In this issue

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

Production Team

Ian Pawson G8IQU Trevor Brown G8CJS
Terry Mowles VK5TM

Contributing Authors

Trevor Brown G8CJS
Marco Geels PE1BR
Ken Konechy W6HHC
Richard Carden VK4XRL
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Mike Stevens G7GTN

Editorial

We have been trawling the internet and social media to source any ATV news, projects or activity reports. We do this for every issue, so you don't have to.

If it's a project that contains intellectual property we will have contacted the author and cleared its publication. Always when we do this we get a mixed reaction. Some are delighted and want to share their work, some just say no, which is sad but for some reason or other it happens.

Without the engineers to design and publish the information we need to build the toys we so enjoy, our hobby would soon grind to a halt. Our thanks go to everyone who has published their work in CQ-DATV. Without you there would be no publication.

Look on it as a ladder. We all start somewhere and as we grow we become able to feed others. We may not all get to be designers and for those that do its never the end, just the beginning. Equipment design is constantly evolving and things that were once beyond the finances of ATV'ers may become affordable E.G. John's work with YIGS that were once the exclusive domain of high end test equipment.

What is important is that we communicate and share ideas and solutions. That is why we have created CQ-DATV and why we circulate it free every month. Our hobby needs a monthly reflector for both projects news and activity to be reported.

It's our contribution to expanding and developing ATV and helping others along the path, which is a constant process delivering tomorrows engineers along with state of the art hardware.

Everyone knows who their mentors are, Trevor always says his TTL and digital logic was Arthur Critchley and his code writing came from Chris Smith G1FEF, both examples were from the ATV press.

Everyone remembers what they built and often the number of hours and late night oil it took to get it to fruition. Please, if you have any offerings, ideas or just examples of equipment and contacts, then CQ-DATV would love to hear from you.

In this issue Trevor has produced part 3 of his 50 years of P.A.L. series and is looking back at a Colour Sync Generator he designed for a book which he and many other designers contributed to back in the early days of ATV.

Sadly this publication is out of print, but if the last remaining copy will scan we will try and get it converted to an electronic download.

Marco PE1BR has produced the second part of his aerial rotator to end all aerial rotators, well we think so, but you never know if something bigger and better is on the way. This unit is supported by a PCB, but as of yet CQ-DATV has not started selling kits, but we hope the links to the files will enable you to order your own PCB's and recreate his design.

Gwil Jones has been developing a 5.6GHz ATV station, using a 32 channel RC832 and TS832's 600Mw TX that can also be fed directly into a 3 to 4 watt RF amplifier. I won't spoil it for you read the full story in this issue. 5.6 GHz something at CQ-DATV we are very passionate about as it is an in expensive way into AT.

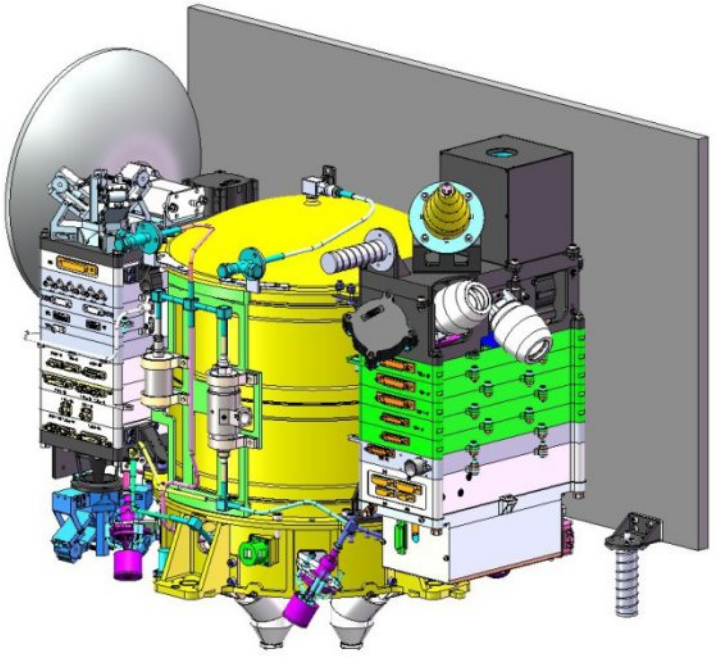
Ken W6HCC has put together his latest DATV Express news letter and Richard VK4XRL takes a look at providing a repeater controller using the basics from his switcher series of articles.

Last but not least, the Region 1 Contest is this month (June), and the rules are available at *https://www.iaru-r1.org/images/VHF/atv/IARU_ATV_contest_rules_version_2015.pdf*, so why not get the portable kit out and give it a try and please let us all see the pictures of your setup for the July CQ-DATV

So, as we always say, sit back and enjoy CQ-DATV Issue 60.

CQ-DATV Production team

Ready for Phase 5?

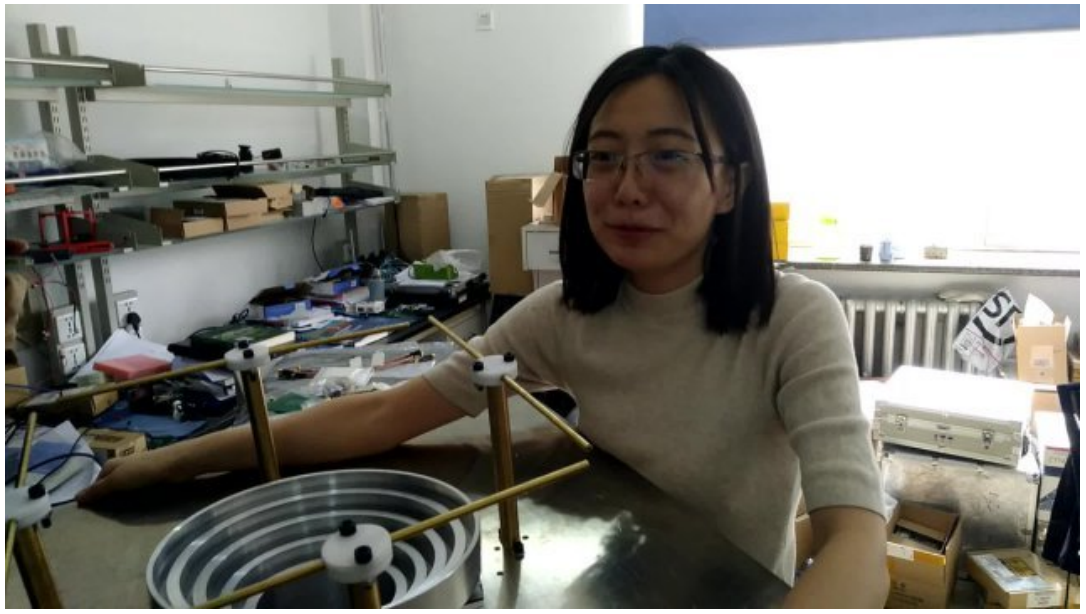


DSLWP Lunar Satellite

Phase 3 was the term coined for AMSAT's first high-earth orbit satellites back in the late 1970s, Phases 1 and 2 being the prior "bleepsats" and early transponder based LEO satellites (the very successful AO-6, AO-7, and AO-8 among them).

Later, Phase 4 was coined to indicate satellites in geosynchronous orbits and Phase 5 to denote missions that would leave Earth's orbit.

While AMSAT-NA doesn't currently have any Phase 5 missions planned, industrious students at China's Harbin Institute of Technology not only have a Lunar mission planned, but it is expected to launch on May 20 at 21:30 UTC!



Hu Chaoran BG2CRY tests 435/2250 MHz dish feed for DSLWP ground station – Image credit Wei Mingchuan BG2BHC

Ambitious is a good description of the mission: not one, but two 47-kg microsats are expected to end up in an "HLO" – a highly elliptical Lunar orbit – and will be carrying amateur radio payloads.

For more details and links to further information including a Linux-based "live CD" for using these satellites, see AMSAT-UK's news article here: *https://amsat-uk.org/2018/05/19/dslwp-satellites-lunar-orbit/*

Updated!

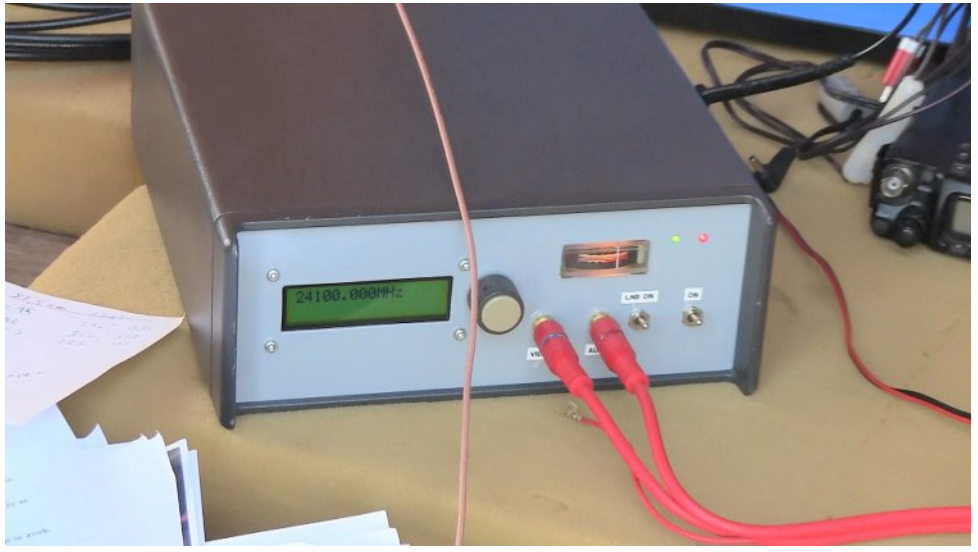
Ken W6HH reports that he has now uploaded the Draft14 of MiniTiouner-Express User Guide to the *DOWNLOADS* section of the DATV-Express project web site.

Draft14 has been updated to discuss recent MiniTioune v0.8s new tools/functions and includes an Appendix B – describing how to reprogram early hardware units EEPROM for compatibility with v0.8s software.

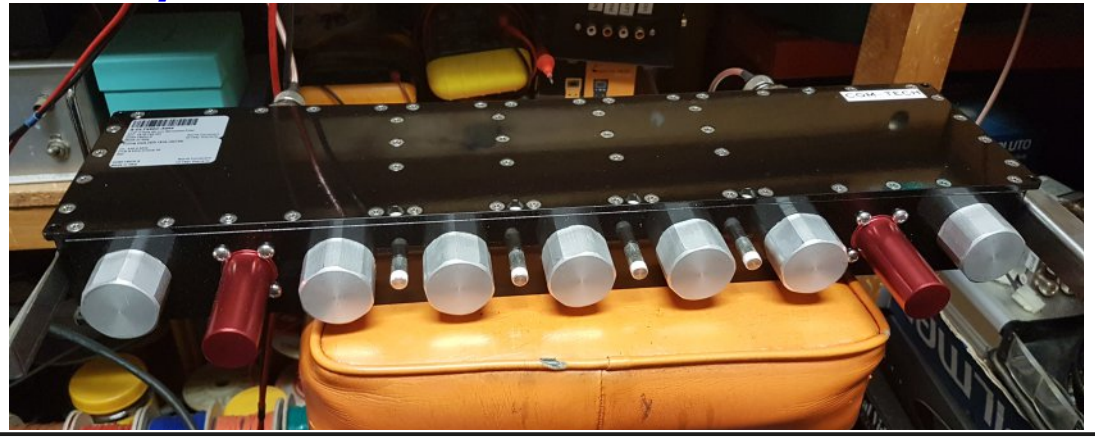
24GHz contact

News just in from CQ-DATV's Slovenian correspondent in Trieste, yes you have guessed it Rudi Pavlic S58RU who has had an exchange of FM ATV pictures with Francesco IK3HHG in Lignano Sabbiadoro nothing too unusual there, except it was on 24 GHz across the Adriatic, a path of 50Km.

Rudi was using 300mW and Francesco was running 800mW. So in this digital world it is good to know there is still some life left in FM ATV.



The Black Art of Duplexers: Demystifying Cavity Filters



Peter Cossins presents a practical guide to the black art of cavity filters for repeaters and digital TV transmitters.

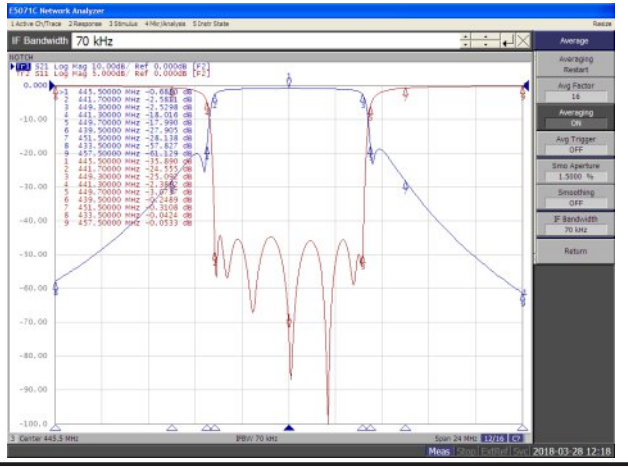
Cavity filters are a mystery to most, but at a practical level, not that hard to make or tune. Drew has developed an inexpensive way of building filters using common materials.

There are three basic types of filter, pass-band, pass-reject and notch. It is down to the coupling design, which again can be modified or home built. Each has particular applications. All three can be used in repeater duplexers at VHF and UHF.

Notch can be used to block unwanted signals like paging TX. Drew will demonstrate a unique use for notch cavities for cleaning the spurious skirts of DVB-T television power amplifiers and the use of low cost software defined radios (SDR) as test instruments for general use and cavity/duplexer tuning..

Finally, low cost software defined radios (SDR) and noise sources as spectrum analysers and "tracking generators" for general use and tuning cavities or duplexers is noted.

Blog post with links to the files:
http://vk4zxi.blogspot.com.au/2018/05/the-black-art-of-duplexers-demystifying.html



Contest

The annual IARU Region 1 International Amateur TV Contest will be held from 1300 BST on Saturday 9 June until 1900 BST on Sunday 10 June.

ATV contacts on all amateur bands above 432 MHz are valid. In parallel, the BATC will be running a UK-only contest, with the same basic rules, on the 146 MHz band. You don't have be on the air throughout the contest – single-contact entries are welcomed!

To participate in the contest, ATV stations simply need to exchange a 4-number code by video and then exchange reports and locators by voice. Logs should be submitted to the BATC at contests@batc.tv, who will compile the National rankings and then pass the logs on for the international rankings. Logs need to be submitted before Monday 25 June.

International Certificates will be awarded to the highest scoring station overall and the highest scoring station in each band. Additionally, the BATC will be presenting the following awards to UK-based stations:

A £50 Amazon Voucher to the winner of the BATC 146 MHz Contest

A £50 Amazon Voucher to each station in the Best DX 2-way 5.6 GHz Contact

A £50 Amazon Voucher to the transmitting station using a Portsdown system received at the furthest distance (any band)

Different 4-number codes should be used for each band. If a station changes location he should restart his serial numbers from 1, and change all his codes; if he works a station that he worked from his previous location, he should ask them to send a different code as well. A separate set of logs should be submitted for each new location.

Logs should be submitted using the Excel template that can be found here:

https://www.iaru-r1.org/images/VHF/atv/ATV_contest_log_-_ATV_yourcall_YYYYMMDD.xls .

If you have problems with Excel, simply submit all the information by e-mail – we will not exclude anyone from the contest just because they can't do Excel!

The Contest rules are here:

https://www.iaru-r1.org/images/VHF/atv/IARU_ATV_contest_rules_version_2015.pdf.

Details of planned activity can be found on the BATC Forum here:

https://forum.batc.org.uk/viewtopic.php?f=75&t=5427

and more detail on how to participate can be found here:

https://wiki.batc.org.uk/IARU_ATV_contest

Remember – it's not the winning that matters – it's the taking part!

