden, Alan provided the lucky tits with a nesting box complete with their very own TV channel so he could watch and report on their development.

Music was his relaxation, Alan was an accomplished electronic organ player.

Alan will be sadly missed by CQ-DATV readers and all the group who use and support the GB3FY ATV repeater.

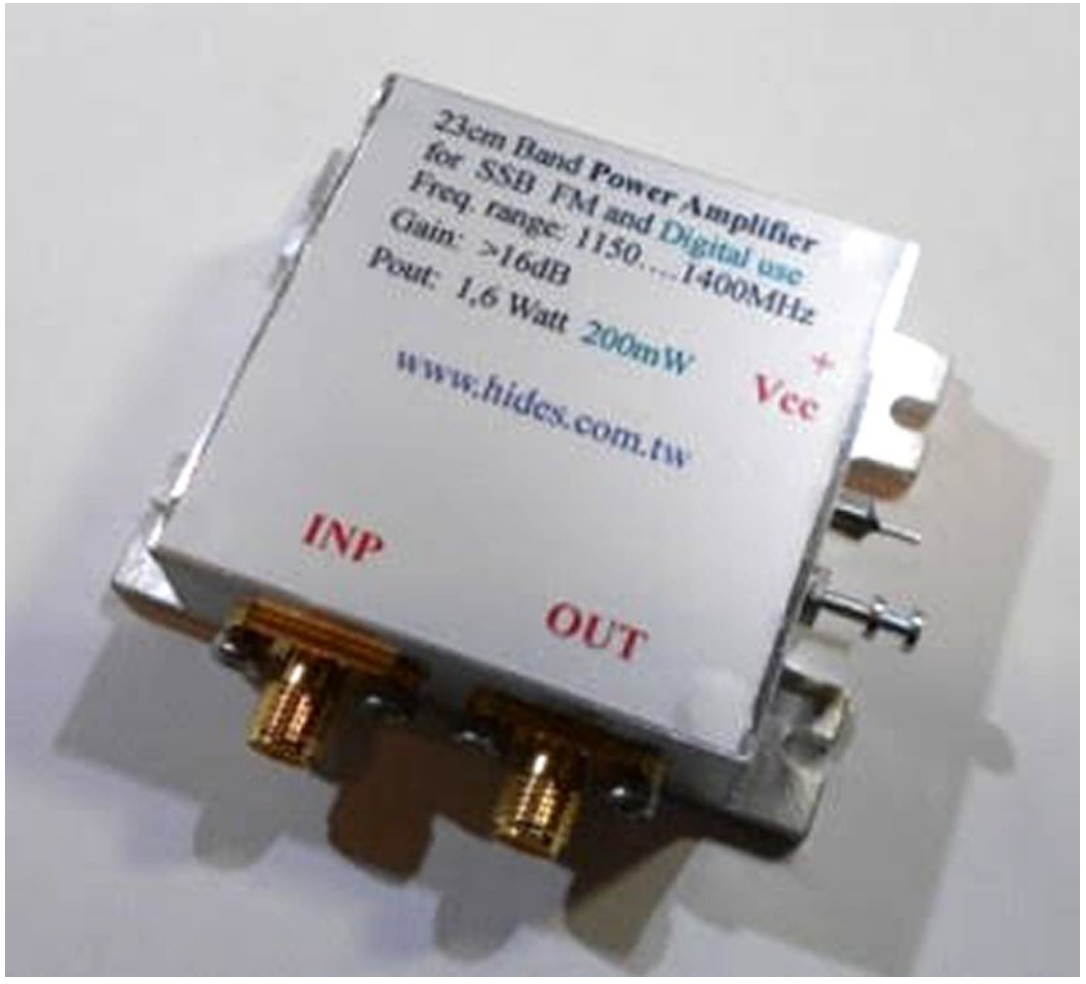
Ruza, Alan and Rebekah his son (Daniels) wife

Two new items from HiDes

All mode UPconverter for 13cm band, made by HiDes - Taiwan

Available on ebay: *http://www.ebay.com/itm/BU-500-13cm-Up-Converter-for-SSB-CW-FM-FM-ATV-DVB-/222442487988?hash=item33ca9b00b4:g:ECEAAOSw4YdYy5Fx*

23cm All mode Power Amplifier, made by HiDes - Taiwan



Available on ebay,: *http://www.ebay.com/itm/PA1200-23cm-PA-for-SSB-CW-FM-FM-ATV-DVB-/322454891678?hash=item4b13cf2c9e:g:TWkAAOSwCU1Yy5mR*

BATC Porstdown Project - "How to" videos

After a couple of false starts (quality control issues with the actor and script writer :-( ) I'm pleased to announce that the

video showing how to do the Portsdown initial set up is on the BATC youtube channel at
https://www.youtube.com/watch?v=nkjheie8uOk

Note that even if you buy the SD card and assembled filter modulator you must run this procedure once to set up the system.

More videos describing how to set other features are planned - if we can get the staff!
73 Noel - G8GTZ
Source:
http://www.batc.org.uk/forum/viewtopic.php?t=4841&p=12117#p12117

WIA volunteers find 5000 intruders

Wireless Institute of Australia observers looking for intruders on the 'Primary' frequencies of the Amateur Service on high frequency bands in 2016 found more than 5,000 intrusions - FIVE THOUSAND !

These were collated and sent to the spectrum regulatory agency in IARU member countries.

A resulting clamp down on the Indonesian 'village radio' stations was occurring with the government regulator progressively removing offenders.

The WIA reports intruders to the Australian Communications and Media Authority, but due to the itinerant nature of some intruders this can prolong the process for their removal.

Unfortunately, some authorities seem to ignore requests for the removal of interfering services.

Among the observers is the very active John Kirk VK4TJ with monthly reports.

Individual volunteers have also left frequent reports sent via the WIA website electronic lodgement system, in particular ALARA's Lyn VK4SWE and Col VK4CC.

An increasing number of digital emissions are intruding, and the use of Software Defined Receivers have identified non-amateur digital systems that are frequency hopping. The Manly-Warringah Amateur Radio Society of New South Wales has a five-band SDR receiver system that greatly assists in monitoring activities.

Perhaps other clubs could help too?

For the WIA monitoring system to work volunteers are required.

Information on how to join the WIA monitoring system can be found on the WIA website
http://www.wia.org.au/members/protecting/about/

The latest The IARU Region 1 Monitoring System newsletter reports a STANAG-4285 signal in the 40m amateur radio band probably from the Falkland Islands

They say the signal on 7101.8 kHz was strong in South America, but rather weak in Europe. STANAG-4285 is typically, but not exclusively, used by the military.
http://www.iarums-r1.org/iarums/news2017/news1702.pdf
Source: WIA News
http://www.wia.org.au/members/broadcast/wianews/

Don't Forget - IARU ATV contest

The IARU ATV contest that will be held from 10 June 12:00 UTC to 11 June 18:00 UTC.

See Editorial in this issue for more info.

DKARS MAGAZINE

De Stichting DKARS wenst u een voorspoedig 2017

In dit nummer/on this edition:

- Valbeveiliging en juist gebruik van middelen
- Hoe meet je het lineaire gedrag van je transceiver of eindtrap ?
- XX9TGM, Macau
- Een FUN-stukje door PA9JOO/P
- Write your own logbook
- And much nore...

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Januari 2017 editie 30

Check out the DKARS website at:-
http://www.dkars.nl/

Micro Corner - I2C Controlled Stepper Motor

By Trevor Brown

In the CQ-DATV 44, I outlined an ATV repeater that could be controlled from a smart phone over the internet by using the EPS8266 module as its logic.

