In this issue

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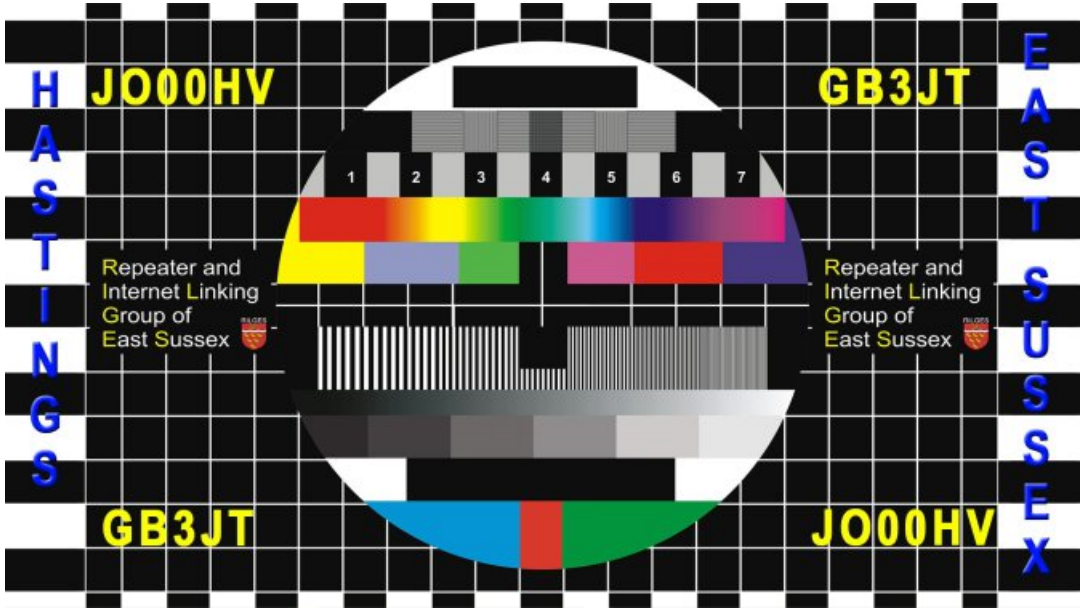
Richard Carden VK4XRL
Ken Konechy - W6HHC
Steve Noll - WA6EJO
Michel - F1DOJ (SK)

GB3JT NoV Has Been Approved

Source:
http://ereclub.org.uk/forum/forum_posts.asp?TID=491

Great news in that our Digital ATV Repeater application for GB3JT in Hastings, is good to go!