Dave G8GKQ, BATC Contest Manager

DATV-Express Project

The sales of the MiniTiouner-Express hardware units began on the project web site *www.DATV-Express.com* on April 05. Sales have been brisk, with around 50 units sold worldwide in April including:

EU – 17 units
USA – 10 units
Japan – 7 units
Australia – 3 units
Canada – 1 unit
India – 1 unit
Chile – 1 unit

On April 20, Jean Pierre F6DZP released a new update to the MiniTioune software, called v0.8s. This new software release is designed to be compatible with all of the variations of MiniTiouner hardware, including the MiniTiouner-Pro and the MiniTiouner-Express. See the BATC forum for an announcement of v0.8s new features.

The latest MiniTioune software README file continues to improve nicely on describing LEDs and switch functions and is a "MUST READ". One change in v0.8s is the software expects the hardware EEPROM must identify the NIM product field as "MiniTiouner-Express"…OTHERWISE the new v0.8s software will now say **"Incompatible hardware"**.

Early MiniTiouner-Express shipments did not include this EEPROM change and users affected need to use the utility called FTprog - that can be downloaded from the FTDI web site.

This EEPROM reprogramming step is not difficult, and instructions to use FTprog will be included in an update to the USER GUIDE, soon. Art WB8RMC has reprogrammed EEPROM on all units shipped after April 25…and ALL units shipped from Charles G4GUO into EU had been reprogrammed.

Ken W6HHC reports that the shipping date for his order for a LimeSDR-mini has slipped from March 31 to April 19. HOWEVER - Ken has NOT seen a real "shipping e-mail". yet???

Charles G4GUO reports that:

- While using DATV-Express software, he can not get the LimeSDR-mini to produce a good MER using DATV-Express software…the transmit signal looks OK.

- He can only get PLUTO hardware units to achieve 3 MSymb/sec for DVB-S protocol. The latest DATV-Express software release for PLUTO is v1.25p5. An experimental release, v1.25p6, that completely rewrites the timing software does have better MER and eliminates a problem with running Pluto where audio was being lost after a few minutes.

- Charles reports that DVB-S could be re-written for PLUTO to achieve better DVB-S Symbol Rates (by loading a new FPGA code to only require Transport Stream import via USB)…but the DVB-S2 protocol requires too much FPGA-memory to benefit from this approach.

Project Speed is set to moderate….de Ken W6HHC

50 years since P.A.L - Bringing P.A.L. to ATV

50 years since the commencement of a P.A.L. colour TV service started in the UK, we have looked at the broadcast side and in the last issue why P.A.L. was chosen and what the alternatives were at the time. I this issue I would like to focus on ATV and P.A.L

From an ATV perspective we needed to make the jump from exchanging B/W pictures to exchanging P.A.L. pictures. There was no downside, colour was compatible with B/W, so if you chose to add colour to your transmission then it was your choice and many did.

Support for colour was via the ATV handbook which is available on the CQ-DATV website as a free download and what was called the revised ATV handbook which is no longer in print, but if we can get some old technology scanned we will try to get it there too.

This second book was an attempt to support so many people that worked to bring colour to ATV, from John Lawrence GW3JGA and David Ellis Jones GW8PBX that designed a high quality P.A.L. coder and Richard Russell G4BAU who designed the Electronic Test Card along with David Stone G8FNR who put together the production switcher.

Looking back with so many production solutions such as Vmix now in common use, production mixing P.A.L. on home constructed hardware really was cutting edge. My only regret was that in not producing both books in a single volume, particularly the Colour SPG which was a key module to getting a very powerful ATV production set up running, but due to the personal pressures of doing so, this was never going to happen, so let's in this issue look at the Sync pulse generator.

The heart of any TV station 50 years ago was the SPG (Sync Pulse Generator), broadcast cameras needed pulses as did all video sources, then they could be synchronised to any vision mixer.

Some ATV stations followed this protocol some just used free running sources and put up with a splash when they changed sources.

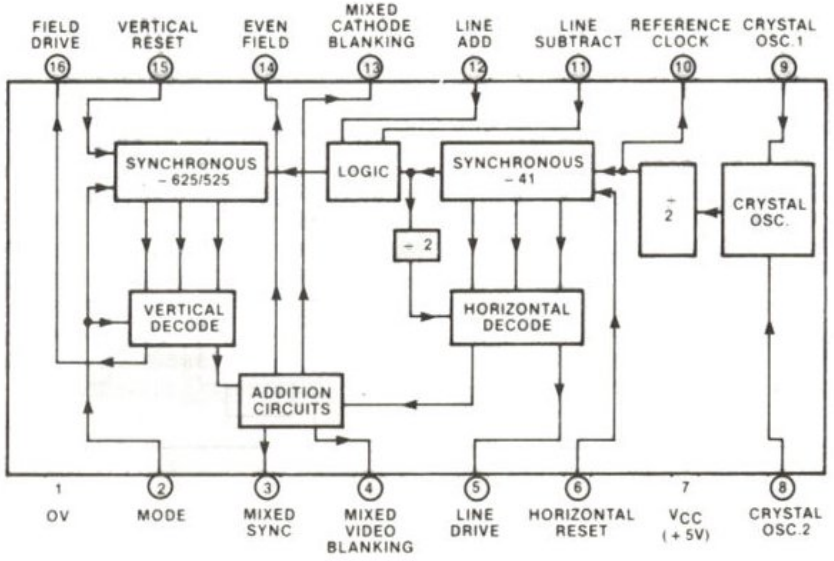
B/W sync pulse generators were around, my preference was a design from Arthur Critchley, I remember etching the PCB populating the PCB and getting it working in the early 70's.

The problem was getting all the video sources to lock to it, in particular the Pye Lynx camera. It was a bigger step to locking everything to a colour SPG as the signals used to change chroma phase along the cable runs, 1° of subcarrier for every 8" of coax, get it wrong and the colour would disappear on the mix.

We needed a colour SPG and one that we could lock all the sources to in our ATV station, at the time I don't think we realised what a challenge this was going to present, the Pye Lynx of the B/W days was nothing compared to micros like the Sinclair Spectrum or the BBC Computer, but we were ATV enthusiasts and all challenges needed to be met head on, but first we needed a colour SPG and one that set the bar high, one with all the necessary off sets and Brunch blanking.

The first attempt was engineered by Tom Mitchell G3LMX and used a mathematical locking of the subcarrier to line, based on an idea by Eric Putt, both Tom and Eric were BBC engineers. The problem was the design used TTL chips and rather a lot of them, Tom designed a single sided PCB to aid construction, but it also required a rather complex set of cabling on the component side and was not a construction project for the faint hearted.

Fortunately large scale integrated circuits started to appear and one of them was a ZNA134 SPG chip, that was locked to a 2.5625 MHz xtal. This was a brilliant start, but alas was not a colour SPG chip, but a very high quality B/W chip that was used in a lot of broadcast equipment. Could it be locked to a colour subcarrier? Remember in the last issue that P.A.L. had a 25Hz offset so you cannot just divide 4.433618.75 by any number an end up with 2.5625Mhz that would have been too easy.

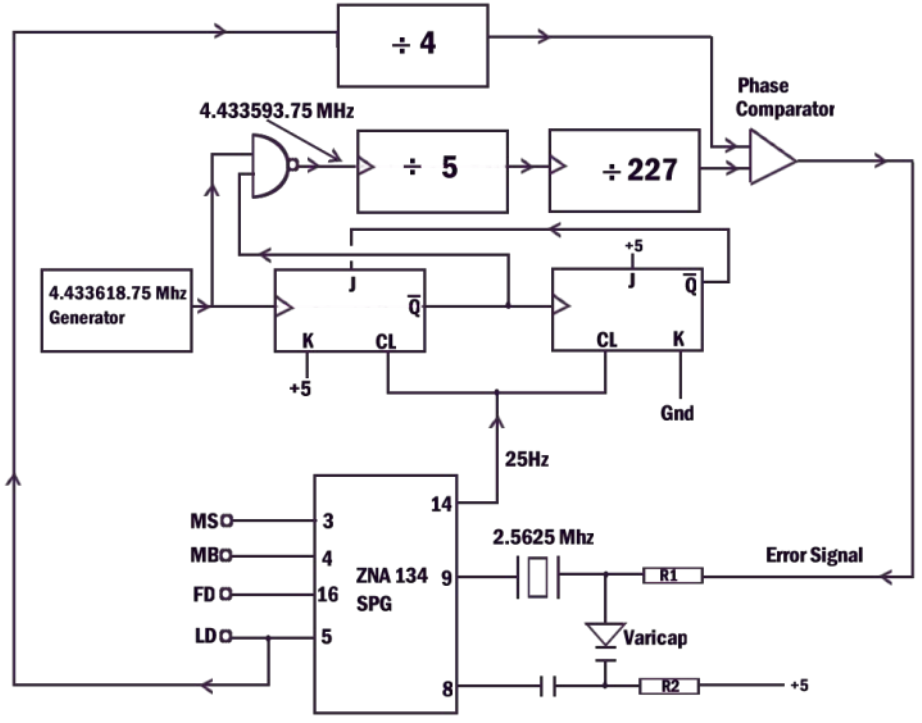


The early broadcast SPG's worked by mixing 25Hz derived from, frame divided by 2 with subcarrier and that gave the well known 2 sidebands FO+ FC and FO-FC, filter the FO-FC and use it to count down to provide a source to lock the SPG and you have the required relationship, but a little filter heavy.

Then another solution appeared to which I claim no originality. This removed the need for a sideband selecting filter. Using 2 JK's to remove one of the cycles of subcarrier every TV frame. This leaves 4.43361875Mhz with holes, if we count the cycles we get 4.433593.75 MHz divide it by 1135 and we get 3.90625 KHz compare that with 15.625 (625 line frequency) divided by 4 = 3.90625 and we have a signal we can steer the ZNA xtal oscillator into lock with, providing 25Hz offset. All we need is to compare the two signals to obtain an error signal that can be used to control the frequency of the master oscillator of the ZNA134 via a varicap diode.

Easy to check for lock, if the two square waves are locked at the input of the phase comparator on a double beamed scope then the system is locked and working.

The result should produce a subcarrier lock with all the correct line to subcarrier relationships and pattern cancellation as prescribed by Dr. Brunch in the original P.A.L. specification, none of this free running TV games subcarrier which does hurt when saturated colours meet with sharp edges.



Colour Subcarrier Lock for the ZNA 134 chip

A monochrome SPG provides four sets of pulses:
MS (Mixed Sync)
MB (Mixed Blanking)
LD (Line Drive)
FD (Field Drive)
the last were mainly for old camera's.

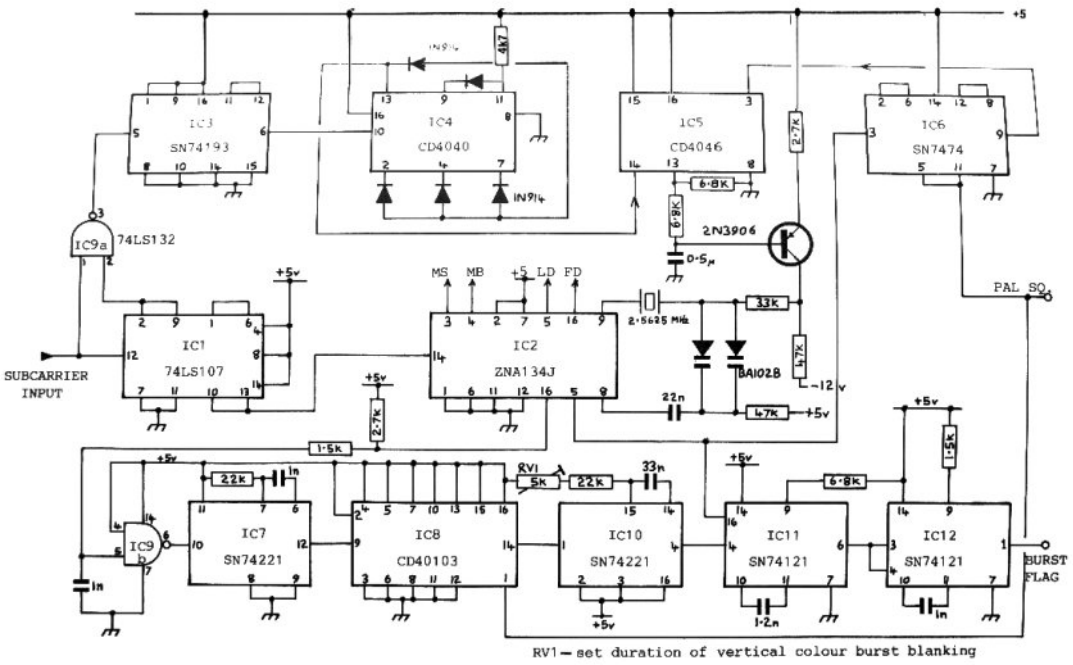
Colour will provide some additional pulses from an SPG:
SC (Subcarrier)
PS (PAL Square Wave)
BG (burst gate).

So there is still a little more work to do to make a colour SPG. SC is probably the simplest and is often provided by a 4 times SC oscillator divided down to gain as much frequency stability as possible and in a broadcast SPG the xtal oscillator is often housed in a temperature controlled oven to add to the stability.

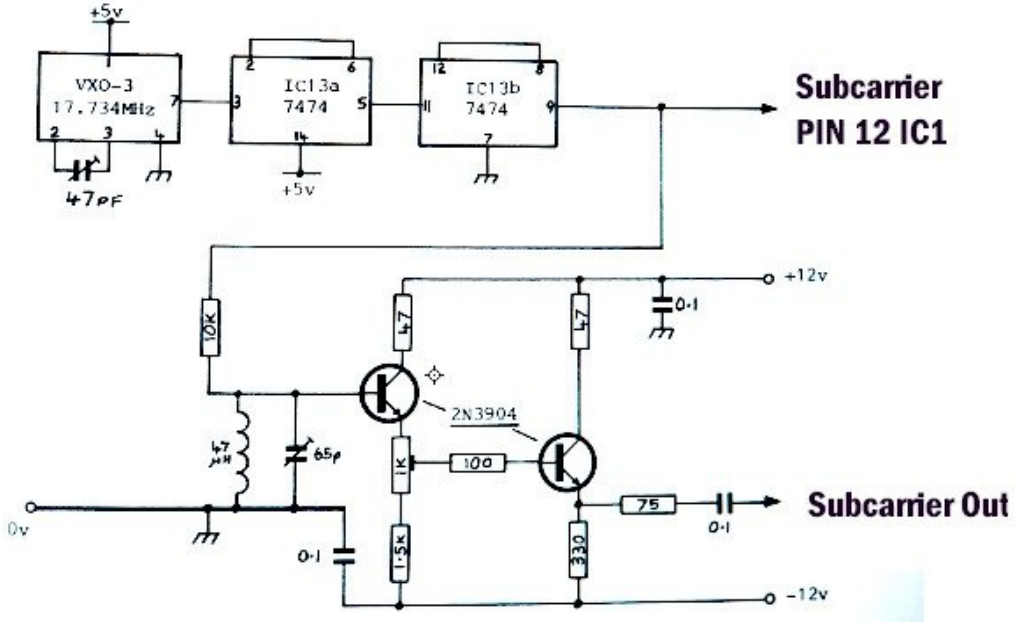
PAL Square Wave is a 7.5Khz square wave that tells all the connected equipment which line needs to be phase inverted, in our SPG we used line Drive divided by 2, not perfect, but close enough.

BG, Burst Gate, sometimes call Burst Flag provides the information of where to put the colour burst in our TV waveform, in our SPG this has a 9H pulse which suppresses the colour burst as is required by some lines in the vertical interval in a sequence that still today is named Bruch Blanking after Dr Brunch who put the P.A.L. system together.

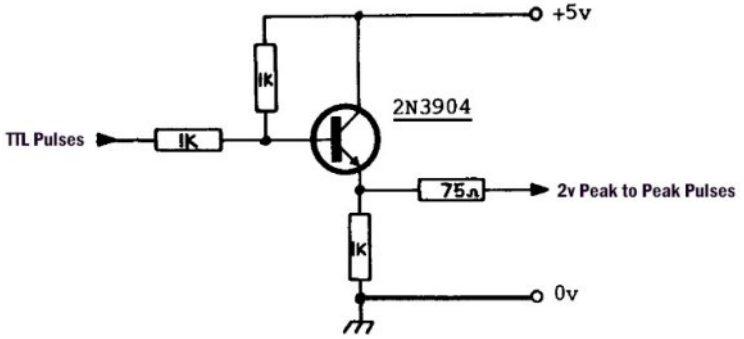
This was the final circuit and is perhaps the simplest at least to construct colour SPG. The ZNA134 was and still is an expensive chip, but it helped considerably to get the unit down to a single nights construction as we supported it as did Tom and his project 100 SPG with a PCB card. P100 was at least 10 years earlier and as always the solutions to our problems evolve at a fast pace.