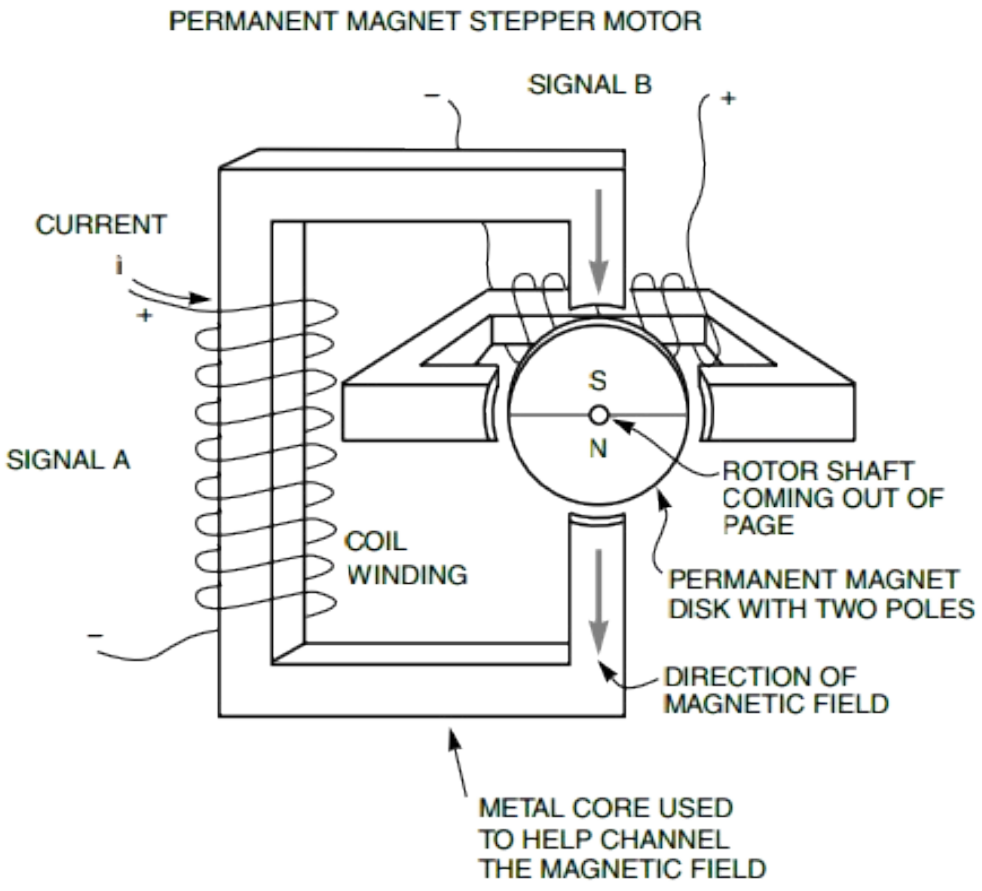
One of the features of this repeater was a movable receive aerial. The control menu was interfaced to two LED's, one to turn the aerial in a CW direction, one to rotate it in a CCW direction. Both these functions were latched into the logic and the software also had a stop button to clear the latches.

For some of you, this may be enough, for others let me expand the logic by actually rotating a small motor. Again via an I2C interface and ultimately over the internet with the NODE MCU micro, using a simple BASIC programme.

There are various options available for a proportional controlled rotating aerial from a DC motor, relay driven and perhaps simple direction indicating logic via a mechanically coupled potentiometer, all of which can be Wi-Fi connected to a smart phone as an upgrade on the CQ-DATV 44 article clockwise and anticlockwise LED's.

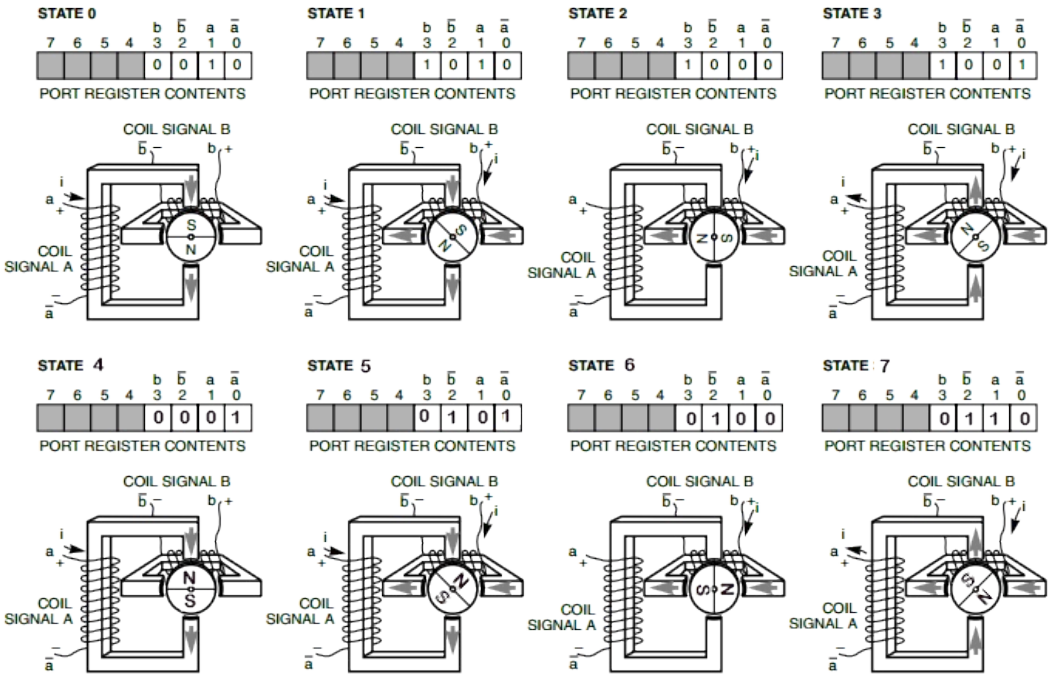
But how about using a stepper motor to rotate the aerial? For those of you not familiar with these devices, a stepper motor is, as its name suggests, a motor that can be stepped through a fraction of its rotation, via a sequence of external currents supplied to its coils. The position of the motor can be calculated by counting the steps and as such it does not require any external position indicating logic. All that we have to do is count the steps to keep a track of the position of the attached aerials.

What is inside? Generally, a stepper motor consists of a stator or rotor with a shaft, and coils. The stator is a surrounding casing that remains stationary and is part of the motor housing, while the rotor is a central shaft within the motor that actually spins during use. Let's look at the internal components.



In order to rotate the stator in our diagram through one complete revolution, the current in the coil will have 8 different states.

We can monitor those states in software, pre-set how many revolutions will take place, and even limit the rotation to part of a revolution.



Rotor sequence and coil current direction required

It is this control that makes the stepper motor popular with microprocessor projects from robots to 3D printers. Anywhere where precise movement is being delivered by a micro we will inevitably find a stepper motor. So why not use one to rotate a small aerial such as a 10GHz horn that can deliver some 10 to 20dBs of gain over an Omni direction receive aerial at our repeater site.

The diagram is a little over simplified. The rotor is a little more complex and a change of state will move the rotator through 1.8° (according to the data sheet). To do this the coils need sequence control, which I hope the diagram illustrates.