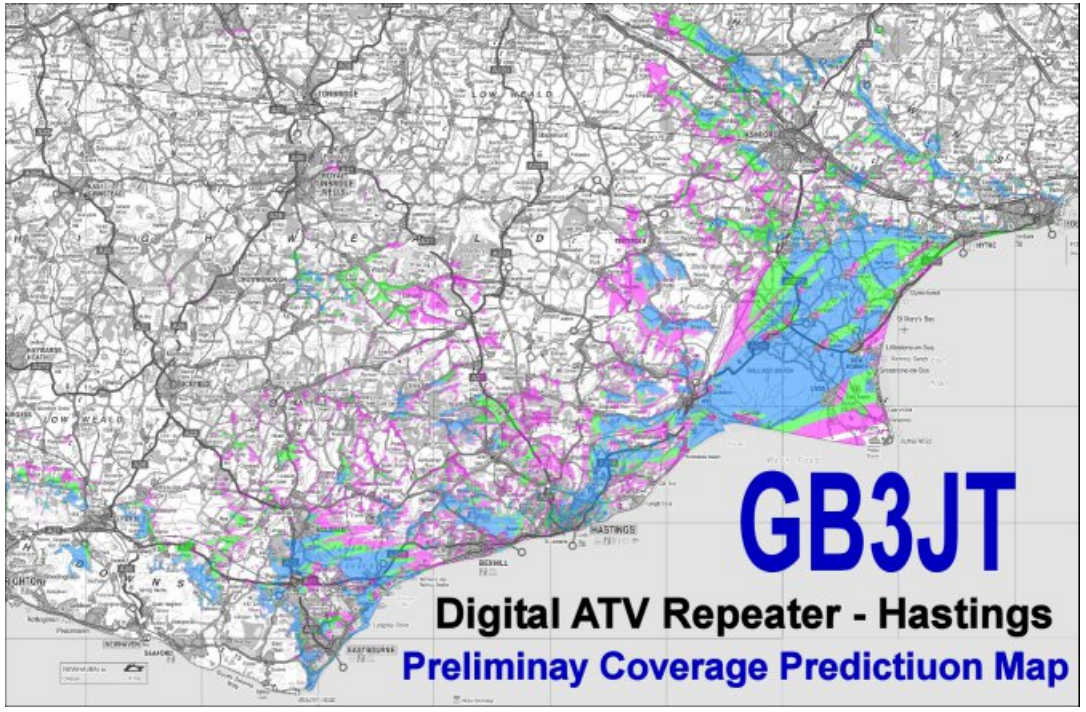


News just in, is that the National Air Traffic Services (NATS), are happy with our application and Ofcom agreement for NoV licence issue is confirmed.

Although the exact frequencies will be noted on the NoV when it arrives shortly, our repeater is expected to have a digital ATV transmitter on 1318 MHz and digital ATV receiver on 1249 MHz. With analogue input frequency TBC.

Talkback will initially be via GB3HE for the early development of our repeater. A separate receiver will then follow, as will internet connection for live feed and control.

The antenna will be a Alford Slot, mounted on top of the GB3HE stack.



Further details to follow as this is still very early days.

UKRepeaters Site
http://www.ukrepeater.net/my_repeater.php?id=2339

Repeater Summary Details for GB3JT
Keeper/NoV holder: DAVE WILLIAMS [G8PUO]

- *TX Frequency/ies: 1318.0000MHz*
- *RX Frequency/ies: 1249.0000MHz*
- *Mode: TELEVISION REPEATER*
- *ETCC Region: South-East*
- *Location/Whereabouts: HASTINGS*
- *Location:*
- *NGR: TQ8251012030*

- *Locator: JO00HV*
- *Latitude/Longitude: 50.878994 / 0.59310621*
- *Group web site: http://www.rilges.org.uk*
- *CURRENT STATUS: LICENSED*
- *Database Entry: 8 Nov 2014*
- *Date of NoV Issue: 6 Feb 2015*
- *Renewal Date: 31 Mar 2017*

Last Chance Saloon for UK amateur Licence holder

Ofcom reported that the number of licences that had not been revalidated continued to fall but at a slow rate, with 22 percent outstanding. It was noted that Ofcom had yet to agree a process for dealing with those licences that remain unvalidated.

Until Ofcom actually revoke unvalidated licences they remain valid and stay in the licence statistics. It seems it could be sometime before Ofcom does anything on this front.

Windermere Triangle

The Daily Mail newspaper reports on the street where cars refuse to unlock but it fails to mention the root cause - a bad choice of frequency for car key fobs.

Unlike the USA which chose a frequency of 315 MHz the UK decided on the unsuitable frequency of 433 MHz as a result the low specification key fobs can stop working when in the vicinity of licensed transmitters operating in the 420-450 MHz spectrum.

Many transmitters such as Tetra operate in this part of the radio spectrum and similar problems have been encountered across the country.

Read the Daily Mail story - Riddle of the 'Windermere Triangle', where cars mysteriously refuse to unlock
http://www.dailymail.co.uk/news/article-1250204/Mystery-Windermere-Triangle-traffic-lights-decide-cars-unlock.html

BBC Video - Mystery of Windermere street where gadgets go haywire:
http://www.southgatearc.org/news/february2010/windermere.htm