SPG circuit diagram



Subcarrier generator



Pulse buffer

The pulse buffers are required so that the TTL outputs could provide 2v into 75 ohms and the Subcarrier generator that used a VXO module as a source for four time subcarrier, which probably did not meet the specification on colour subcarrier stability, but was the most stable device (short of an Xtal in an oven) available at the time, this was also on the PCB which before you ask is long out of production.

It was produced on Koda trace paper using stick on pads and converted to a PCB by a company called WASCO run by Alan Smith who without his support the PCB's would have never have got off the ground.

No CAD or any other trendy solutions were within the Amateur price range back in the 80's.

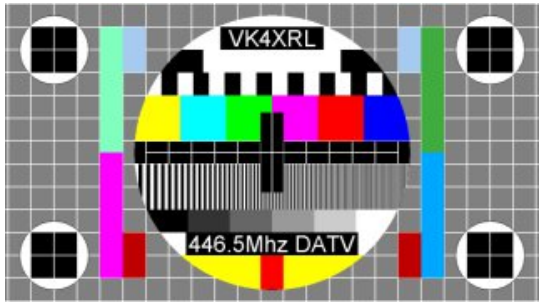
My thanks to the team that helped produce both books.

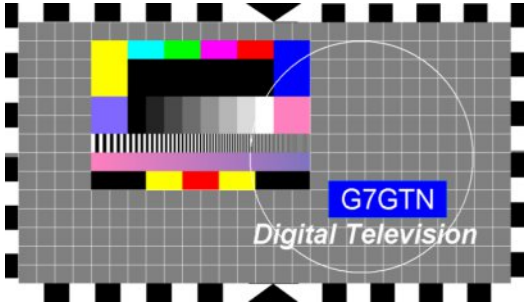
I hope I have credited you for your work and ideas such as project 100 that ran before the ATV Handbook and the Revised ATV Handbook which should have been produced together.

Its uncertain as we leave P.A.L how many ATV stations were supported and brought colour to the ATV airwaves. If anyone out there has any working cards, do please email the *editor@cq-datv.mobi*, we would love to hear.

Analogue 8x1 Video and Audio Switcher - Part Repeater Controller

Richard Carden VK4XRL & Mike Stevens G7GTN





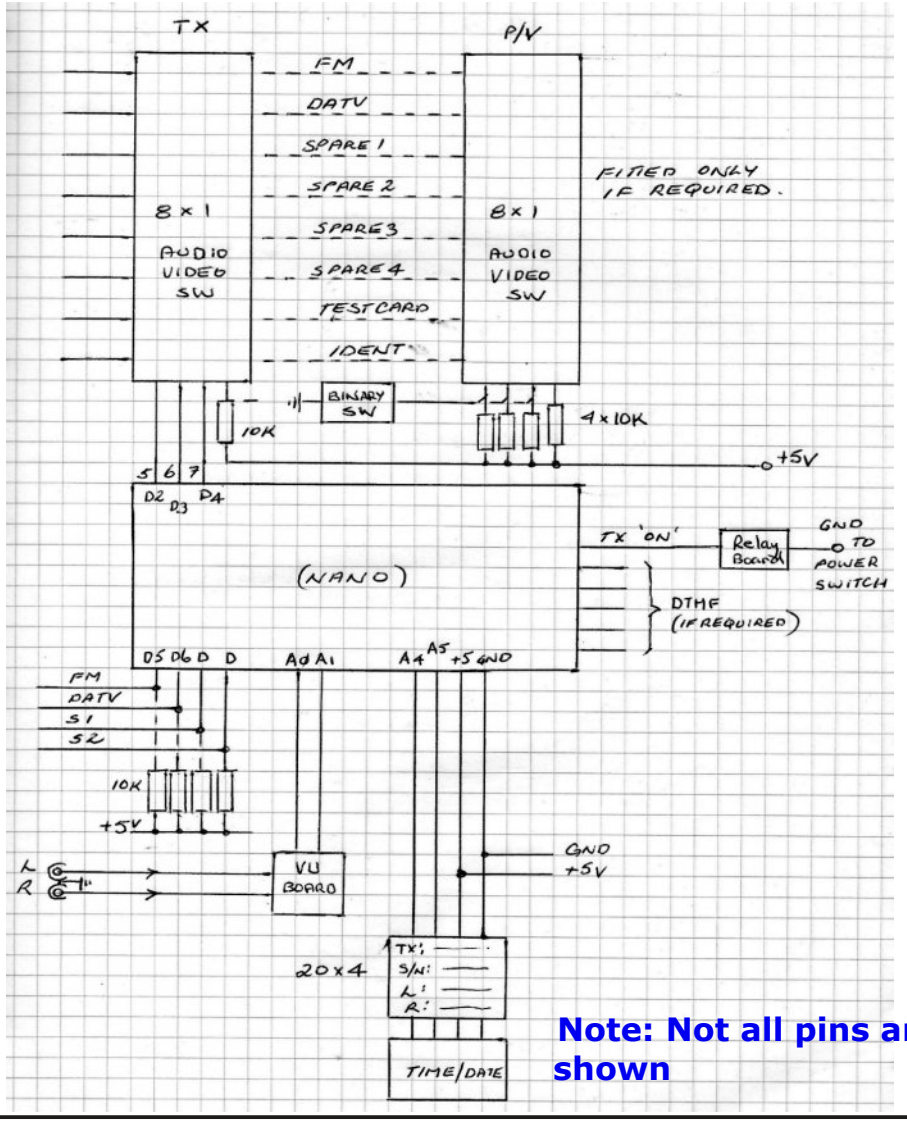
In this article we take a look at providing a repeater controller using the basics we have used in our switcher series of articles. We will use the basic switcher using eight inputs but you can add or subtract whatever you require.

Since we don't need to use the remote control or the PV switcher this can be left out however the PV switcher could be an advantage to allow testing at the remote site. If you wanted this facility then you would need to either use switch buttons or a binary type switch.

The cycle through test facility which was on the original switcher using the '0' remote button could again be used by using an external button to switch that operation on. Or it could be provided by the software and can checked via pressing the reset button.

What we intend to do here is describe a basic no thrills repeater controller where it is possible to add on as your requirements dictate in your normal repeater operation. We'll start with the basic 8 x 1 video and audio switcher, where your inputs will be dictated to what complexity you require as all repeaters are not equal.

I have always used the KISS principle where possible. In our example we have allowed for four fixed inputs and 4 controlled inputs such as FM and DATV receivers on whatever frequency you use in your repeater situation. Fixed inputs would or could be Test-card, motion Ident for repeater beacon mode or clock/temperature etc. These inputs would be controlled via direct code while our controlled inputs would require code plus an external input in our case a GND. See Block Diagram.

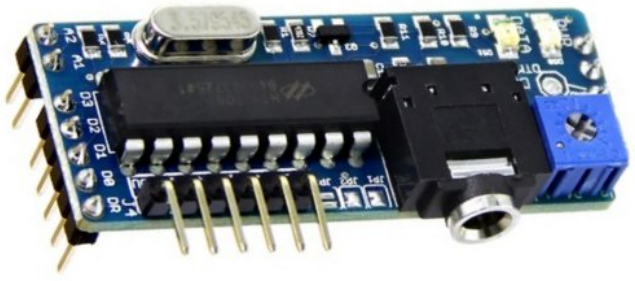


Note: Not all pins are shown

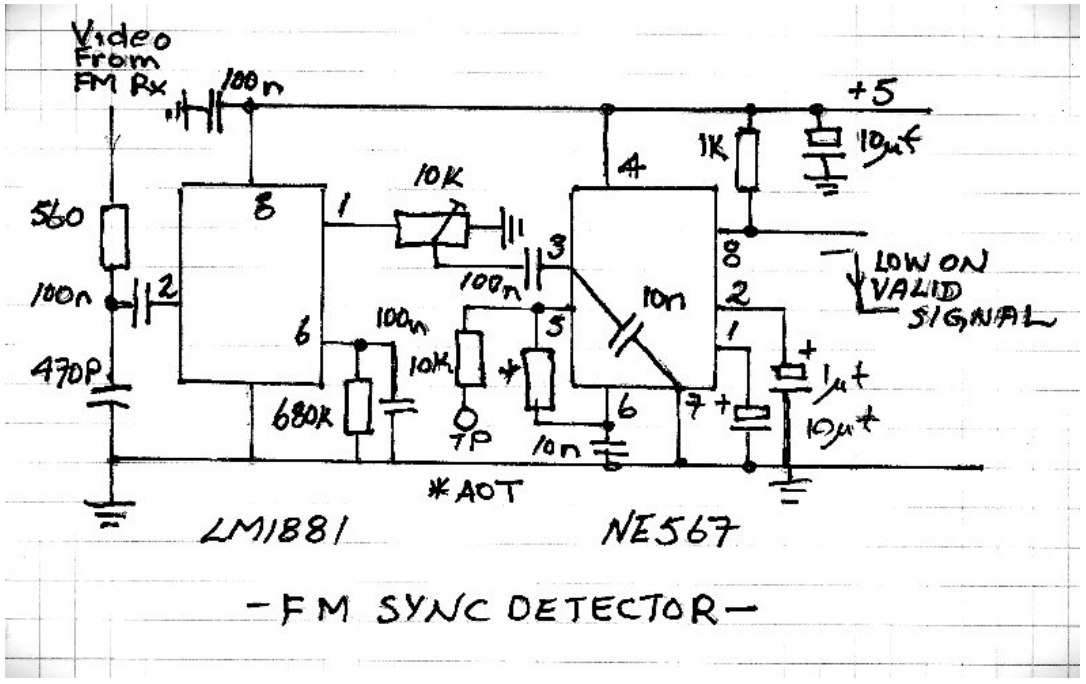
With FM inputs, at least with the setting we are allowed to use here in Australia +/-9 MHz the received video levels are somewhat lower then 1v P/p. However Maxim has an AGC chip a MAX7452 that can for fill our requirements in two ways, that is our levels controlled by the AGC and you can utilise the LOS signal for switcher control-D5. The DATV receiver uses D6 which are used as interrupts within the coding. More on this later.

We have now have fitted a 20 x 4 LCD which will now show what is been transmitted with space for signal strength indicator if required and the VU left and right levels using the same input circuit as we used in part 3. Of cause you could still use the original system using a 20 x2 LCD with the external switch to change screen information.

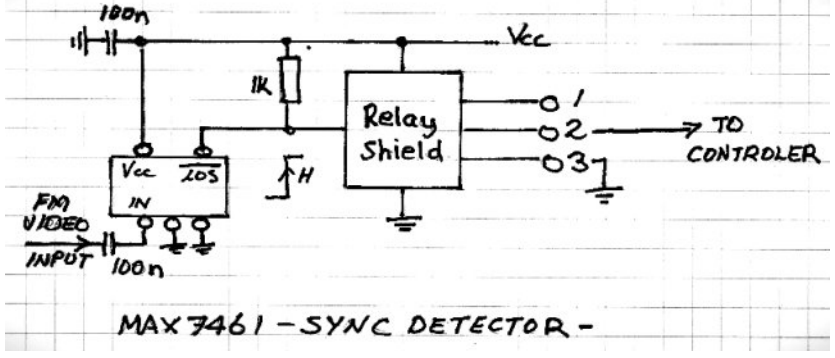
A TX on indicator is needed to switch the repeater on, however the method used is up to the individual repeater installation. This is controlled by Pin D13 and I have used a one relay shield board where the output pins are wired so a GND is fed to the external power switcher unit and of cause you can change this to a positive voltage if required, whatever your micro needs for switching.



As I indicated you can add whatever you like therefore a DTMF shield could be used for DTMF control if so desired. A number of different units are available so again that's up to you which one to use. Using one will save time and most have led's to show you what the state of the output is. Coding for this operation has not be included.



The FM and DATV interrupt inputs D5, D6 plus the spare inputs D? and D? will require a GND when vision is present for switching. For the FM signal a number of different scenarios can be used. The old classic one is the NE567 tone decoder IC.



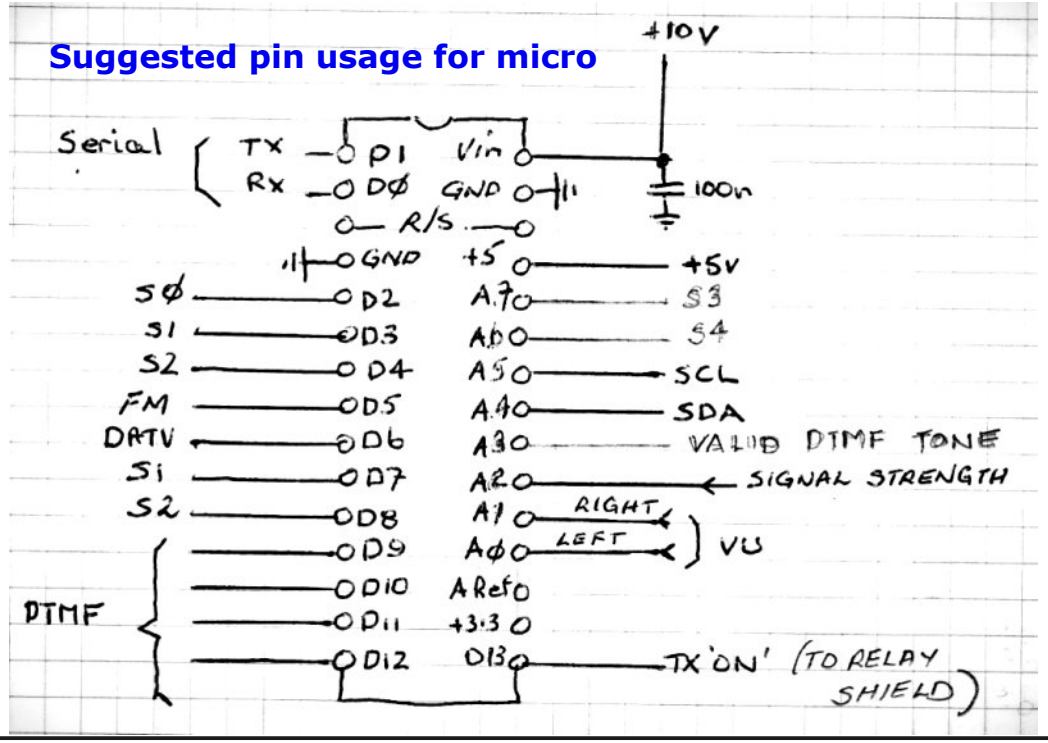
Also the Max7461 could be used, while another approach as explained earlier is the MAX AGC IC MAX7452. This gives the added advantage to increase the video level to the required 1V p/p and has as well the LOS output which would be available.

Time and Date maybe added if you require it. But as you will see we are fast running out of I/O pins unless we do something about it.

Mike has pointed us to his articles using I2C with a PIC to allow for those extra inputs we may need. Some inputs are therefore not marked as such and will depend on what method of approach you adopted.

There had been a few emails flowing via Yahoo re the use of ASI and IP for switching therefore bypassing the PAL to digital conversion. Like wise SDI and HDMI could also be used, however what ever method you decide on it would be nice to see some articles expanding on these principles so that others may experiment. Unfortunately the PAL switching is the easy way to implement switching for a repeater at this stage. Also a list of suitable equipment would be welcomed by those interested in this experimentation so lets hear from you here in this Magazine by contacting the editor.