- *State 0 Power the A coil*
- *State 1 Power the A and B coil*
- *State 2 Power the B coil only*
- *State 3 Power the A and B coil but with the current flowing the other way through coil A*
- *State 4 Power the A coil only but still reverse powered*
- *State 5 Power the A and B coil both reverse powered*
- *State 6 Power the B coil only still reverse powered*
- *State 7 Power the A and B coil but only the B coil reverse powered*

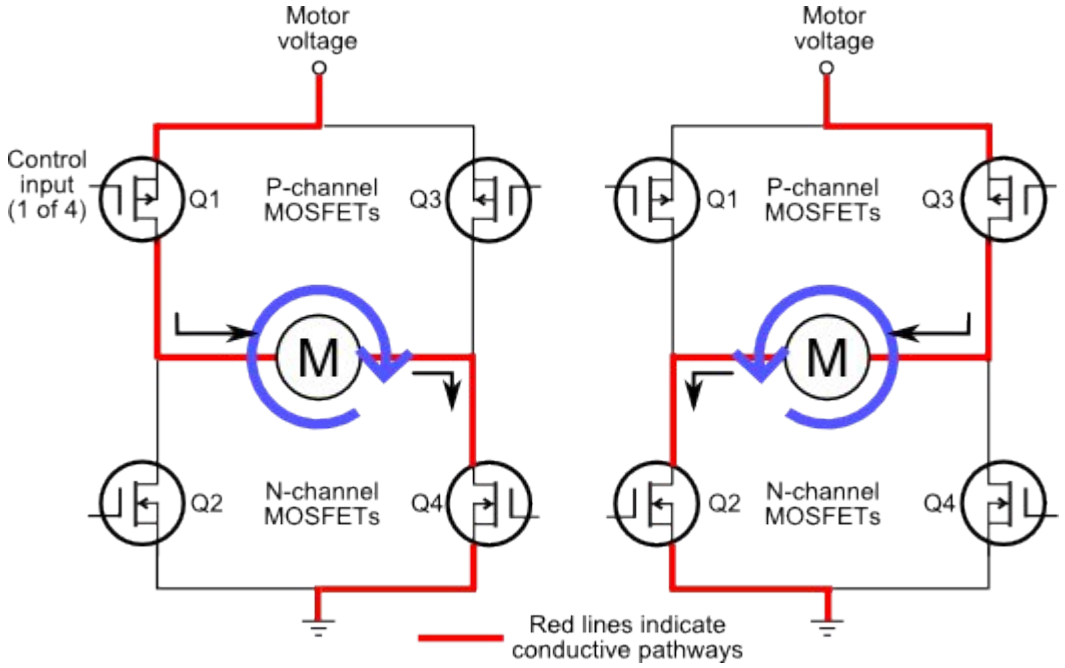
To rotate the motor the other way we reverse the sequence.

The motor I chose has only two windings. Some have more. If you are looking for bigger headache, some have centre tapped coils so you can put volts on the centre tap and just pull down the appropriate end of the winding to get the current flowing in the desired direction.

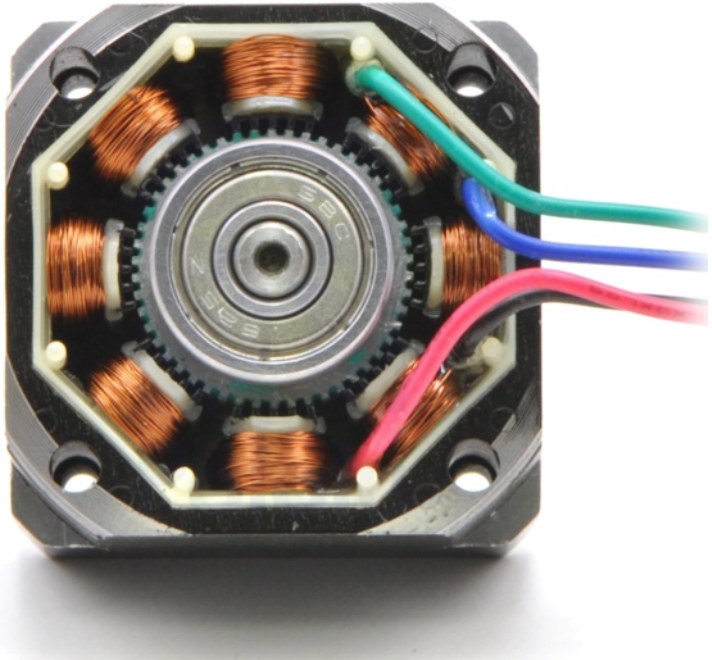
The motor I chose was the Nema 17. It was under £10 and it arrived within a few days. It is also popular for mechanical accessories such as mounting brackets and gear boxes; just ask google.

The Nema 17 dual coil 4 wire interconnect motor

Nema 17 with an optional gear box



The block diagram of the required motor drive amplifier



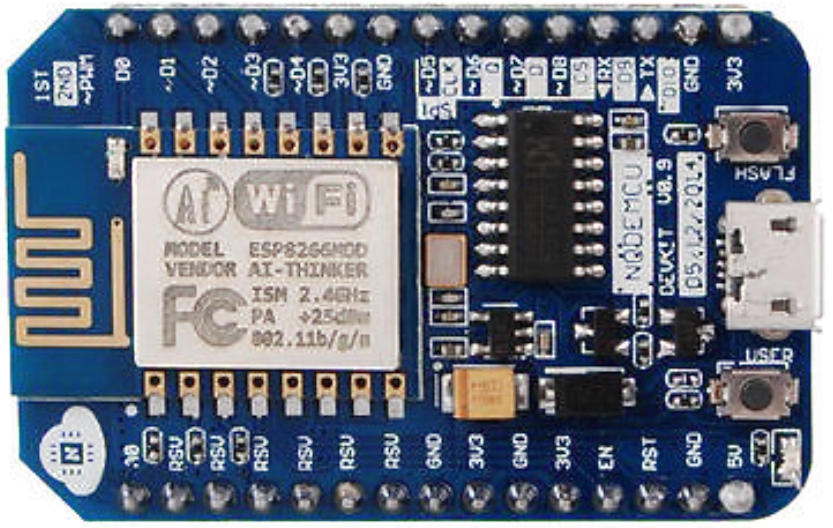
A look at the inside of the beast

I spent a few days designing the current drivers for this unit which needed to be able to sink current through the coils in either direction and in the end I went for a custom chip, the L298, and chose the module option with all the surrounding bits and bats in place so all I had to do was to connect the module to the PC 8574 chip to interface it to an I2C bus, or so I thought at the time!

The problem was the motor drive module or H bridge as they call it, came without any paperwork and I had to spend time reverse engineering it to produce the following diagram.

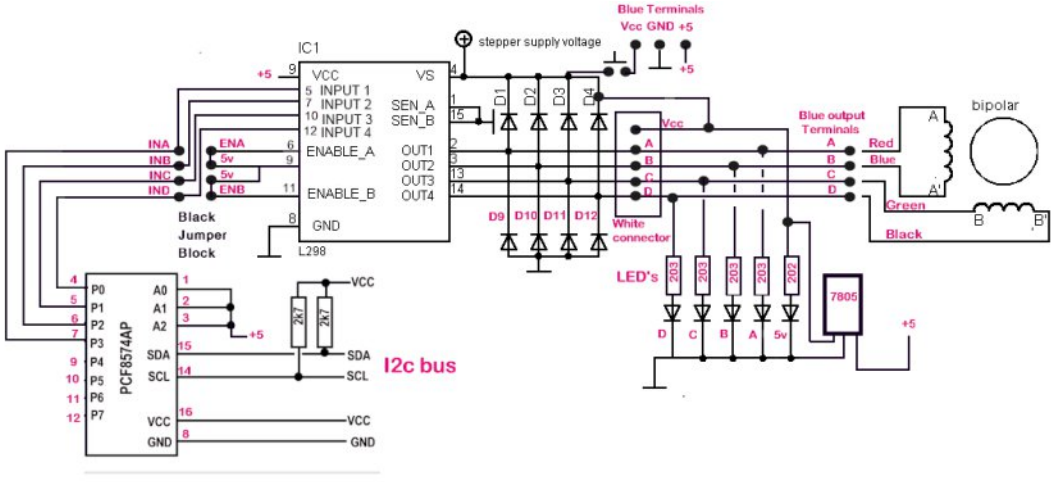
So yes, it was a simple four connections to the motor and four connections to the I2C interface chip, but the PCB seemed to get smaller and harder to trace out, or is that just my failing eyesight? Even the LED's that show which coil is being powered, useful as they are, are pin head size.