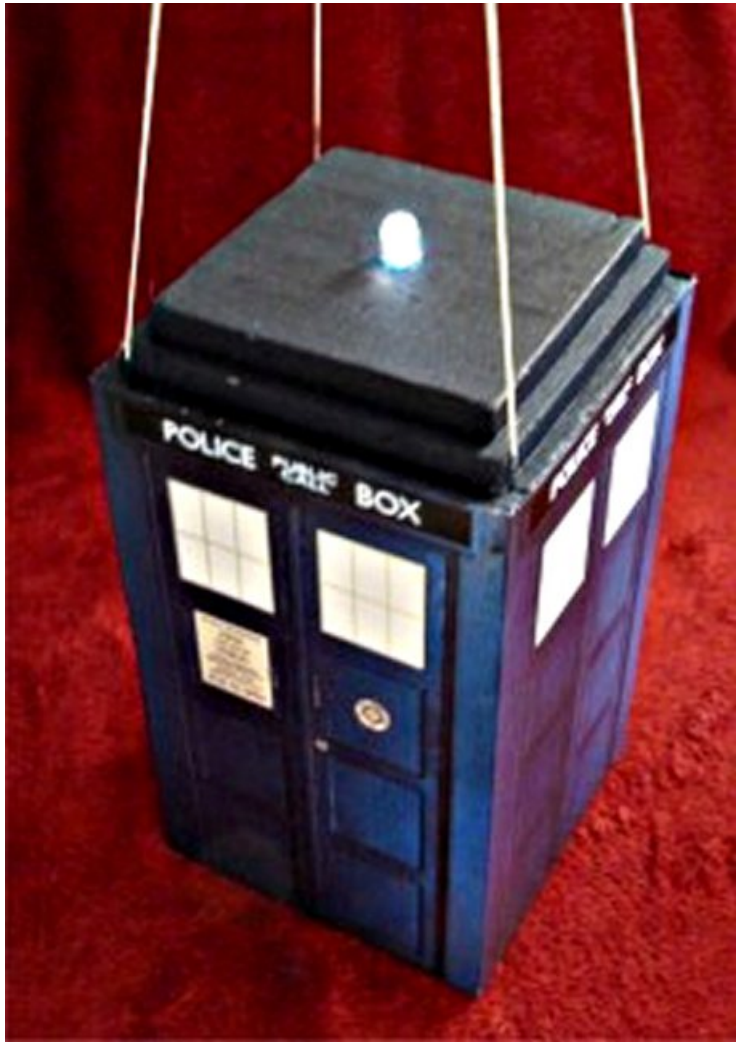
For sale dream ATV vehicle

Eva live TV has for sale a beautiful and brand new Outside Broadcast vehicle, complete with everything necessary for direct Live TV and web streaming. It has an uplink dish, generator and ups, mixer video, encoder Professional mpg2 and mpg4 hd. The Vehicle "kangoo," diesel has about 20.000 km on the clock. Ideal news gathering vehicle, quick and light.

Contact Claudio Mazzoleni via Face Book for a quick sale

Ballooning

Dave Akerman has written *High Altitude Ballooning, From The Ground Up (and back again)*.



See http://www.daveakerman.com/?p=1732, with a section all about pictures from time lapse to 4K recording. So if you fancy getting your ATV kit to where no ATV as gone before, then visit Dave's site.

Updated DX RECORD for DATV transmission on 6M

de Ken W6HHC

On Feb 10, Dave G8ADM completed a one-way transmission to Mike G8LES on 51.2 MHz using DVB-S protocol.
Nearby interfering signals prevented G8ADM (using a 6M dipole) from receiving the transmission from G8LES.
This is the longest DATV DX that I am aware of on the 6M band. It has been added to the updated KNOWN DATV DX RECORDS table below at the very end.

Known Digital-ATV DX Records
updated 2015-02-17
by Ken W6HHC

24 GHz		
124 KM	JA6DME & JA6EES	2011-11-12
Locations Mont Ten-Zan and Mont Ge-Zan		
10 GHz		
450 KM	HB9JBC & F4CXQ	2005-06-21
Locations JN40CT (Sardinia) and JN12OH (Spain)		
5.7 GHz		
341 KM	JL1BLF & JH1GED	2011-08-06
Locations Mont Chokai-san and Mont Kashimayari-gatake)		
2.4 GHz		
252 KM	JA6SPI & JA5MFY	2009-11-03
Locations ??		
1.2 GHz		
440 KM	G4KLB to G1LPS	2010-10-11
Locations IO90BR and IO94EQ		
(tropospheric ducting - one-way DATV)		
419 KM	G4KLB & MØDTS	2010-10-11
Locations Bournemouth, England and Yarm, England		
(tropospheric ducting)		
379 KM	VK3RTV(RPTR) & VK7EM	2011-02-23
Locations Mount Dandenong, Victoria and Penguin, Tasmania		
(operators VK3BFG, VK3DQ , VK3WWW and VK3TRX)		
252 KM	JA5GYU & JA6JNR	2009-11-03
(1 Watt)		
70 CM		
696 KM	F1FY to G8GTZ	2013-09-24
(DVB-S 2MS/sec FEC=1/2 - - one way reception)		
696 KM	G8GTZ to F1FY	2013-09-25
(DVB-S 2MS/sec FEC=1/2 - - one way reception reported by FM)		
Locations IO91KH (near Basingstoke) and JN16VB (near Roanne, France)		