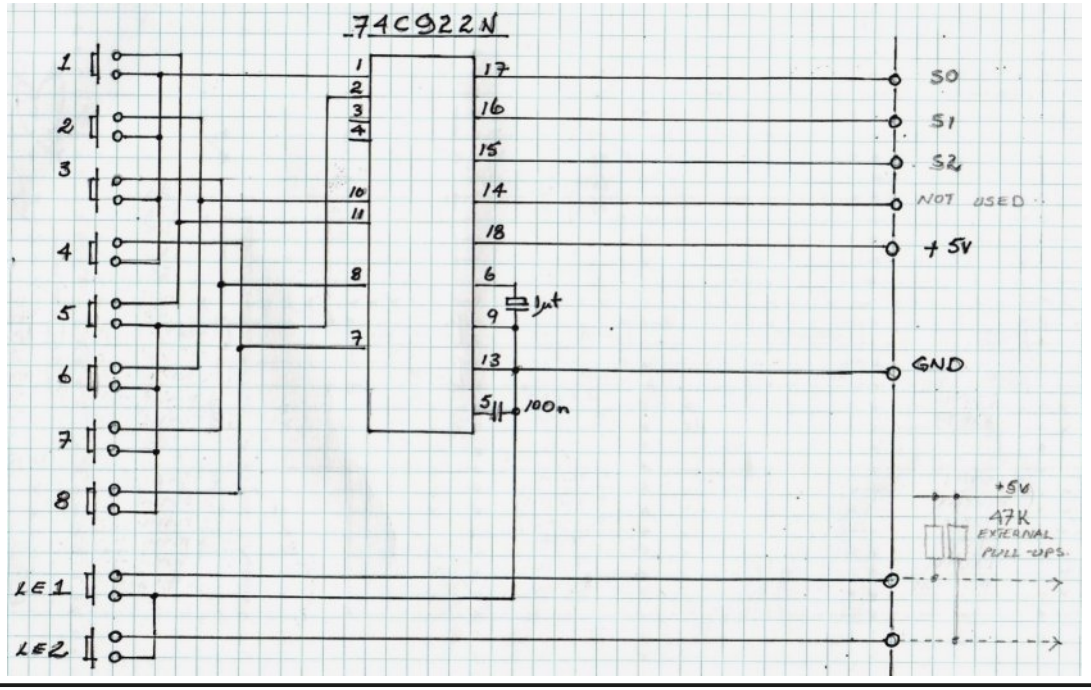
Suggested pin usage for micro



The following are the suggest inputs for the switcher and LCD readout.

1. FM D5
2. DATV D6
3. Spare1 D7
4. Spare2 D8
5. Spare3 A7
6. Spare4 A6
7. TESTCARD S0,1,2
8. IDENT S0,1,2

The preview switcher could if required be switched via the following unit using the 74C922n or via a switcher control pad as shown (not tried).



One point I should mention is the Latch requirements, the two 47k pull up resistors need to connect to the same supply latch voltage you are using in the switcher other wise you may need to add a transistor stage to invert to the required voltage, this is true for when using a micro. In one particular switch I built I had used +12v on the switcher and there for the multiplex latch pull up was connected to +12v as well. In this case the suggest push buttons worked very well as shown. Also you may need to change the coding to reflect any changes in this area.

While this hasn't been a complete project as such there should be enough information to follow it through. If anyone has additional ideas please take pen to paper and tell us about it. Any recoding would be welcome and I have included the latest software sw300 that I have been using (excluding any repeater operation and DTMF when it was written) so your turn now.

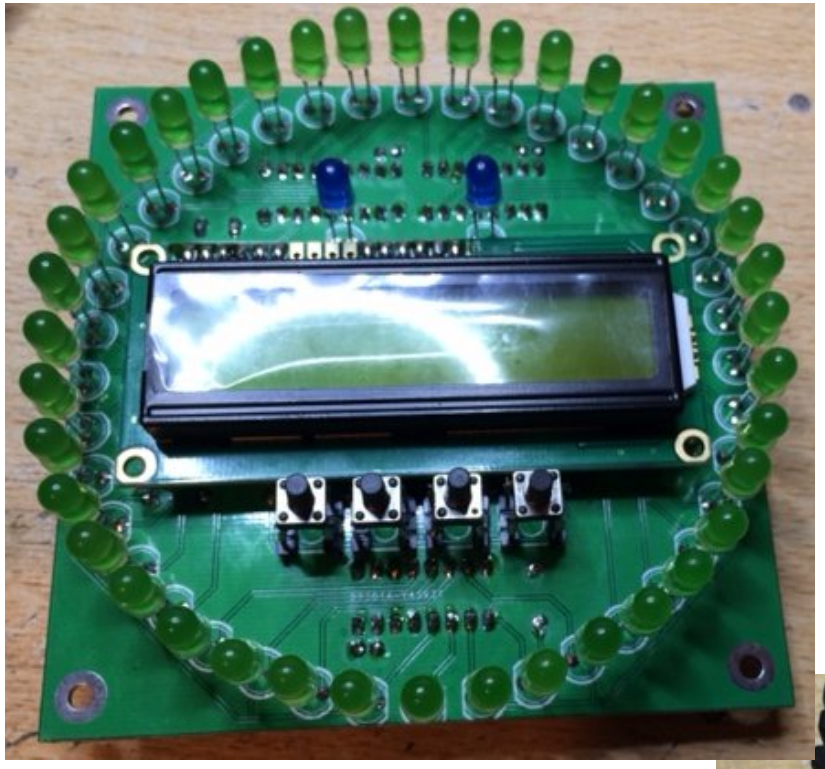
The software for this project is available from the *cq-datv.mobi* web site.

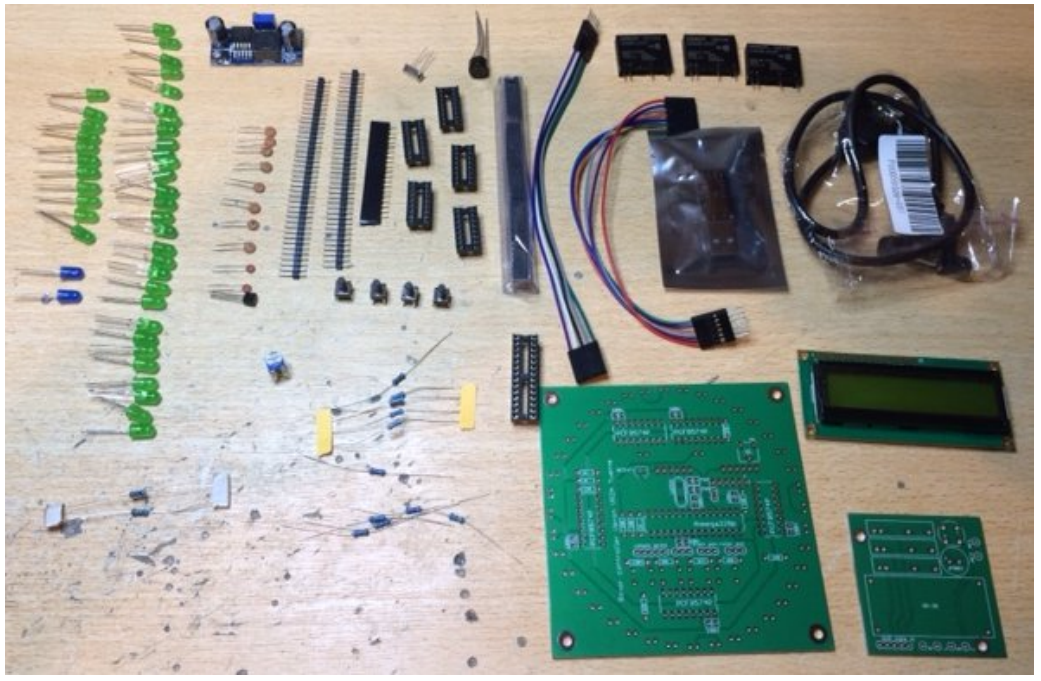
Please note that this mailing list is only used to advise interested people about the availability of new issues of CQ-DATV magazine. The list is not, and never will be, shared with any other organisations.

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

Rotor controller Veron VRZA Twente

Written by Marco Geels PE1BR *http://pe1br.nl*





As promised last month, here is Marco's updated Rotor Controller project.

artikel	aantal
Dc-dc converter	1
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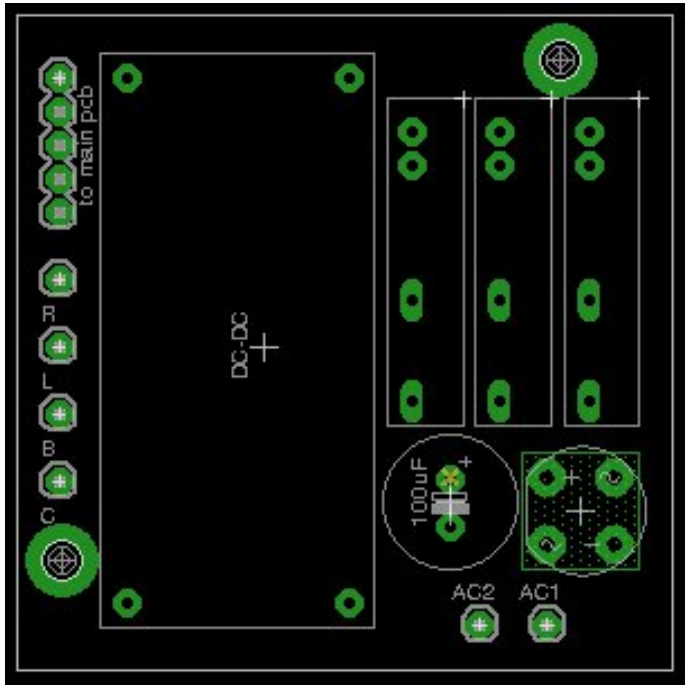
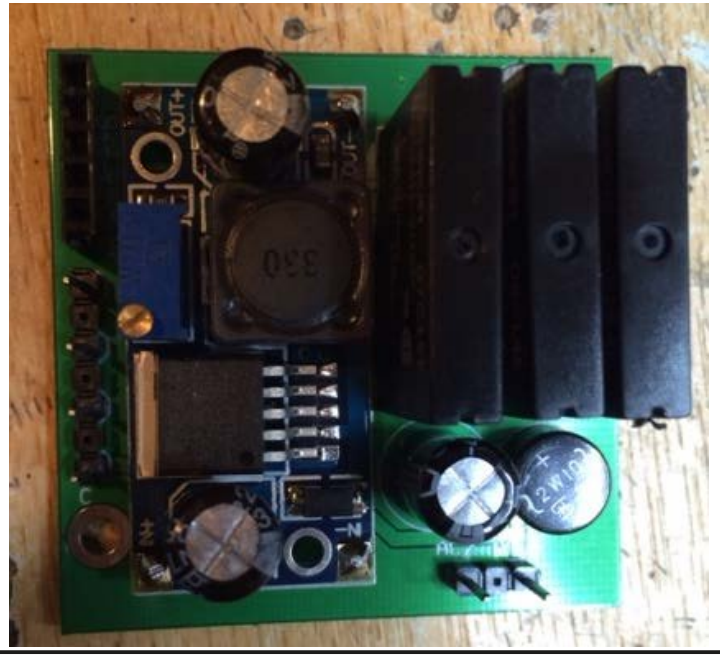
crystal 16MHz	1
Solid state relais	3
led blauw	40
led groen	2
100nf condensator	8
22pf condensator	2
100uF elco 63volt	1
lcd 2x16	1
instel potmeter 5K	1
usb converter	1
Weerstand 220 ohm	4
Weerstand 1 kilo ohm	3
Weerstand 100 ohm	2
Weerstand 10 kilo ohm	1
Weestand 120 kilo ohm	1
Weerstand 27 kilo ohm	1
Weerstand 1,2 kilo ohm	1

Component list

The power supply and relay PCB

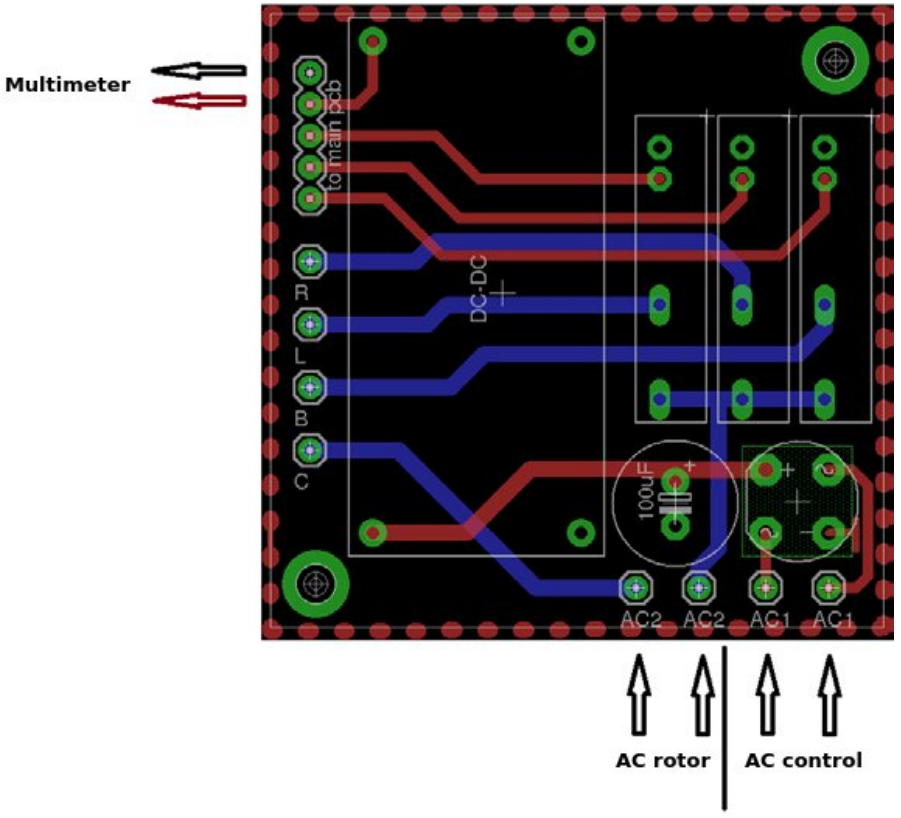
We start by building the supply and relay PCB:





Place all components as shown in the figure. The DC-DC converter comes with 4 pinheaders above the PCB. Note the polarity of the elko and the rectifier.

Connecting and adjusting



Connect a power supply to AC control (alternate or equal voltage between 7 and 40 volts).

This can be the transformer for your rotor but also a lab power supply or a 12 volt power supply for you trancier.

Measure with a multimeter in the direct current (DC) position on the output of the PCB.