The motor drive amplifier module complete with L298 driver and associated components



The Node MCU that provides the I2C bus for the PCF 8574AP

This is the final diagram and the connections to the motor and to I2C interface chip.



The reverse engineered module and the motor interconnect and I2C port chip

The Nema 17 motor can be powered by up to 12V and the module makes provision for this with an on-board 7805 volt regulator to maintain +5 for the rest of the circuitry, but the LED on the 7805 input does start to glow brightly at 8 volts and above, so I did all this experimentation with +5 on the Vcc input of the motor drive amplifier.

The PCF 8574AP was connected to the Node MCU micro I used in CQ-DATV 44 and powered from its 3V3 rail and controlled over the internet in station mode.

I spent a little time trying different settings of the I2C address for the PCF8574AP so that multiple ports could be part of any final repeater design.

To this end I used the rather clever I2C address locating software used in CQ-DATV 44, which runs again under the ESP8266 BASIC and scans all the I2C addresses and reports back any address with connected hardware. My thanks to the author, it is a really clever tool.

ESP BASIC I2C Scanner Programme

```
 for address = 1 to 127
   i2c.begin(address)
   stat = i2c.end()

   if stat  <  1 then
     ' print stat
      wprint "Found I2C device at address: 0x"  &
hex(address)
      wprint " -  >  "  &  address
      wprint "  <br>"
 endif
next
wait
```

The I2C scanner should be cut and pasted into the micro editor page and run.

I tried every combination of A0 A1 A2 and came up with the following which was a simple binary progression from a binary implementation of the three address lines, but it's good to see the software deliver the expected results.

A0	A1	A2	DECIMAL	HEX
0	0	0	56	0x38
1	0	0	57	0x39
0	1	0	58	0x3a
1	1	0	59	0x3b
0	0	1	60	0x3c
1	0	1	61	0x3d
0	1	1	62	0x3e
1	1	1	63	0x3f

The I2C addresses available to the PCF 8574AP port as set by A0 A1 and A2

I connected the three lines to the PCF rail +3V3 and went with an address of 63 (BASIC uses decimal)

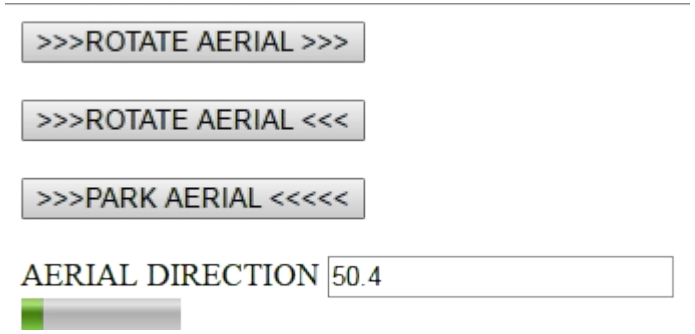
ESP BASIC I2C Aerial Rotate Programme

```
let address=63     'PCF8574 I2C Address set by hardware
let met=0
button ">>>ROTATE AERIAL  >>>    " ,[1]
wprint "<br />"                    'remove all the wprint lines
for a horizontal menu
wprint "<br />"
button ">>>ROTATE AERIAL  <<<    " ,[2]
wprint "<br />"
wprint "<br />"
button ">>>PARK AERIAL  <<<<<    " ,[3]
wprint "<br />"
wprint "<br />"
wprint " AERIAL DIRECTION "
textbox  met
wprint "<br />"
meter met,0,360
wait
[1]
let met=met+7.2
if met  >361 then goto [backward] 'call virtual end stop
i2c.begin(address)
 i2c.write(02)      'step 0
i2c.end()
i2c.begin(address)
i2c.write(10)      'step 1
i2c.end()
i2c.begin(address)
i2c.write(16)      'step 2
i2c.end()
i2c.begin(address)
i2c.write(09)      'step 3
i2c.end()
i2c.begin(address)
i2c.write(01)      'step 4
i2c.end()
i2c.begin(address)
```

```
i2c.write(05)      'step 5
i2c.end()
i2c.begin(address)
i2c.write(04)      'step 6
i2c.end()
i2c.begin(address)
i2c.write(06)      'step 7
i2c.end()
wait
[2]
let met=met-7.2
if met  <  0 then goto [forward]  'virtual end stop
i2c.begin(address)
i2c.write(06)      'step 7
i2c.end()
i2c.begin(address)
i2c.write(04)      'step 6
i2c.end()
i2c.begin(address)
i2c.write(05)      'step 5
i2c.end()
i2c.begin(address)
i2c.write(01)      'step 4
i2c.end()
i2c.begin(address)
i2c.write(09)      'step 3
i2c.end()
i2c.begin(address)
i2c.write(16)      'step 2
i2c.end()
i2c.begin(address)
i2c.write(10)      'step 1
i2c.begin(address)
i2c.write(02)      'step 0
i2c.end()
wait
[3] 'Park
for q=1 to 50
let met=met-7.2
if met  <  0 then goto [forward]   'virtual end stop
i2c.begin(address)
i2c.write(06)      'step 7
i2c.end()
i2c.begin(address)
i2c.write(04)      'step 6
i2c.end()
i2c.begin(address)
i2c.write(05)      'step 5
i2c.end()
i2c.begin(address)
i2c.write(01)      'step 4
i2c.end()
i2c.begin(address)
i2c.write(09)      'step 3
i2c.end()

i2c.begin(address)
i2c.write(16)      'step 2
i2c.end()
i2c.begin(address)
i2c.write(10)      'step 1
i2c.begin(address)
i2c.write(02)      'step 0
i2c.end()
next Q
wait
[backward]   ' virtual end stop
 let met=met-7.2
wait
[forward]  ' virtual end stop
 let met=met +7.2
wait
```

The software can be 'cut and pasted' into the editor, saved and run. You will then get three buttons on the screen.
(img,, alt: stepper9 src: ../Images/stepper9.png)



Screen controls Panel as seen on your PC or smart phone browser (no App required)

The two rotate buttons step the motor clockwise and anticlockwise. Each press of the button will move the motor through around 7°,(7.2 on the data sheet), less if you couple the motor to the aerial through a reduction gear, but then the beauty of BASIC is you can easily edit the text based programme to suit the mechanics of your aerial rotation. To this end I have added comments so you can see what is happening where in the code.

If you couple through a worm drive, then it will of course stop the aerial rotating the motor. You can stop the coils being powered as an electronic brake, as this also causes the motor drive chip and to some extent the motor to get hot! The software does leave the motor powered up, but if you do not need a brake then add to the end of routine [1] and [2] and move the wait to the end of the routine.[3]

```
i2c.begin(address)
i2c.write(00)     'power off
i2c.end()
wait.
```

The park button takes the aerial to the preset start position, so the power can be removed and powered up again with the motor and degree indicator in step. Remember the end limit switches are software not hardware.

```
if met  <  0 then goto [forward] 'virtual end stop
if met  >361 then goto [backward] 'call virtual end stop
[backward] ' virtual end stop
 let met=met-7.2
wait
[forward]' virtual end stop
 let met=met +7.2
wait
```

The degree counter is based on 7.2° per step and I have run this back and forth several times and powered and de-powered using park and everything seems to keep in step.

The Node MCU is in Station Mode so it sits on my home internet at 192, 168, 0, 24, DCHP in action, but it could be put in WAP mode (Wireless Access Point) and controlled directly via your smart phone, no App required remember it is browser driven.