70 CM - continued		
528 KM	G3PYB & F5AGO	2013-09-24
(DVB-S 2MS/sec)		
Locations near W YORKSHIRE and JN06DP (near Poitiers, France)		
501 KM	W4HTB & WB8LGA	2014-07-26
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting		
Locations Bowling Green, KY and Marengo, OH		
373 KM	G8GTZ & F3YX	2013-09-25
(DVB-S 2MS/sec FEC=1/2)		
Locations IO91KH (near Basingstoke) and JN18AP (near Limours, France)		
290 KM	W4HTB & W8ZCF	2014-04-12
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting		
Locations Bowling Green, KY and Cincinnati, OH		
121 KM	KH6HTV to KØRZ	2011-11-21
(video resolution HDTV 1080i - protocol ITU-T/J.83B QAM-64 - one-way DATV)		
Locations Cheyenne, Wyoming and Boulder, Colorado		
144 MHz		
237 KM	F3YX to F9ZG	2011-11-09
DVB-S protocol at 1000 KSymb/s using modified SR-Sys MiniMOD (one-way)		
on 145.0 MHz experimental license 5-Minute max		
Locations JN18AP (near Limours, France) to IN99KC		
28 KM	MØDTS & G1LPS	2015-01-11
H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express		
on 146.5 MHz - UK temporary band allocation		
Locations Yarm, England and Spennymoor (County Durham), England		
50 MHz		
64 KM	G8ADM to G8LES	2015-02-10
DVB-S protocol at 1.133 MSymb/Sec with FEC=3/4 (one-way)		
on 51.2 MHz using 200W avg Pwr Out and BW approx 1.5 MHz		
Locations North of Harrow (IO91TO) to North of Alton in Hampshire		

See more details at **www.von-info.ch/hb9afo/records/recordse.htm**

HiDes Models Comparison Update

By Ken W6HHC

I received a lot of world-wide feedback on the original COMARISON table, espescially from Darko OE7AEC on a few corrections and recent feature changes on HiDes products.

Editors note: The updated tables are available to download, as they are too large to display properly in the PDF version:

http://cq-datv.mobi/archive/page1.jpg

http://cq-datv.mobi/archive/page2.jpg

SS SSTV operational

The Russian ARISS team on the International Space Station started the Slow Scan TV (SSTV) experiment on 145.800 MHz FM at 1000 UT on Saturday, January 31.

Initially there was an issue with the transmissions. Paulo PV8DX in Brazil reported that the 1030 UT pass had a strong carrier but there was no SSTV audio. As expected there was the 3 min interval in transmission.

The issue was resolved late afternoon and radio amateurs around the world were able to receive the SSTV pictures. The transmissions are expected to continue until 2130 UT on Sunday, February 1.

See pictures that have been received at http://www.spaceflightsoftware.com/ARISS_SSTV/

Links for free SSTV software and tracking information at http://amsat-uk.org/2015/01/29/iss-sstv-this-weekend/

MOSCOW, February 2./TASS/. The launches of Russian-Ukrainian conversion-based Dnepr carrier rockers within the Cosmotras international program have been suspended, Russia's Federal Space Agency (Roscosmos) said on Monday.

"Now the project for the launch of Dnepr carrier rockets has been suspended. The prospects of this program will be determined later," Roscosmos said. Cosmotras declined to comment on the statement.

Previous reports said two launches of Dnepr carrier rockets were planned for 2015. The previous launch of a Dnepr rocket took place in November 2014.

A carrier rocket launched under the Dnepr program in June last year put a record 34 satellites into orbit for customers from 17 countries.

Dnepr is a three-stage liquid propellant rocket. Its first and second stages are standard stages of the inter-continental ballistic rocket RS-20 (SS-18 Satan).