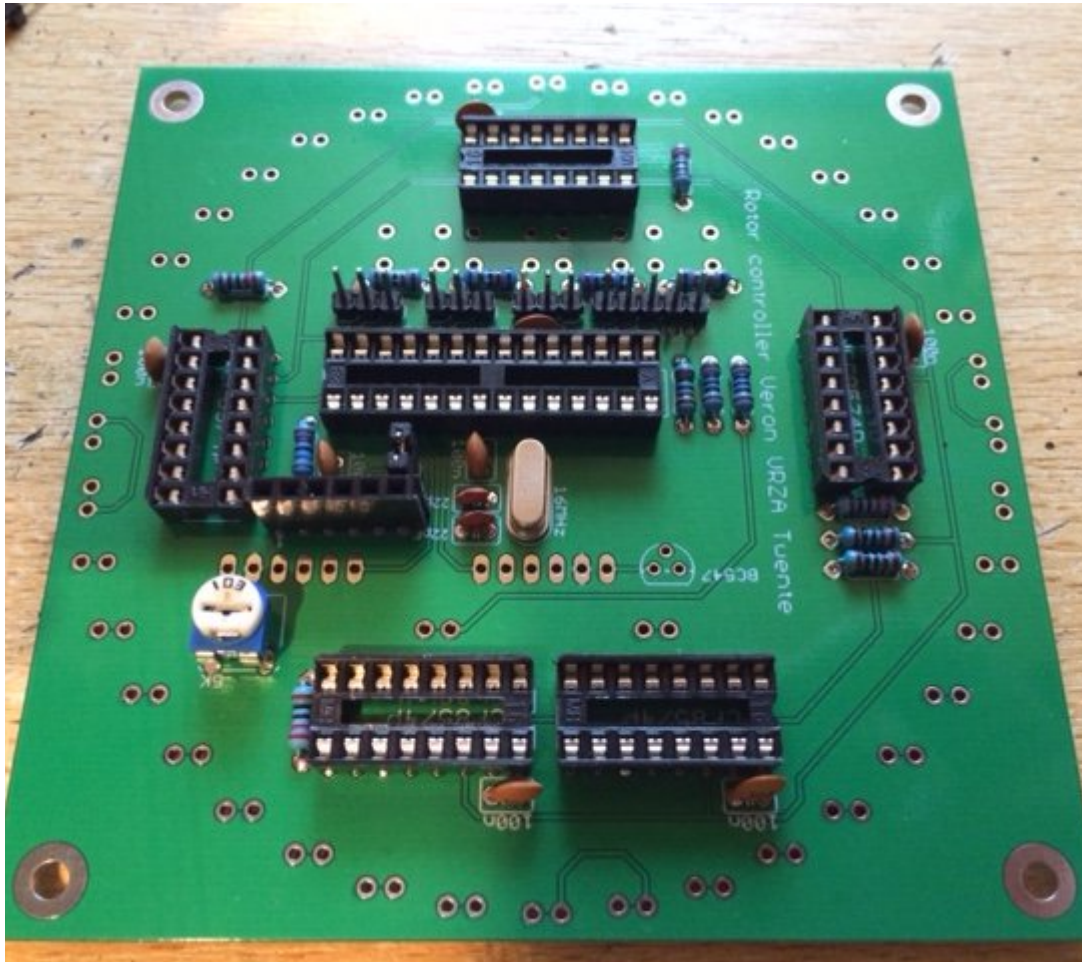
Turn the potentiometer on the DC-DC converter until the multimeter indicates 5 volts.

The Control PCB

Important: Please read through the whole assembly process before beginning.

Place the components in the following order (as shown in the following pictures)

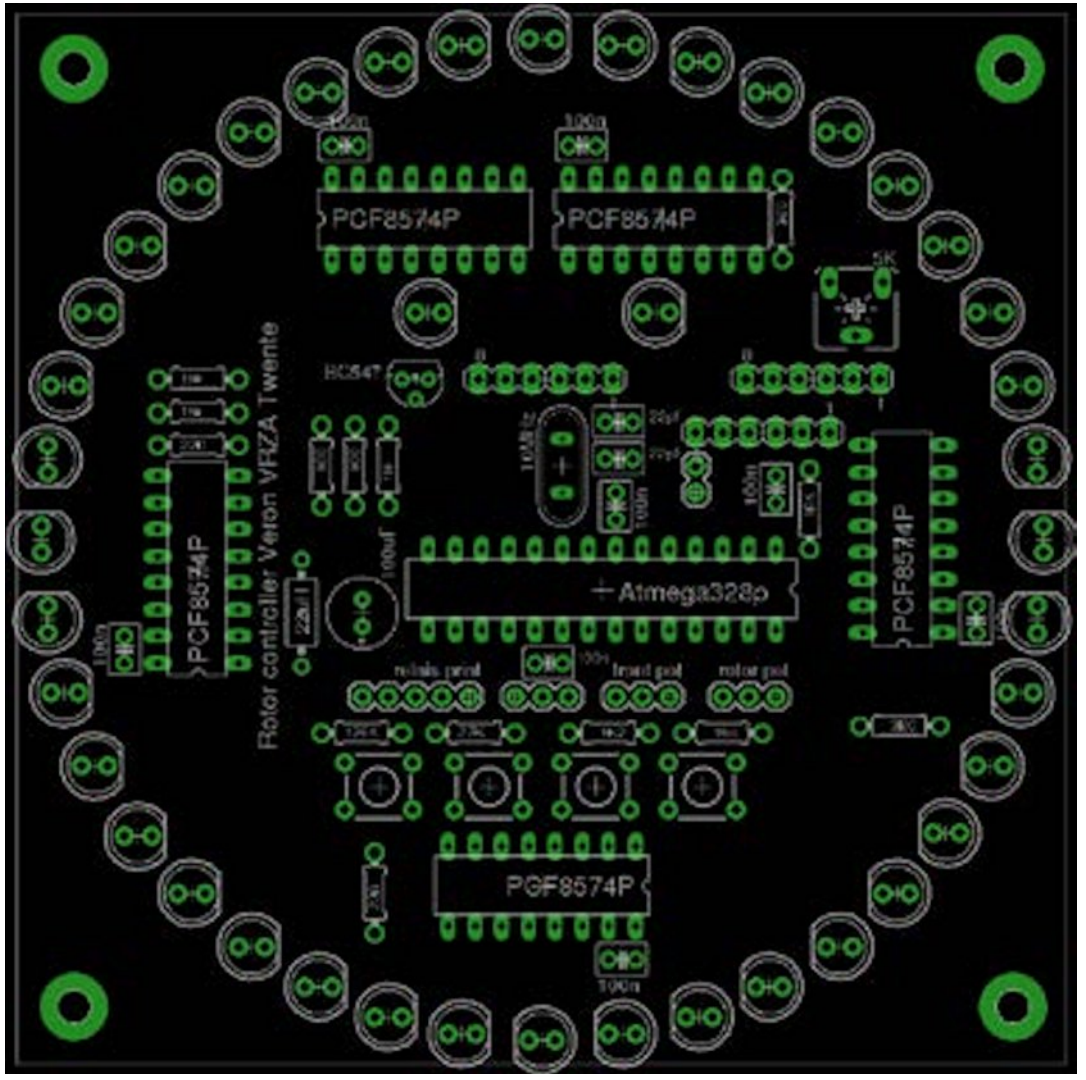
Start with the components side of the PCB.



Pay attention:

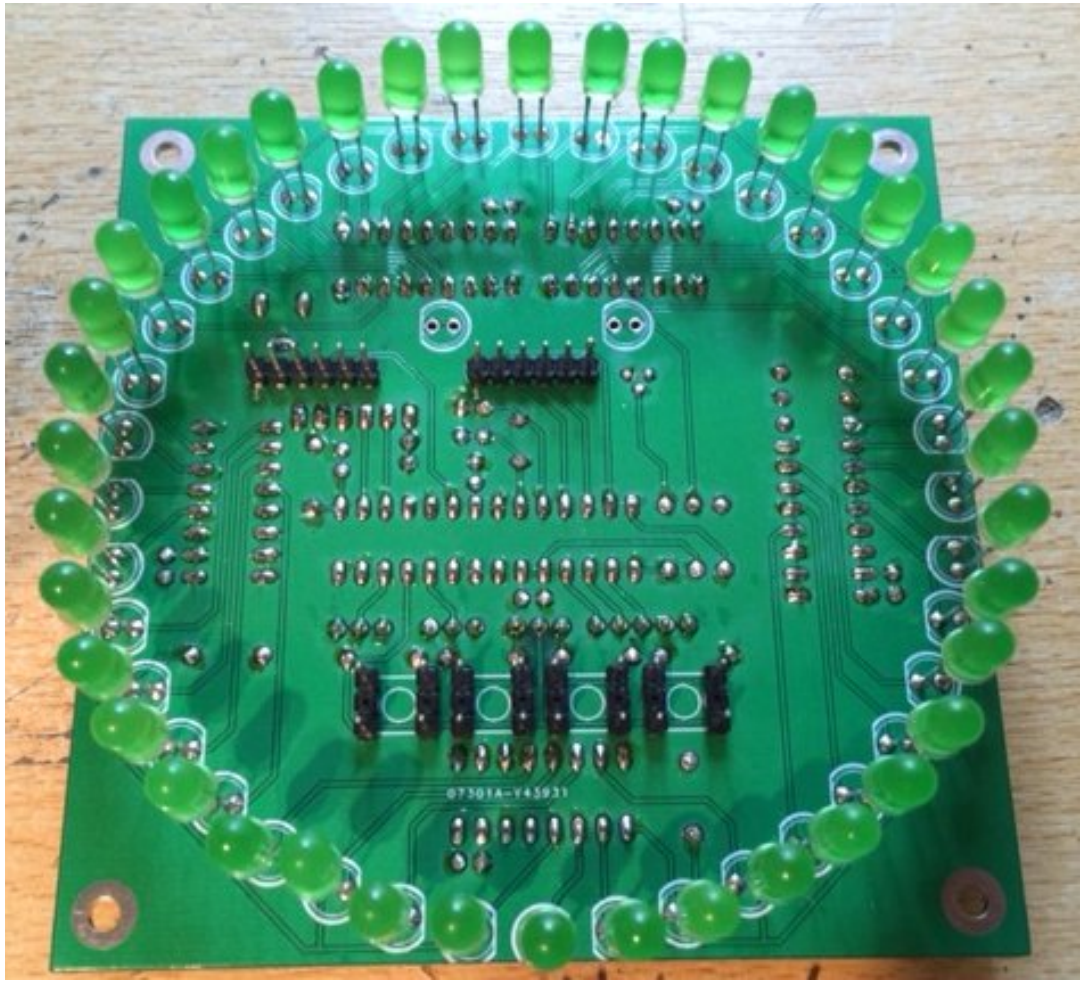
- to the notches at the end of the ic header, these are indicated on the PCB.

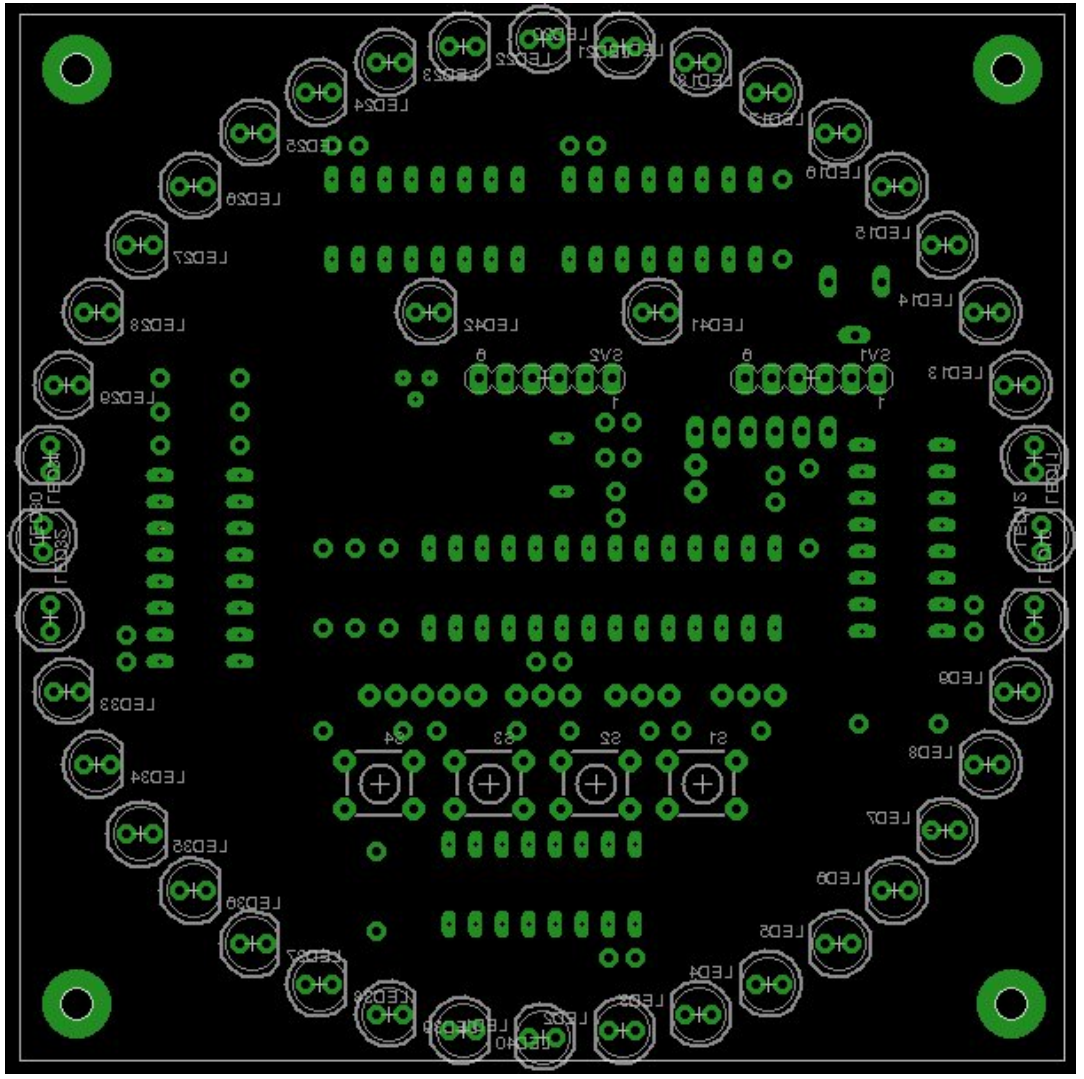
- All pinheaders male except left bottom (see photo).



Continued next page...

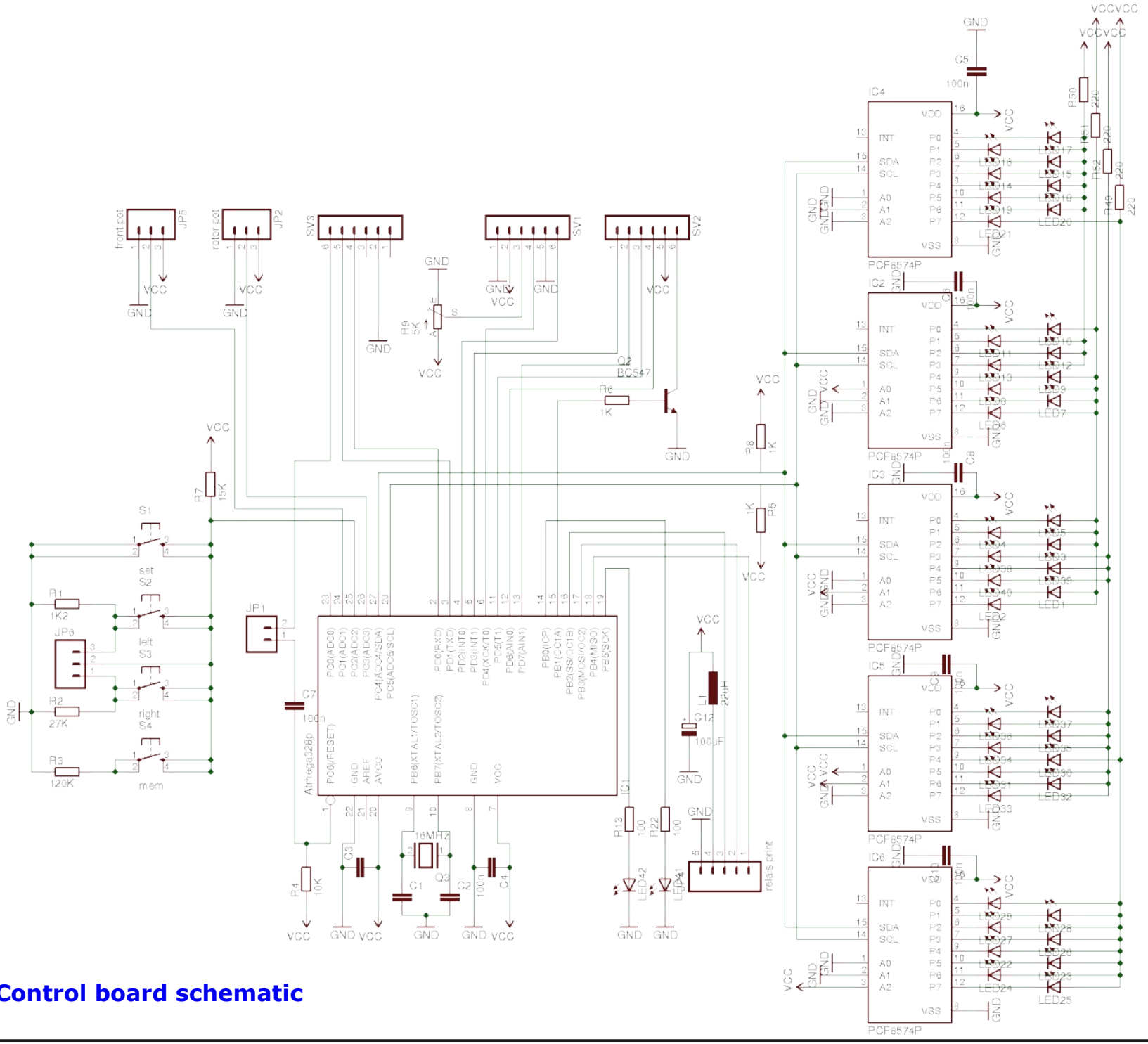
Then we solder the components on the operating side of the PCB without the LCD screen:





Place the LEDs at such a distance from the PCB that the LCD screen will come out underneat your front panel and the LEDs will stick through. In my case this is 11mm.