The BASIC code could be tidied up by using sub-routines, but as in line code it is easy to see how it works and change any section to suit your needs. Remember the BASIC language manual, it's free and on line at

https://docs.google.com/document/d/1EiYugfu12X2_pmfmu2O19CcLX0ALgLM4r2YxKYyJon8/pub#h.o9kamrmfwc3u

There are lots of ads for the Node MCU module

http://www.ebay.co.uk/itm/like/201699790850?lpid=122&chn=ps&adgroupid=41285909471&rlsatarget=pla-470338960552&adtype=pla&poi=&googleloc=1006588&device=c&campaignid=738225731&crdt=0

But shop around and be prepared for delays from China. Sorry no aerial, just not an RF or aerial designer, but if you come up with one keep CQ-DATV in the loop, we always like to see our projects in action and hear from our readers.

Looking at DATV Repeaters in USA

by Ken W6HHC

When I first got interested in DATV in 2009 (just before commercial TV stations here in USA were switching over to Digital TV) there was only one DATV repeater here…the ATCO repeater WR8ATV had set up a DVB-S repeater in 2004 and has run 24/7 non-stop ever since.

For many years, there was growing DATV interest, but there were no other DATV repeaters in USA that lasted more than a few months.

Today, I can list a total of 14 active DATV repeaters (at least known to me) including 12 DVB-T repeaters and 2 DVB-S repeaters.

I think two events occurred to allow this growth in DATV to finally happen in USA.

First, a company called HiDes introduced DVB-T transmitters and receivers for ham radio that were reasonably priced and ran on the Windows operating system. I sense that many hams in USA do not want to be bothered by learning Linux, so Windows was the best OS for the US ham market.

Second, after several years of experimenting with DATV protocols, the large Amateur TV Network (ATN) concluded that DVB-T protocol (and HiDes equipment) was user-friendly (aka using Windows OS) and worked very well.

The ATN (with a large analog-based network of ATV repeaters) has added DVB-T to nine repeaters sites over the last 12 months.

It is a pleasure to finally see so much DATV activity here in USA.

Amateur Television Network (ATN) DVB-T repeater W6ATN Mt Wilson, California

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC - 3/4.
Guard spacing - 1/16
Modulation - QPSK
FFT - 8K mode
Modulation Data Rate - 2.20 Mbps
Video aspect ratio - 4:3
Audio Encoding - 96 Kbps
Video PID - 1601(base 10) - 0x641
Audio PID - 1602(base 10) - 0x642

Amateur Television Network (ATN) DVB-T repeater W6ATN Snow Peak, California

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC, etc -same W6ATN Mt Wilson

Amateur Television Network (ATN) DVB-T repeater W6ATN Jobs Peak, California

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC, etc -same W6ATN Mt Wilson

Amateur Television Network (ATN) DVB-T repeater W6ATN Santiago Peak, California

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.

FEC - 3/4.
Guard spacing - 1/16
Modulation - QPSK
FFT - 8K mode
Modulation Data Rate - 2.20 Mbps
Video aspect ratio - 4:3
Audio Encoding – 96 Kbps
Video PID - 1601(base 10) - 0x641
Audio PID - 1602(base 10) - 0x642

W6CX DVB-S repeater Mt Diablo, California

Band - 1292.5 MHz uplink input frequency.
Video encoding - MPEG2.
Symbol Rate - 2.222 MSymb/sec
Channel BW - 3 MHz.
FEC - 3/4
Modulation - QPSK
Video PID - 256(base 10) - 0x100
Audio PID - 257(base 10) - 0x101

Amateur Television Network (ATN) DVB-T repeater W6ATN Oat Mountain, California

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC, etc -same W6ATN Mt Wilson

Amateur Television Network (ATN) DVB-T repeater W7ATN White Tank, Arizona

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC, etc -same W6ATN Mt Wilson

Amateur Television Network (ATN) DVB-T repeater W7ATN Mt Lemmon, Arizona

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC, etc -same W6ATN Mt Wilson

Amateur Television Network (ATN) DVB-T repeater W7ATN East Mesa, Arizona

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC, etc -same W6ATN Mt. Wilson

Amateur Television Network (ATN) DVB-T repeater N7ZEV Mt Potosi, Nevada

Band - 434.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC, etc -same W6ATN Mt. Wilson

WR8ATV DVB-T repeater Columbus, Ohio

Band - 423.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC - 7/8
Guard spacing - 1/32.
Modulation - QPSK
FFT - 2K mode
Modulation Data Rate - 2.0 Mbps
Video aspect ratio – 16:9
Audio Encoding – 96 Kbps
Video PID - 256(base 10) - 0x100
Audio PID - 257(base 10) - 0x101

WR8ATV DVB-S repeater Columbus, Ohio

Band - 1288.0 MHz uplink input frequency.
Video encoding - MPEG2.
Symbol Rate - 4.167 MSymb/sec
Channel BW - 5.5 MHz.
FEC - 7/8
Modulation - QPSK
Video PID - 33(base 10) - 0x021
Audio PID - 49(base 10) - 0x031

W8BI DVB-T repeater Dayton, Ohio

Band - 439.0 MHz uplink input frequency.
Video encoding - MPEG4.
Channel BW - 2 MHz.
FEC - 7/8
Guard spacing - 1/32
Modulation - QPSK
FFT - 2K mode
Modulation Data Rate - 2.0 Mbps
Video aspect ratio – 16:9
Audio Encoding – 96 Kbps
Video PID - 1601(base 10) - 0x641
Audio PID - 1602(base 10) - 0x642

WØBCR DVB-T repeater (RACES) Boulder, Colorado

Band - 1243.0 MHz uplink frequency
Band - 423 MHz downlink frequency
Video encoding - MPEG4.
Channel BW - 6 MHz.
FEC - 3/4
Guard spacing - 1/16
Modulation - QPSK
FFT - 8K mode
Modulation Data Rate - 6.59 Mbps
Video aspect ratio - 1920 x 1080
Audio Encoding – 96 Kbps
Video PID - 1601(base 10) - 0x641
Audio PID - 1602(base 10) - 0x642

Tools Explained

DRILL PRESS: A tall upright machine useful for suddenly snatching flat metal bar stock out of your hands so that it smacks you in the chest and flings your beer across the room, denting the freshly-painted project which you had carefully set in the corner where nothing could get to it.

WIRE WHEEL: Cleans paint off bolts and then throws them somewhere under the workbench with the speed of light. Also removes fingerprints and hard-earned calluses from fingers in about the time it takes you to say, "Oh, shit!"

SKILL SAW: A portable cutting tool used to make studs too short.

PLIERS: Used to round off bolt heads. Sometimes used in the creation of blood-blisters.

BELT SANDER: An electric sanding tool commonly used to convert minor touch-up jobs into major refinishing jobs.

HACKSAW: One of a family of cutting tools built on the Ouija board principle. It transforms human energy into a crooked, unpredictable motion, and the more you attempt to influence its course, the more dismal your future becomes.

VISE-GRIPS: Generally used after pliers to completely round off bolt heads. If nothing else is available, they can also be used to transfer intense welding heat to the palm of your hand.

OXYACETYLENE TORCH: Used almost entirely for lighting various flammable objects in your shop on fire. Also handy for igniting the grease inside the wheel hub out of which you want to remove a bearing race.

TABLE SAW: A large stationary power tool commonly used to launch wood projectiles for testing wall integrity.

HYDRAULIC FLOOR JACK: Used for lowering an automobile to the ground after you have installed your new brake shoes, trapping the jack handle firmly under the bumper.