The Cosmotras company is responsible for converting the RS-20B rockets originally developed in Dnipropetrovsk, Ukraine, into the Dnepr space rocket.

It is launched either from the Baikonur space site in Kazakhstan or from the Yasny space facility in the Orenburg region in the south Urals.

W5KUB Video Broadcasts

Tom w5kub is now running a weekly video webcast. You can see his first programme here https://www.youtube.com/watch?v=-TsCbfA8Tp8&feature=player_embedded in which he talks to Glen Popiel, KW5GPauthor of the ARRL publication Arduino for Ham Radio. This publication is becoming the handbook for Arduino Microcontroller Projects. The aim of the webcast is to create a two way video using google plus hangouts or skype those that want to be on the show please email tom if you would like to get involved this applies to hams or swls wa5kub@gmail.com you may need to download the plug in and open a google plus free account https://plus.google.com/hangouts

Tom would like hams and swls from all over the world to join and talk about what they do on ham radio for say 5 to 10mins. It is every tuesday night 2000 central time, thats Wednesday morning at 0200gmt. You can watch the show live on the w5kub site www.w5kub.com

A recording is on youtube which is not edited https://www.youtube.com/results?search_query=http%3A%2F%2Fyoutu.be%2F-TsCbfA8Tp8

Please check out our ham radio video broadcast page at http://w5kub.com and please join our W5KUB video broadcast group at: https://www.facebook.com/groups/279273778772594/

w5kub round table webcast promotional video https://www.youtube.com/watch?v=b79s8TqitaM&feature=youtu.be

73 Ian G3ZHI www.qsl.net/g3zhi

Editorial

It is always difficult to set the formula for a new magazine. We know we are the new kid on the ATV block and we are doing things differently to everyone else. We are publishing only in an electronic format, we are not charging and we publish CQ-DATV monthly. These are linked together. Electronic only is very low on costs, to the point where we do not need to charge.

We did set out to circulate CQ-DATV around the world and the cost of something that is considered low in Basingstoke, UK, could be unaffordable in other parts of the world. We do not have a club to support and understand the costs of those that do, but should members not be members because they want to support the club, not because it is the only way to receive a publication? So we are asking other ATV organisations to consider free publishing in electronic format as a way of increasing their circulation.

It a brave move for anyone to give something away, but we need to remove barriers to ATV. We are a small part of Ham Radio and communication across all the different communities is essential. Technology is moving in our favour not against us. DATV is opening doors to new bands.

Electronic publishing has removed publication costs and the Internet is playing its part with web-streaming and one day ATV repeater linking. Let's try riding this wave rather than fighting it.

Nobody knows how many ATV enthusiasts exist in the world, CQ-DATV being free, should, we hope appeal to all. Yes there are language barriers and although translation software is far from perfect, electronic publications can be cut and pasted into suitable software and something semi understandable does emerge.

At the time of writing, CQ-DATV has had just short of 75,000 downloads since issue 1, so divide that by 20 (for the number of issues) and we are well over 3000 downloads per issue closer to 4000.

Yes I am sure some of these are robots, but equally I am sure there are ATV enthusiasts not reading CQ-DATV. Ian is working on the download software and soon we will know which countries we are reaching and the volume.

Please lets all pull together and get the ATV word out there. CQ-DATV is, we hope, doing its bit.

This year we are going to take the CQ-DATV banner out to our first rally. This will be the NARSA rally in Blackpool. The south of England is already well catered for, so we thought we would start this activity further north and try to spread the ATV word in a lesser served area.

We have assembled a team and the stand is being planned. This will show ATV activity and the necessary hardware. I hope that we can also encourage our readers around the world to do the same. It's not difficult to contact an exhibition organiser, book space and take along some kit. Even a laptop loaded with demonstrations of our hobby.

Soap box away and please enjoy the rest of our magazine, which has part 2 of Steve's tri band dish feed and the latest DATV express news from Ken. Richard has been looking at phased aerial arrays whilst Trevor has written another instalment of moving on with film making. John has been busy in his workshop designing a video sweeper for home construction and Fabrizio describes a 10GHz Omni-directional TX Antenna. So please enjoy CQ-DATV 21.