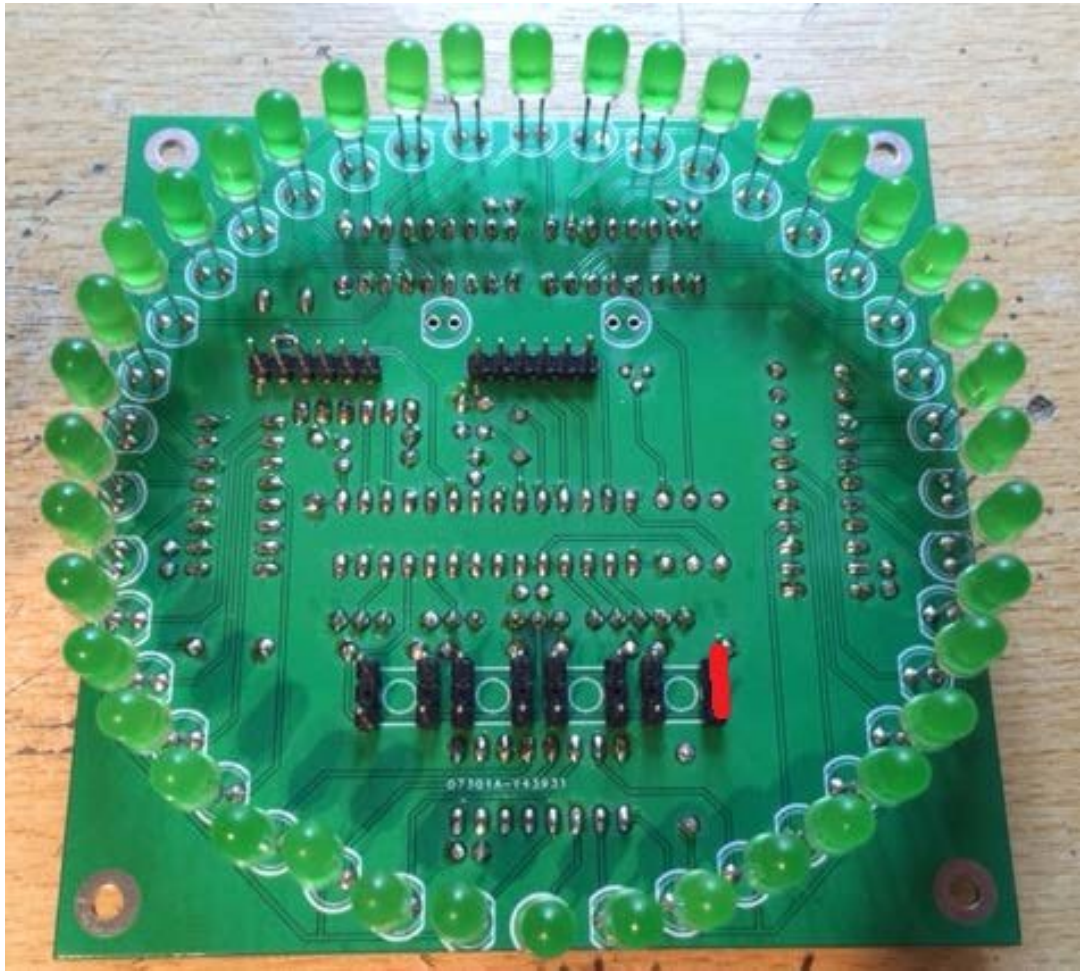
Note the polarity of the LEDs, the flat side on the image of the PCB is the minus. This corresponds to the slanted side of the LED and the short leg of the LED. Once again place the pin header for the LCD but not the LCD screen itself.



Control board schematic

Testing

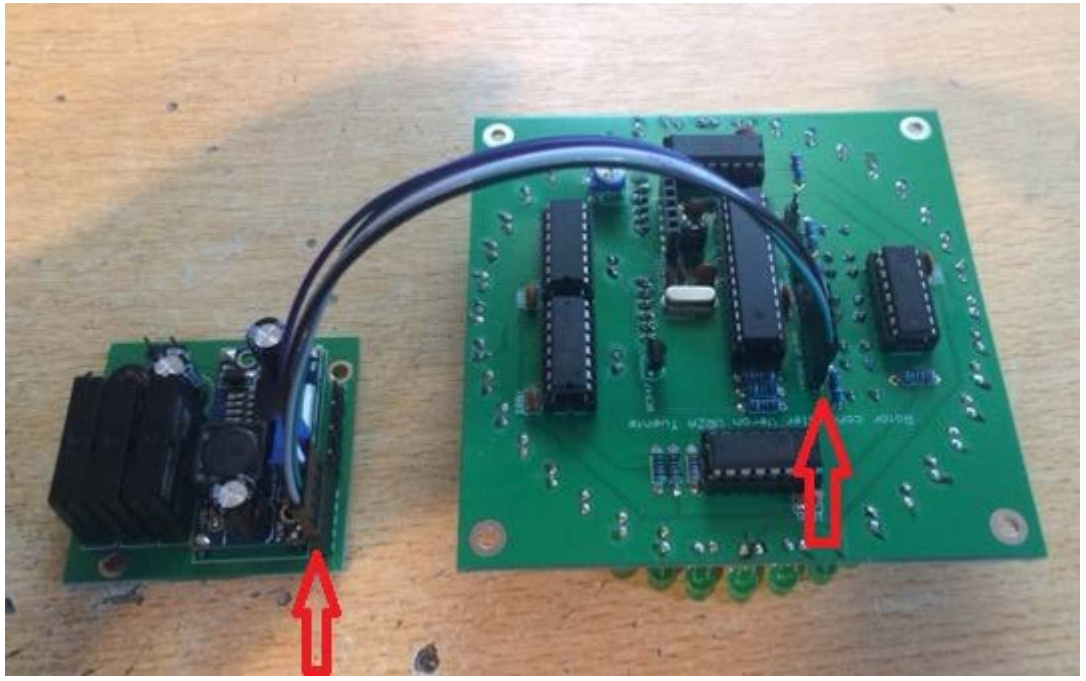
Close the last pushbutton briefly like the red line in the image:



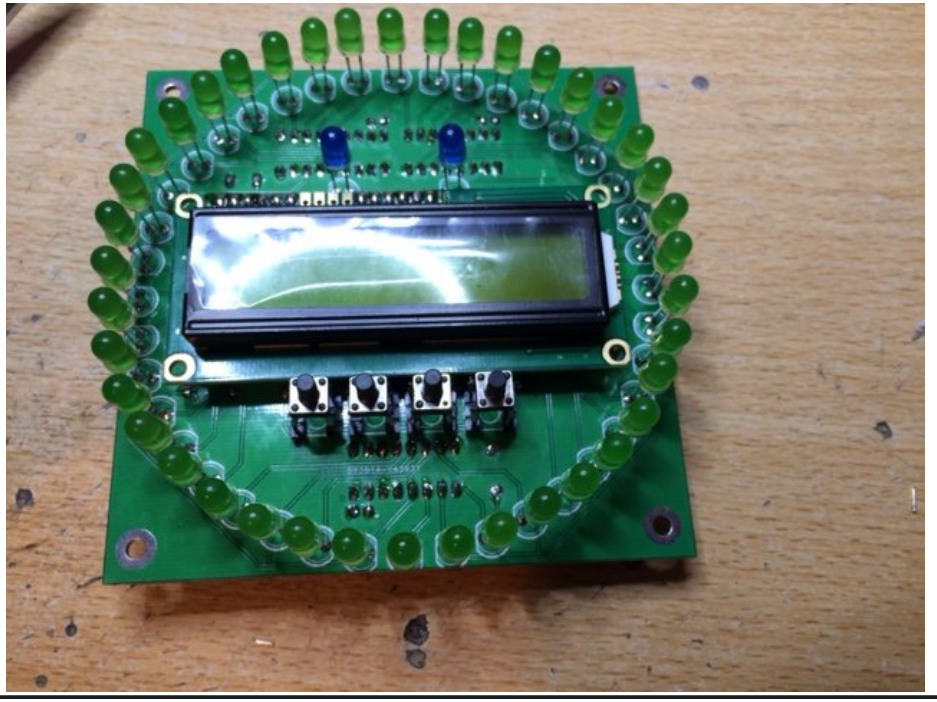
Insert the ICs and connect the power supply board to the control board

Connect the power cable with the same colour below (see photo), the LEDs will now light up in succession as a running light. Check that all LEDs are functioning.

Do not proceed until all LEDs are working.



Solder the push buttons and then the LCD screen on the control side of the PCB:

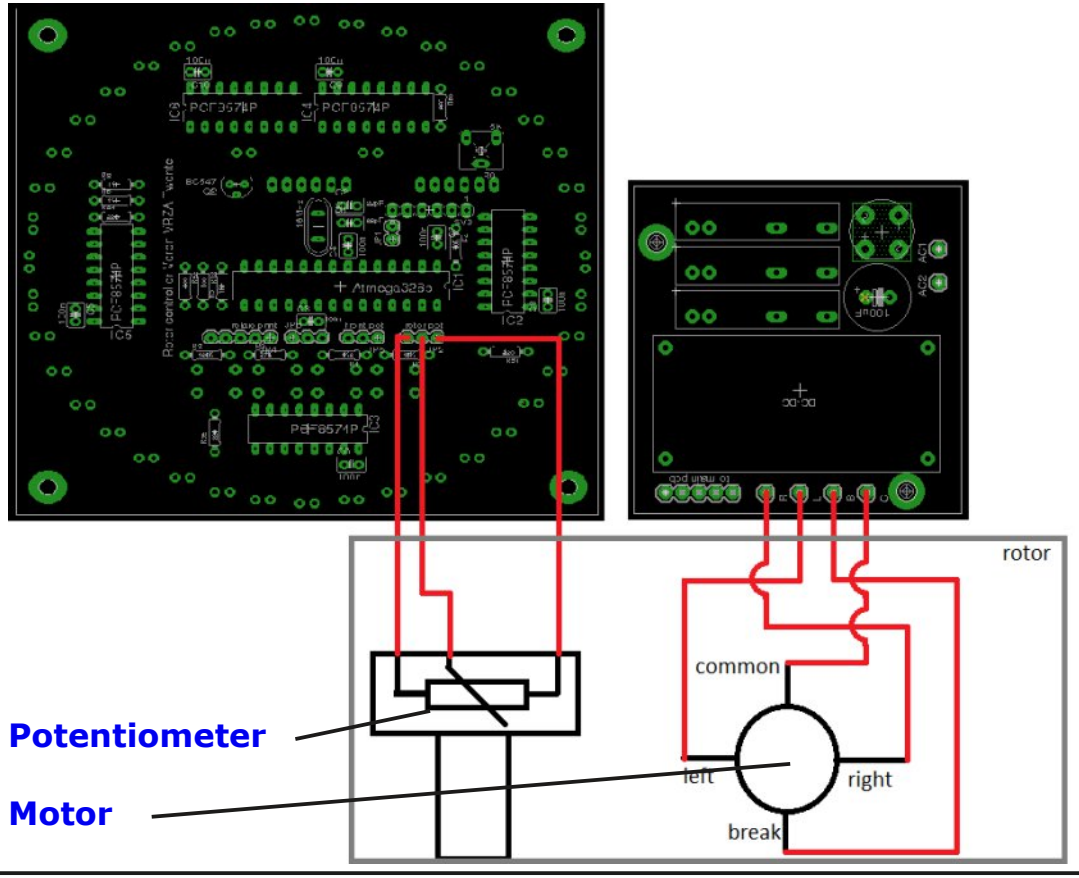


First solder the push buttons and make sure they are sufficiently above the screen to be pressed through the front plate. Then solder the LCD screen onto the PCB, taking into account the height of the push buttons and the LEDs ensure that everything is neatly at the height of the front plate.

To couple the rotor with the control

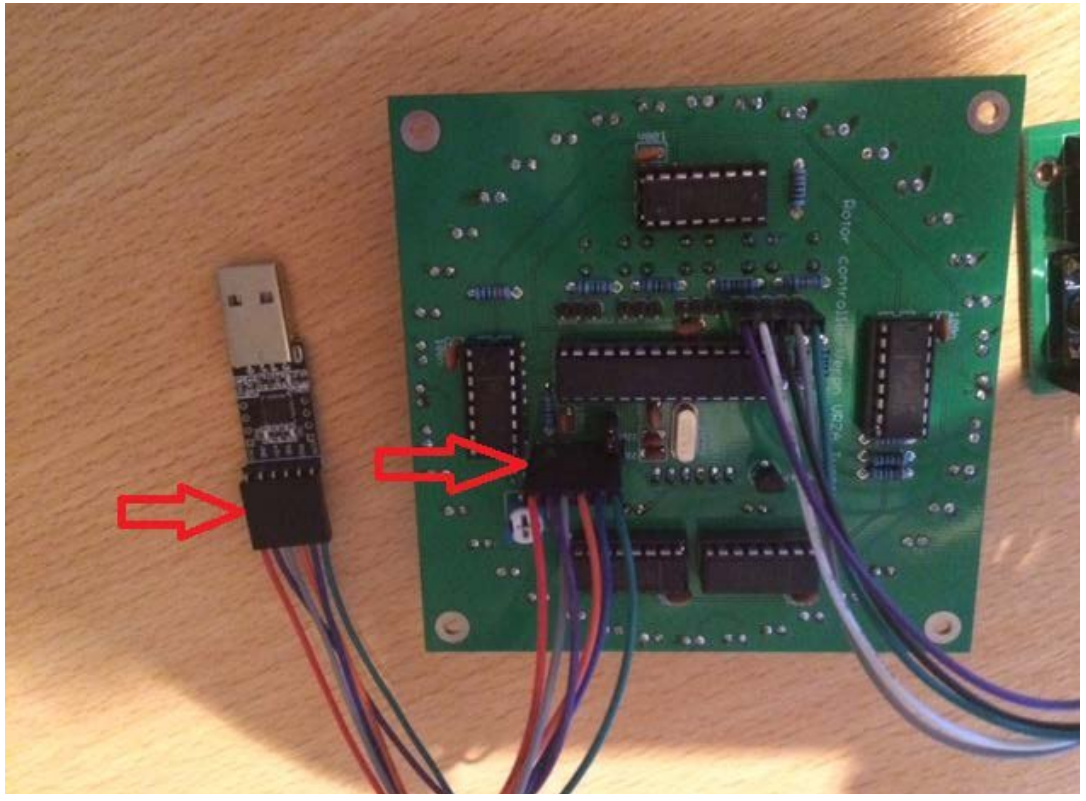
Every Rotor is different but there are many similarities.