BAND SAW: A large stationary power saw primarily used by most shops to cut good aluminum sheet into smaller pieces that more easily fit into the trash can after you cut on the inside of the line instead of the outside edge.

TWO-TON ENGINE HOIST: A tool for testing the maximum tensile strength of everything you forgot to disconnect.

PHILLIPS SCREWDRIVER: Normally used to stab the vacuum seals under lids or for opening old-style paper-and-tin oil cans and splashing oil on your shirt; but can also be used, as the name implies, to strip out Phillips screw heads.

STRAIGHT SCREWDRIVER: A tool for opening paint cans. Sometimes used to convert common slotted screws into non-removable screws and butchering your palms.

PRY BAR: A tool used to crumple the metal surrounding that clip or bracket you needed to remove in order to replace a 50 cent part.

HOSE CUTTER: A tool used to make hoses too short.

HAMMER: Originally employed as a weapon of war, nowadays is used as a kind of divining rod to locate the most expensive parts adjacent to the object we are trying to hit.

UTILITY KNIFE: Used to open and slice through the contents of cardboard cartons delivered to your front door; works particularly well on contents such as seats, vinyl records, liquids in plastic bottles, collector magazines, refund checks, and rubber or plastic parts. Especially useful for slicing work clothes, but only while in use.

SON OF A BITCH TOOL: Any handy tool that you grab and throw across the garage while yelling, "Son of a bitch" at the top of your lungs. It is also, most often, the next tool that you will need.

Want to be notified when issues of CQ-DATV are published? Then join our *mailing list*.

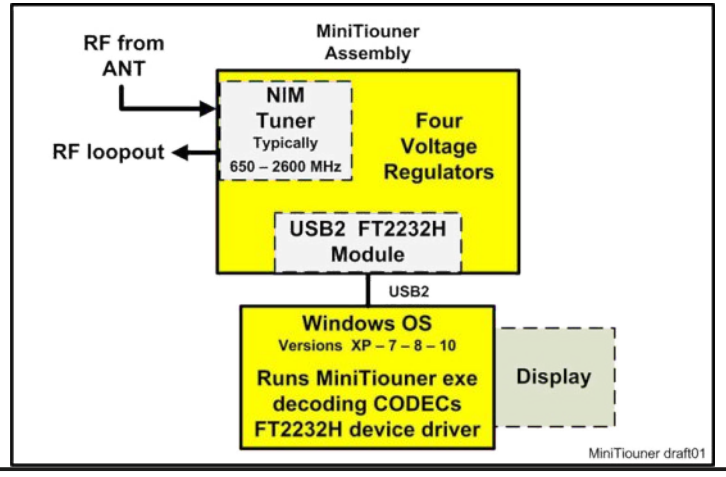
DATV-Express Project - February update report

Written by Ken W6HHC

Art WA8RMC reports that the production build of DATV-Express exciter boards launched in January has been completed and DATV-Express boards are now back in inventory. WA8RMC finished inspecting assembled units and testing this next batch of hardware boards. After unexpectedly being flooded by orders around the end-of-the-year, the project team had to stop accepting orders for boards. The PayPal ordering button has now been reactivated on the project website.

You can order a board from the *http://www.DATV-Express.com* website using the PURCHASE A BOARD link (along the top). You must register on this web site to purchase a board. All boards will ship from USA. Art has shipped out the next four orders in late February.

Ken W6HHC had a chance to prepare a DATVtalk article that provides an overview of the capabilities of the MiniTiouner analyzer/receiver for DVB-S/DVB-S2 that is designed by Jean-Pierre F6DZP.



W6HHC had been using the MiniTiouner to finish testing of the DATV-Express for Windows software release (v1.23). In W6HHC's opinion, the MiniTiouner is not only a valuable DVB-S and DVB-S2 analyzer…but MiniTiouner is the "best DVB-S/S2 receiver that Ken has ever used"! The MiniTiouner receiver is so easy to use….

1. *Set the frequency you want*
2. *Set the SymbolRate you want*
3. *Set the protocol you want (DVB-S or DVB-S2)*

No more blind scans, etc - are needed to see a new received signal.

The article, called "DATVtalk16 - The MiniTiouner Receiver/Analyzer for Digital-ATV", can be downloaded from the CQ-DATV issue 45 eMagazine (free) at *http://cq-datv.mobi*

Charles G4GUO has been relaxing by working on a few fun DATV projects. No LimeSDR efforts last month and no DATV-Express efforts for a few more months.

"Project speed set to time to relax a bit"…de Ken W6HHC

Left - Block Diagram of the USB2-based MiniTiouner set-up for receiving DVB-S and DVB-S2 protocol

Simple Blue Screen Eliminator

By Dave Woodhall G3ZGZ

Background

When working analogue TV it is usually necessary to peak up antennas very accurately when distant stations are weak.

Quite a few modern monitors go to "blue screen" when there is no video input. This makes it very difficult to peak up on weak signals as the monitor will not allow weak signals to be seen.

The circuit in the monitors usually looks for incoming line sync pulses and when these are found it will display the video signal. On very weak signals the sync pulses normally are poor and the monitor won't switch from blue screen.

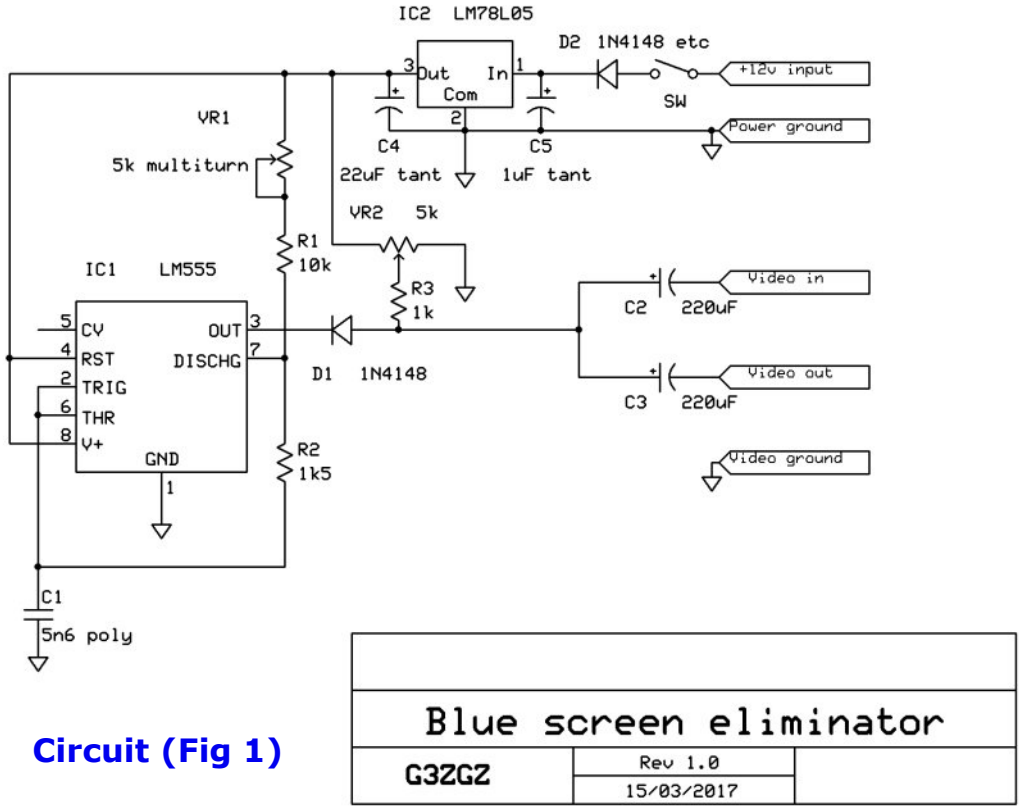
This is exactly when it is necessary to peak antennas for the best signal and if you are operating portable it may pay to move the antenna slightly from it's present position to take the benefit of a reflection etc.