Most rotors use alternating current for the motor. Almost every rotor has a potentiometer and a motor with separate coil for left and right and possibly a brake contact. Sometimes the potentiometer is coupled with a ground contact of the motor but in diagram it always looks like this:



Connect USB

Connect the usb converter to the rotor controller as shown in the image below:



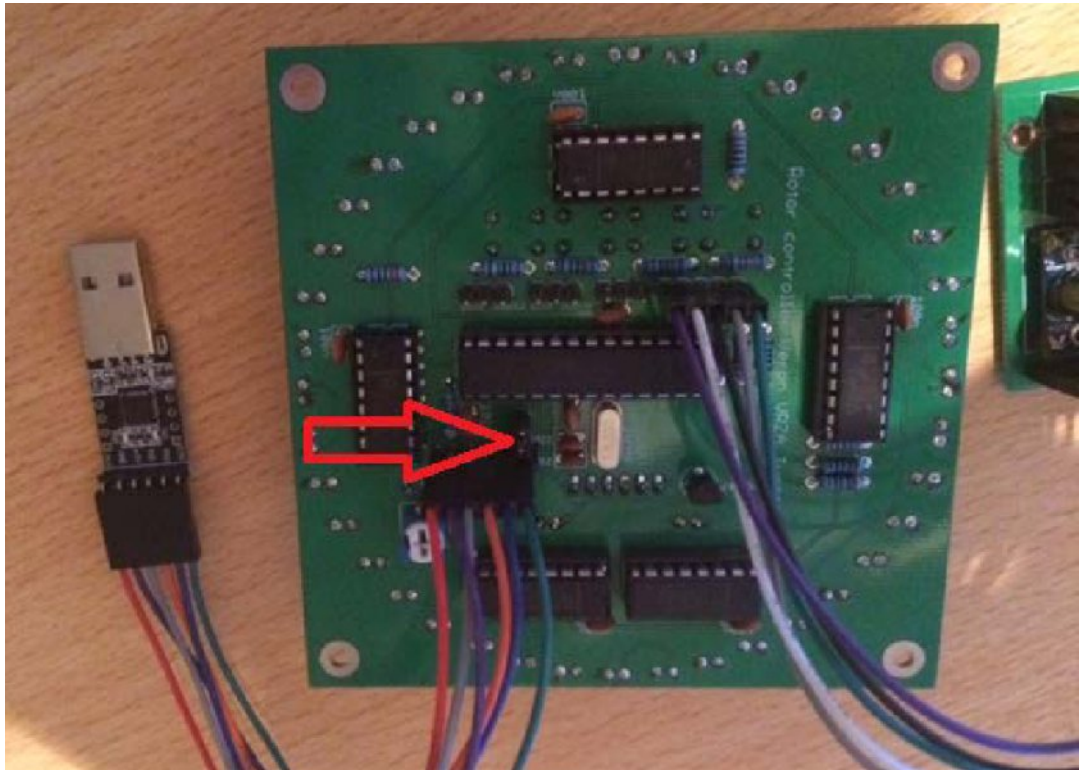
Place the PCB's in front of you as on the photo and make sure that the same color of thread is on the left (see red arrows).

In the kit there is also a USB female to USB female cable, you can mount this neatly in the back of the box.

Programming the microcontroller

The microcontrollers in the kit have already been programmed. However, if you want to re-program it, for example because a new version is out, or because you want to change something yourself, you can.

To put the PCB in programming mode a jumper (or a connection) has to be placed just above the connection of the usb interface.

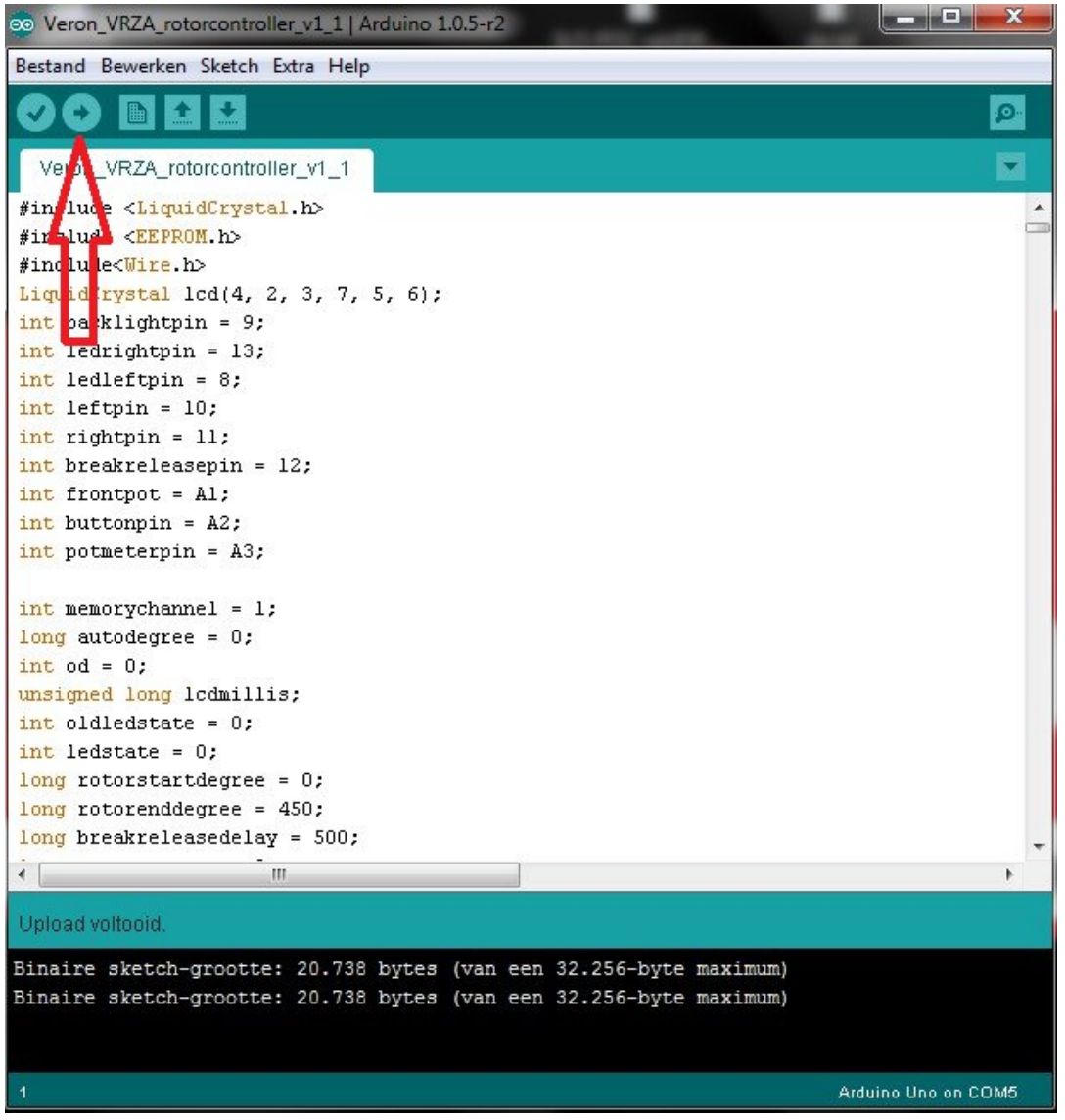


Download and install the Arduino software:
- Windows: *https://www.arduino.cc/en/Main/Software*
- Linux: sudo apt-get install Arduino (log out and log in again to adjust the rights).

Download the latest firmware version from:
http://forum.pe1br.nl/viewforum.php?f=5

Double click on the firmware file, which is opened in the Arduino program.

To load the new software into the microcontroller click on the upload icon.



Wait until the program shows “upload complete” at the bottom of the screen. The firmware has now been updated.

If you have added interesting options to the software, post it on the forum with at least a short description.

Set up

Read this section carefully before using the rotor controller.

Setting the break release and calibration is essential for the use safe of the rotor.

The operation of the rotor controller works completely with the 4 push buttons, on the LCD screen you see all changes.
Seen from the left side:
- Key 1: menu
- Key 2: left
- Key 3: right
- Key 4: confirm

Menu

With key 1 we arrive in the menu. With the buttons left and right you can scroll through the menu and with button 4 you can select a menu item.

The menu options are:

- Memory >> store
- recall
- Settings >> backlight
- brake release
- software
- calibrate >> rotor start
- rotor end
- demo

Memory

In the memory menu you can save a direction and give a name.

This direction can then be retrieved with the press of a button and the rotor automatically turns to that direction.

Save memory channel:

- Place the rotor in the desired direction.
- Press the menu key until there is memory at the top of the screen.
- Now press the left or right button and scroll to the store.
- Press confirm to save the direction.
- Enter a letter with the left or right key
- Press the confirm key to go to the next letter.
- When all the letters have been entered press the menu key.

Recall memory channel:

- Press the menu key until there is memory at the top of the screen.
- Now press the left or right key and scroll to recall.
- Press confirm to enter the recall menu.
- Select a memory channel with the left or right button.
- Press the confirm button and the rotor rotates to the desired direction.

Settings

- All settings options work in the same way.
- Press the menu key until there are settings at the top of the screen.
- Choose with left or right the setting you want to select.
- Press the confirm key to adjust the setting.
- Adjust the value with the left or right key.
- Press the Confirm key to confirm.

Break release:

The break release setting sets the time that the brake in the rotor needs to turn on.

The time you set is therefore the time between unlocking the rotor and rotating the rotor.

With a rotor without brake, it can be set to 0ms. With a rotor with brake, it should never be too short, too long is no problem. You really do not notice A delay of 500ms while working with the rotor

Backlight:

With the backlight setting you adjust the light intensity of the backlight of the LCD screen.

You immediately see the changes when you set this higher or lower.

Software

In the software menu you can choose from various software packages for digital control with the computer. Most software works with the default value, unfortunately not everyone is exactly the same standard. Wintest is an example of this and you can select it in the software menu. If there are more software packages that do not work with the rotor controller please send me a link to the download page. I can try if I can add it to the menu. At the bottom of this manual are a number of screenshots of software settings that work for me.

Calibrate

The first time you turn on the rotor controller, it is not calibrated.

- Go to calibrate with the menu key.
- Press confirm to start.
- At rotor start enter the start degrees of your rotor (at north this is 0 degrees, at south 180 degrees)
- Confirm with the confirm key

At rotor end fill in the maximum range of your rotor, this is usually 360 degrees. When you rotor start is not 0 you have to entered your rotor start + the maximum range. For example: you have entered 180 degrees at rotor start, rotor end becomes 180 + 360 = 540 degrees.

Please note that these files are downloaded from Marcos web site and not the CQ-DATV web site.

Eagle files

Main board: *http://forum.pe1br.nl/download/file.php?id=43*

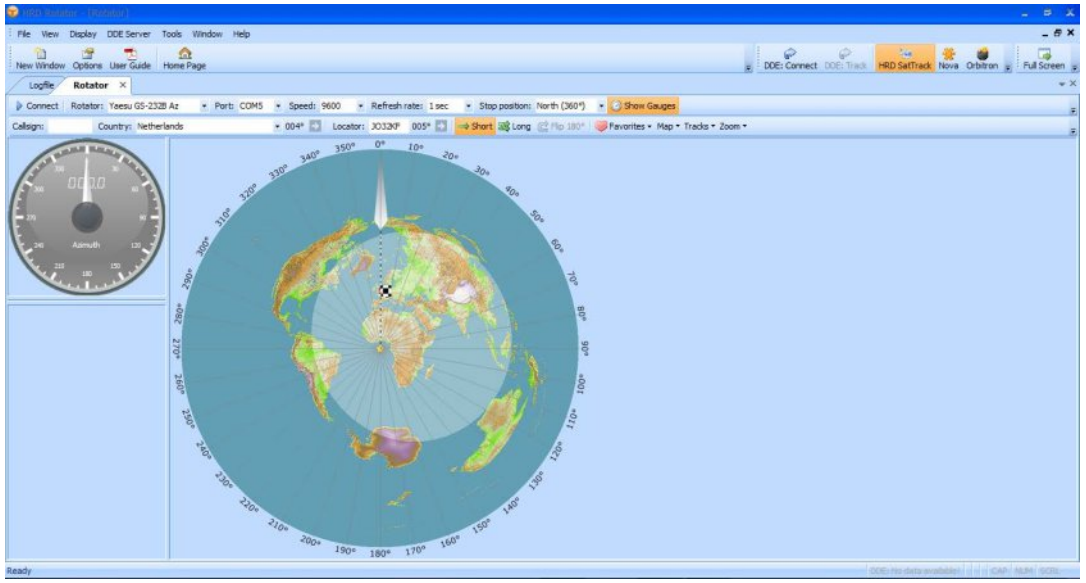
Relay board: *http://forum.pe1br.nl/download/file.php?id=44*

Software version 1.3

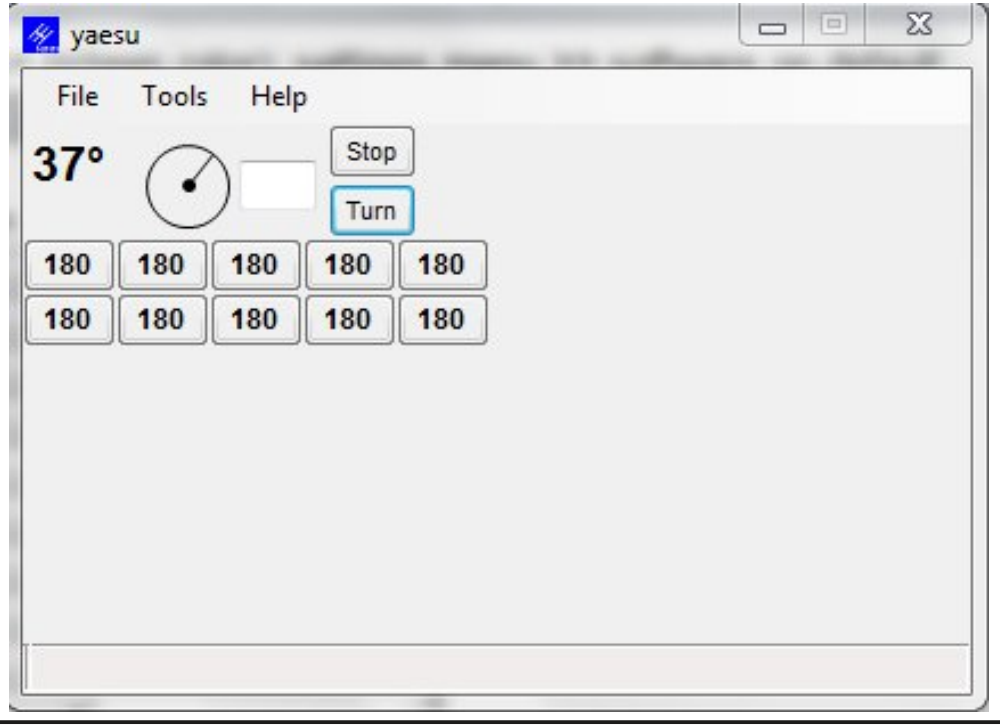
Correction: If the 0 point is not at north, the rotor does not run properly to a memory channel. Problem discovered and solved by Gerrit PE5GSL.

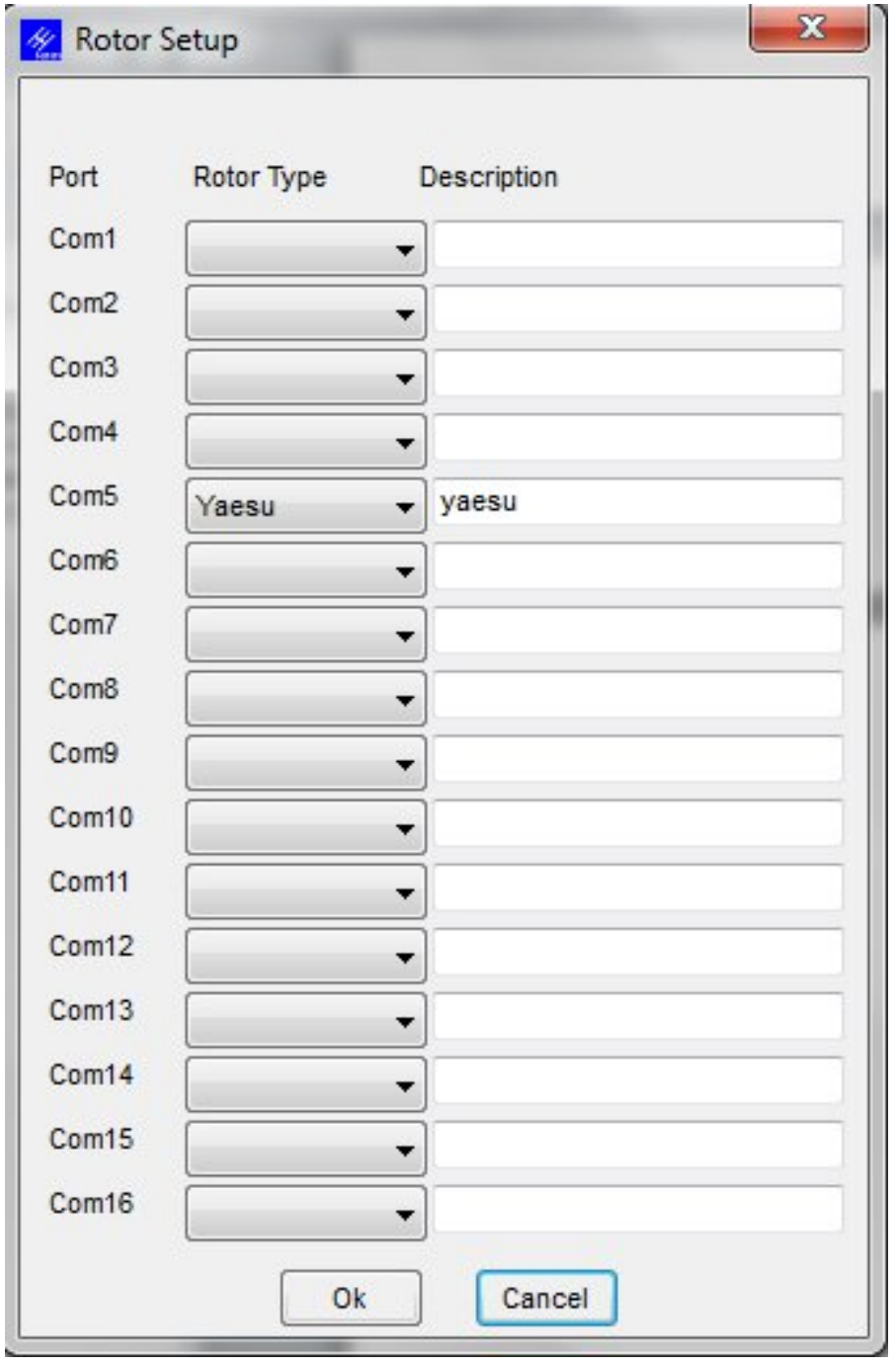
http://forum.pe1br.nl/download/file.php?id=36

Continued next page...

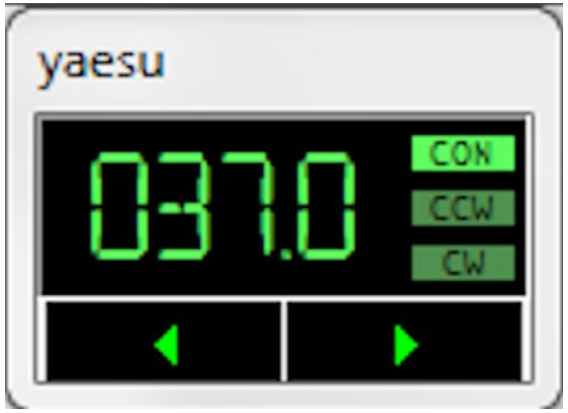


Screenshots - various software packages:

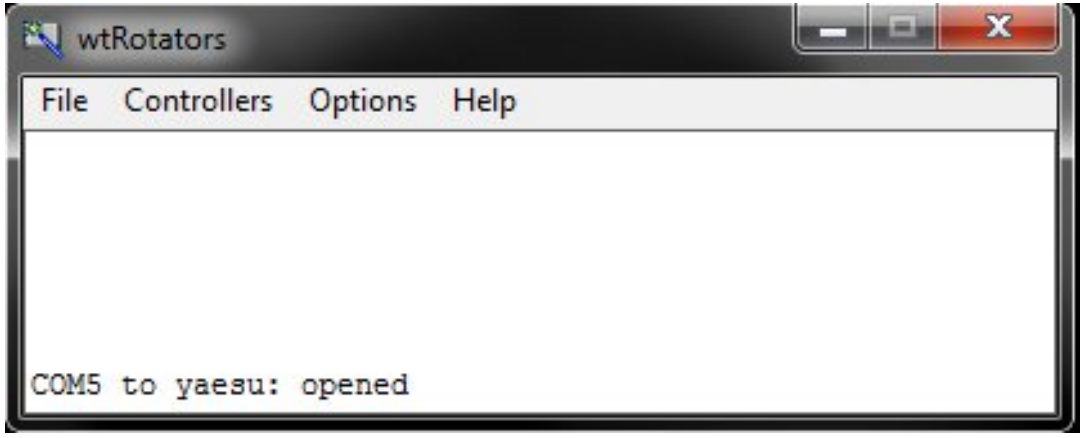


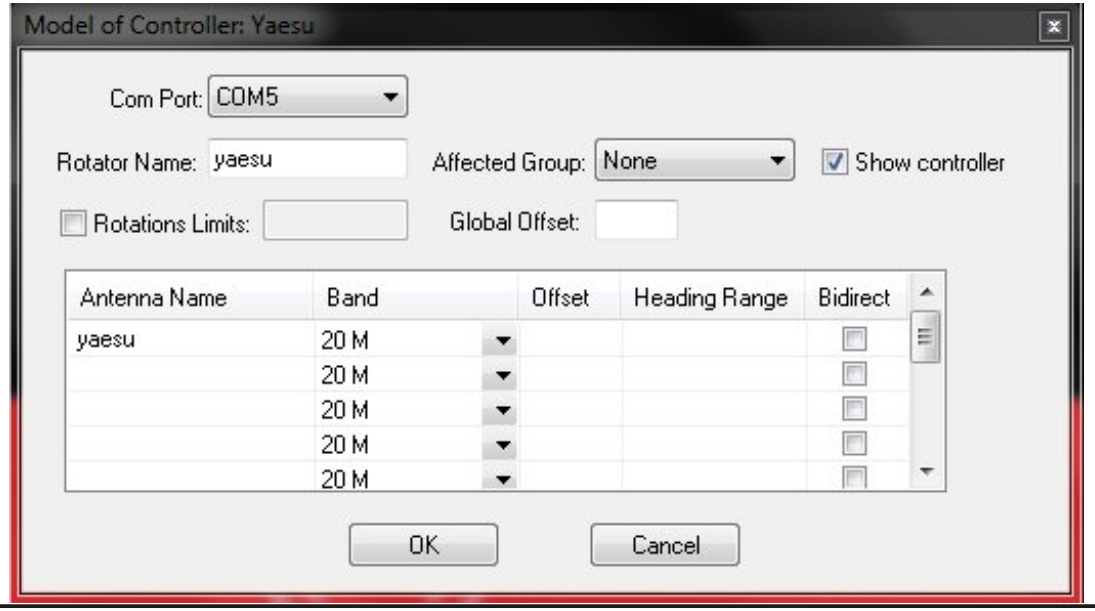


Above: Ham radio deluxe (HRD rotator): settings menu >> software on default.



This page: Wintest (wtrotator): settings menu >> software op Wintest.





Pr
set

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5.6GHz ATV

Written by Gwil Jones (GW6PVK)

During the end of 2017 it came to my attention that 5.8GHz FPV equipment capable of ATV in the UK was starting to become more available for sale on auction sites like Ebay and Amazon.

Most of these device frequencies could be put into the little used part of the UK amateur band on 5.6GHz. After doing some research I ordered various transmitters and receivers from the far east.

The receiver I ordered was the RC832 which is capable of 32 channels, most of the channels are used by the remote control aircraft and drone users.

The receiver is capable of providing PAL and NTSC video output, video out at 1v p-p and an audio sub carrier of 6.5 MHz. It comes supplied with a power lead and a combined video and audio lead, the receiver also has two AV outputs.

The BATC adopted the frequency of 5.665GHZ to use and the RC832 and TS832 channel for this frequency was channel 33.

Transmitter devices range from 25mW up to 2W and RF amps stating 4W output. TS832 devices were ordered and also a TS582000, a 2 watt AV transmitter with a large heat-sink and cooling fan, this turned out to be less reliable and consequently failed after a number of tests.

The TS832, I have found to be more reliable, this also is capable of 32 channels and the channel and frequency is set by the two buttons on the board.

Video in is at 1v p-p with a video bandwidth of 8Mhz. The audio in, like the RC832 is set at 6.5Mhz offset. the output power of this device is stated as 600mW, it does get warm when left on for long periods of time, the solution I used for cooling was taking off the front plastic label down to its aluminium case and sticking on some small heat-sinks which are used for the raspberry Pi. I saw this method being used by another user of these devices (of whom I have forgot who it was) but thanks to his idea along with a cooling fan keeps the device cold. The TS832's 600Mw can also be fed directly into a 3 to 4 watt RF amplifier which is also available from the far east.

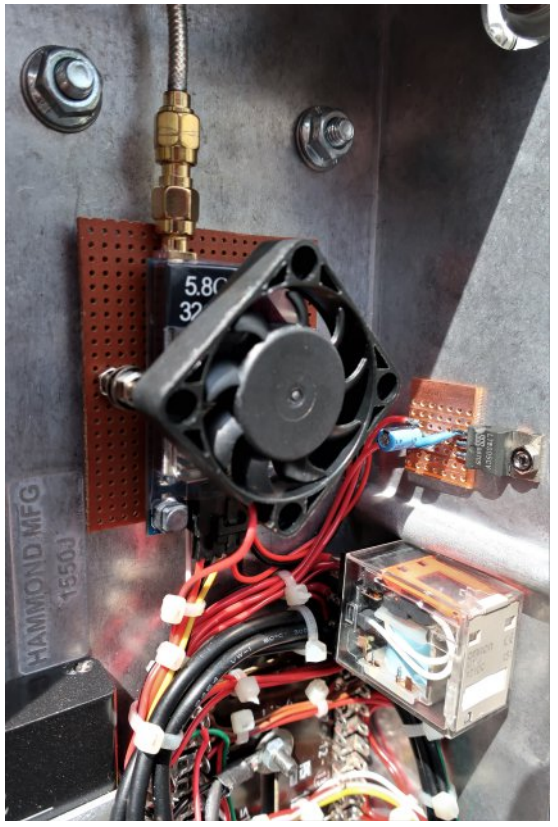
Both devices run from between 7 volt and 15 volts, the transmitter and receiver runs at around 220ma each at 12 volts.

The receiver was fixed against the dicast box with some thermal grease as the receiver was also found to run quite warm when left on for long periods of time. One annoying this about these devices is that they use reverse SMA connectors (RP-SMA) best to order some the same time. Both come with an small SMA antenna.

The antenna I obtained a front fed grid antenna with a stated gain of 26db. The feed system similar to the "penny feed" used on 10Ghz WG16. The mesh is fixed at a vertical position with the feed set to horizontal. Its feed from the change over relay is via an N type socket on the rear. Flat panel antennas are also available with around the same gain, and are also a lot lighter and perform just as well.

Wiring both devices is straight forward, power lead, yellow for video input on the TX and the output on the RX. Red for the audio input for TX and RX output.

I have constructed my ATV transceiver to have two switched video inputs and two audio inputs, this is easier than changing over leads from a camera to a test card for example.



The switched audio in can be fed from a tone input for the other station to detect you and the other a microphone amp input.

Also included in the build is a small 3 watt audio amp to feed a small external speaker or headphones.

A 12 volt switching relay which switches the TX and Rx indicators on the front of the box, the TS832 Tx and the changeover relay at the antenna end, it can also switch off the receiver off if required with an override switch to view the outgoing video transmission. Rf out interconnections to the antenna are via ridged or semi-ridged coax.

I'm not a great lover of RCA connectors, and have found them to be unreliable and a lot of chasing around trying to find faults, I adopted using 75 Ohm BNC connectors and XLR connectors for the audio in and out, I had them hanging around from a previous project.

Testing the wiring before the connecting the transmitter and receiver and ensuring all the voltages are correct and the video and audio switch correctly.

Connecting the antenna and then the supplied leads to the Tx and the Rx. Feeding a video signal in via the input connector and a lead out to a composite video monitor, switching on and selecting channel 33 on both units, if all is well then a video signal will appear on the monitor.

Further testing of the unit is currently underway as I write this and out field testing soon. its a great way for ATV to be taken up "the old fashion way" where it doesn't cost a lot of money to get on the air.

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.

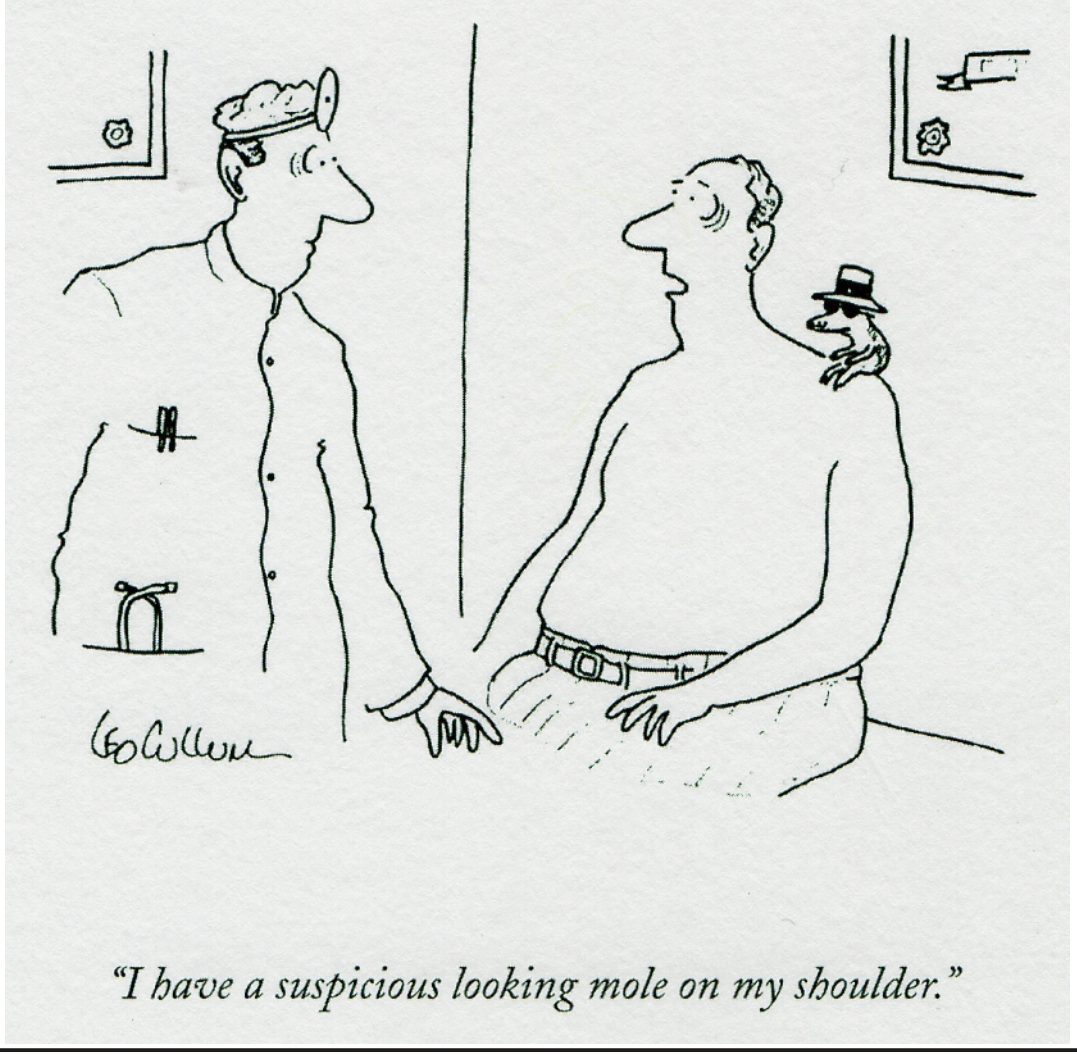
If you are sending a construction project, please include the dimensions of any pcb's and make the pcb image black and white, not greyscale.

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

Coming up in CQ-DATV

Is this the latest issue of CQ-DATV? Click here to go to our web site to check to see if there is a later edition available.

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



"I have a suspicious looking mole on my shoulder."