The blue screen eliminator works by tricking the monitor into thinking there is a useable sync pulse being received and allow it to show an extremely noisy signal. Antennas and tuning can then be peaked for best results.

One of the hardest to find IC's is used (it's only hard to find as it's got small writing and I've misplaced my glasses). This is the 555 timer chip.

It is used to produce "line sync" pulses. The monitors are not too fussed about the sync pulse width (my first experiments were actually with a square wave and that worked).

The sync pulses are used to chop the incoming "white noise"



Circuit (Fig 1)

that an analogue video receiver produces when no signal is present. This tricks the monitor into thinking there is a signal with sync and some video content (the noise).

Once antennas are set correctly the unit is powered down and the monitor will display the incoming picture.

The 555 circuit is taken directly from the data sheet and produces "sync" pulses of about 6 to 10uS duration every 64uS. These are fed via a diode to the junction of two electrolytic capacitors which are in series with the video output of the receiver and the monitor input. The "sync" pulse is added to the incoming noise to produce a "video" signal consisting of line sync plus "noise" in the video part of the waveform.

Two presets are fitted. The first, VR1, sets the repetition rate of the sync pulses to 64uS. The second (VR2) adjusts the "mixing" of the noise and sync pulses. This will adjust the brightness of the noise displayed on the monitor whilst adjusting antennas.

Setting up.

A 'scope should be used to set VR1 for a repetition rate of 64uS when connected to pin 3 of the 555.

If you have a dual beam 'scope leave channel 1 connected here and select channel one to trigger the 'scope.

If single beam with a separate trigger input then connect the trigger to pin 3.

Connect a receiver with NO incoming signal, just noise, to the video in, and a monitor to the video out. Connect the 'scopes second channel to look at the video out.

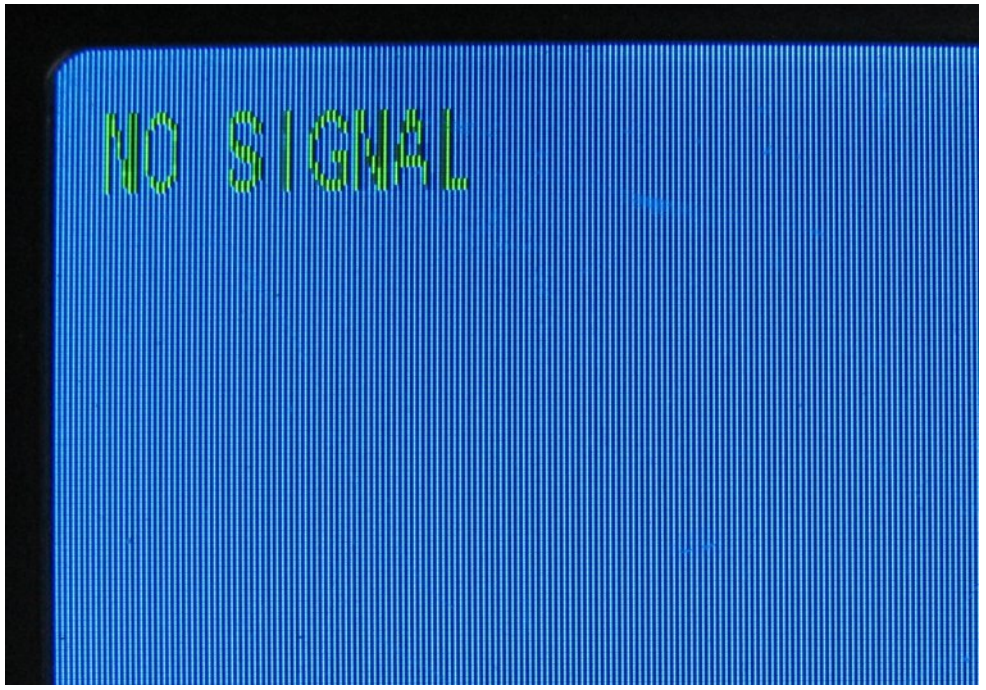
Adjust VR2 for a "false video" signal that shows the noise as though it were video and sync pulses that go below the bottom of the "video". See fig 2 which shows the 555 output on pin 3 and the chopped video to the monitor.

Your monitor should now have switched from blue screen to show noise.

Now apply a very weak signal to your analogue receiver. You should see on the monitor a picture that is "running through" It looks like a picture that has no syncs.

Adjust VR1 To get the floating picture to be as still as possible.

Removing power to the circuit will allow the monitor to show the picture you expect!



Monitor with "no signal" and blue screen

Monitor with noise from RX and circuit active.

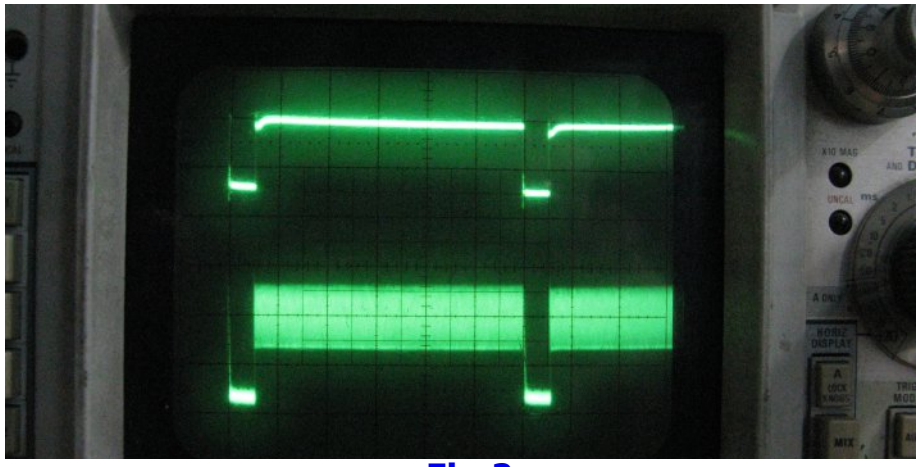


Fig 2

VR2 will adjust the brightness level of the noise being displayed on your monitor and you may find it beneficial to make this a panel mounted control.

I use the same 1.3GHz receiver for both 23cm and 3cm with a LNB. When the LNB is connected my receiver outputs more noise and VR2 may need to be adjusted to compensate.

You may want to add a switch that bypasses the two electrolytics in the video path after antenna pointing is done, but I have not found this necessary.

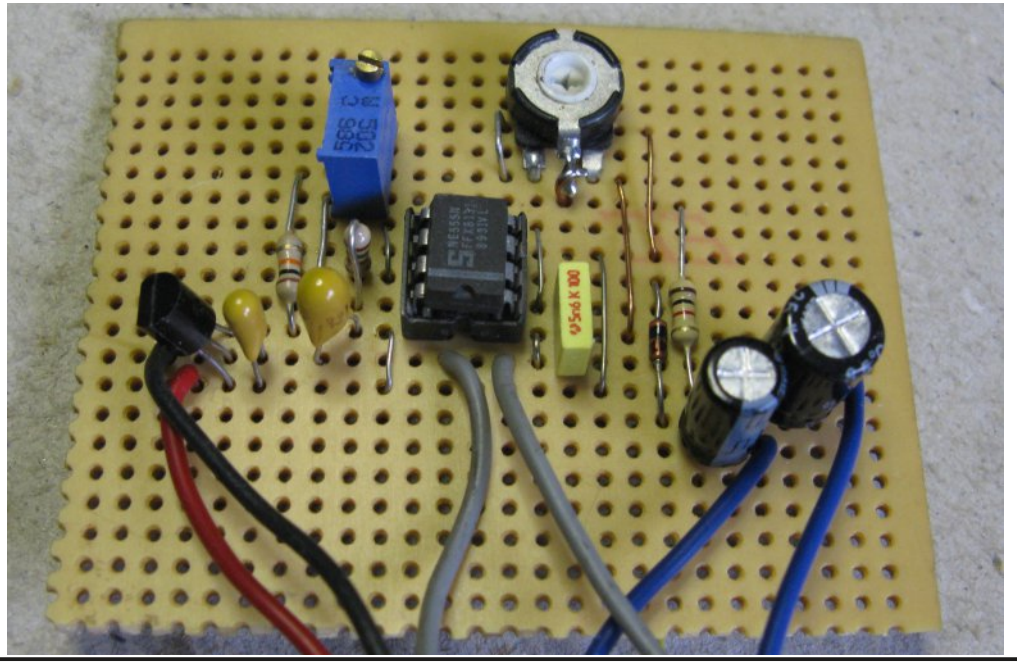
Building

A PCB could have been used, but I simply built my circuit on a piece of Vero board as it has so few components.

Components

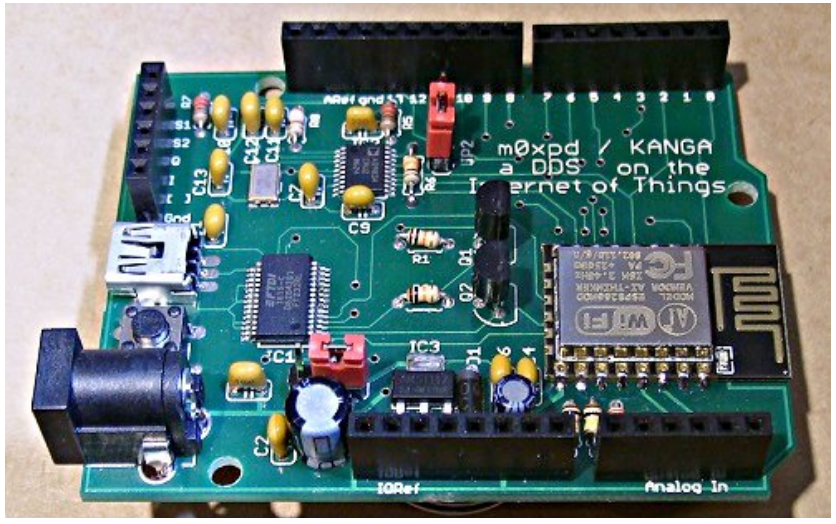
R1 10k	C2,C3 220µF Electrolytic
R2 1k5	C4 22µF tant
R3 1k	C5 1µF tant
VR1 5k multiturn preset	D1,2 1N4148
VR2 5k preset	IC1 555
C1 5n6 polyester	IC2 78L08

Weak signal "floating through". This signal was not good enough to trigger the monitor unless the 555 circuit was used



KANGA PRODUCTS

Radio Kits and Electronic Components for the Radio Amateur



This kit design integrates the ESP8266 system-on-chip and an AD9834 DDS device, in an attempt to encourage exchange of idea's between activities on the "INTERNET OF THINGS" within Amateur Radio.

If you have not seen Pauls Blog there is further reading here: *http://m0xpd.blogspot.co.uk/p/kanga-uk-resources.html#IoT*. Here you will see how Paul has integrated his Sudden Transmitter Shield to create a Beacon.

For further information see website or email for details
www.kanga-products.co.uk sales@kanga-products.co.uk

TV Amateur is a German Language ATV Magazine It is published 4 times a year and if you would like to subscribe go to *http://agaf-ev.org/* **NOTE new URL**

Darko Banko OE7DBH has some information and hints regarding DVB-T from his experience:

MER (Modulation Error Rate)

MER is calculated in order to put the total signal impairment in a measuring value which is presumably at the input of a receiver. The MER is the ratio of the average signal power to the average error power . The MER value is the least of the same or even more importance than a higher transmission power.

A signal in 16 QAM with a MER lower than 8dB can not be decoded. DVB-T TRX mostly have a MER between 20 and 35 dB, due to amplification this good value will be lost.

Depending on the amplifier or the used electronic the MER will be reduced between 5 and 15 dB. But be careful if you are going to the limits of your amplifier while you are believing that in DVB mode the same output power is available as in SSB or FM.

If you are making this mistake, your MER will be down to 5 dB. Your receiving counterpart will notice a signal, but has no chance to get Video and Audio. Less is more.

Let´s compare FM with 16 QAM , same bandwidth and good modulation:

- *A weak FM signal with good modulation could not be decoded, a strong FM signal is no problem to decode.*
- *A weak 16 QAM with a good MER can be easily decoded, a strong 16 QAM is also no problem.*
- *With a bad modulation both modes are causing problems to decode.*

Shoulder Attenuation (Signal – Shoulder span)

The DVB-T system does not utilize the full channel bandwidth, i.e. some of the 2K- or 8K subcarriers are set to Zero so that no interference to adjacent channels will be caused. Due to nonlinearities, there are still outband components and the effect on the spectrum and its shape has given rise to the term “shoulder attenuation”. So it is important to keep the attenuation as high as possible to avoid monkey-chatter and also to keep the MER on a high level.

- *A reduction of 40 % in the Signal shoulder span , leads to a significant reduction of the MER.*
- *The appropriate measurement equipment is a spectrum analyser.*

Class A amplifier

The definition of „class A“ from 30-40 years ago is not the same as for 5-10 years ago, the same is valid for the used technical eqipment. In SSB mode this does not make a big difference, but for DVB signals it is a huge difference.

Let´s take the well known Mitshubishi moduls as example:

- *M57745 (plastic cover): absolutely not suitable for DVB signals*
- *RA30H4047M (plastic cover) limited suitable for DVB, only for very low output power*
- *RA30H4047M1 (metal cover) suitable for DVB , up to approx. 20% of full power in CW mode*

Rule of thumb in the professional broadcast area: 7% of maximum possible power in CW mode can be achieved for digital transmission

In this area mostly Push-Pull amplifiers with solid state electronic components of 80 W HF output power are used. Push-Pull means using 2 amps with 80 watts, so in total 160 watts, combining them at the end with a coupler.

But why they are using a coupler which is only designed for 25 watts in CW?

Because this amp generates only 10 watts in digital mode.

But why to use such high power semiconductors?

This is because they are only working fully linear in the low power range.

Check with the thumb rule:. 7 percent of approx. 150 W in CW mode leads to approx. 10 watts in digital mode.

HAMs are taken this professional thumb rule not so serious with our amps, our thumb rule is rather 10 – 15 %.

In no case exceed this border otherwise your DVB signal will extremely suffer from spectrum and quality. Please keep in mind: Less is more.

Rather a lower signal with better quality is preferred.

Use an antenna with more gain to achieve more power, but also in this area pay attention.

Antennas

Please use omnidirectional antennas without gain, J antennas, dipols, backfire or yagi antennas with gain.

Do not use stacked antennas because those will introduce phase shifting which is very bad for DVB signals.

Power measurement

Best choice would be a "channel power meter" a DVB-T power meter, but who can afford this.

Correct would be to measure the carrier power on DVB, DVB-T offers 2k, 4k and 8k.

2k means 2000 (to be precise 2048) carriers, effectively used are 1704 of them. Measured should only be one of them.

HAMs are measuring across all carriers while using their DAIWA, Bird, Thermal power meter. This is not fully correct but sufficient for us.

A Thermal head power meter shows approx 8% less power than in reality transmitted.

From a feedback I know that a Bird wattmeter shows only 50% of the real transmitted output power.

All other HAM VSWR meters are too imprecise.

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

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