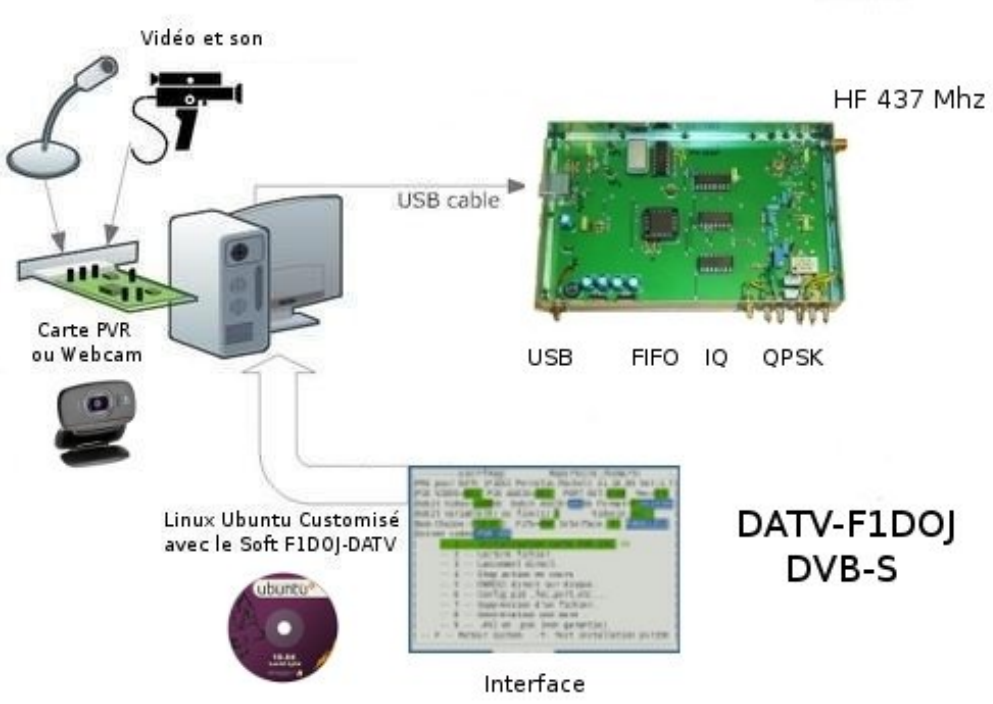
The CQ-DATV Production team.

Version 2.R of the DATV DVB-S 437/438.5MHz

F1DOJ http://f4agc.free.fr/

Complete information about the author F1DOJ

This article describes the steps necessary for the implementation of a DVB-S digital television transmitter designed by Michel F1DOJ (1946-2013).



With version 2.R of its software (see download), Michel F1DOJ propels the OM into the field of fully digital ATV. The pictures are of outstanding quality, the source being either a good definition webcam on an external USB port (or the integrated webcam of the notebook) or the screen on which can be scrolled, images and videos uploaded without prior treatment.

The DATV achievement of Michel F1DOJ, by its simplicity and low cost, has attracted a lot of interest in the Amateur Radio community.

During the CJ 2011 exhibition and a chance meeting by F1DOJ and F4AGC, the talk mainly revolved around DATV. Michel tells of his approach and the outcome of its implementation.

In 2012 the author F1DJO, organized a presentation of the project in Vendée (France), where Michel explained the DATV transmitter. Everything is based on high-performance software and a pcb on which co-exists a QPSK modulator and a FIFO interface through a DB25.

The OMs present (beta testers) realize the rough cuts of the first assembly, and it is with satisfaction that they see their first DATV images.

Following this success, Michel F1DOJ authorizes the release of its realization. A website dedicated to achieving it is born and reflects the evolution of the project.

Today it is now feasible to have DATV with a laptop computer equipped with a webcam, the software on an USB key (auto start) plus QPSK interface.

Here we saw a creative OM (with a lot of hard work and time spent on the set), OMs supporting the project so the whole radio community can enjoy Michel's outstanding invention.

We must thank Michel for his incredible personal investment in DATV, the OMs behind the project and of course all those that contributed to the necessary adjustments' at home of the very first DATV transmitters, giving effective feedback on problems and providing solutions and improvements.

Package description:

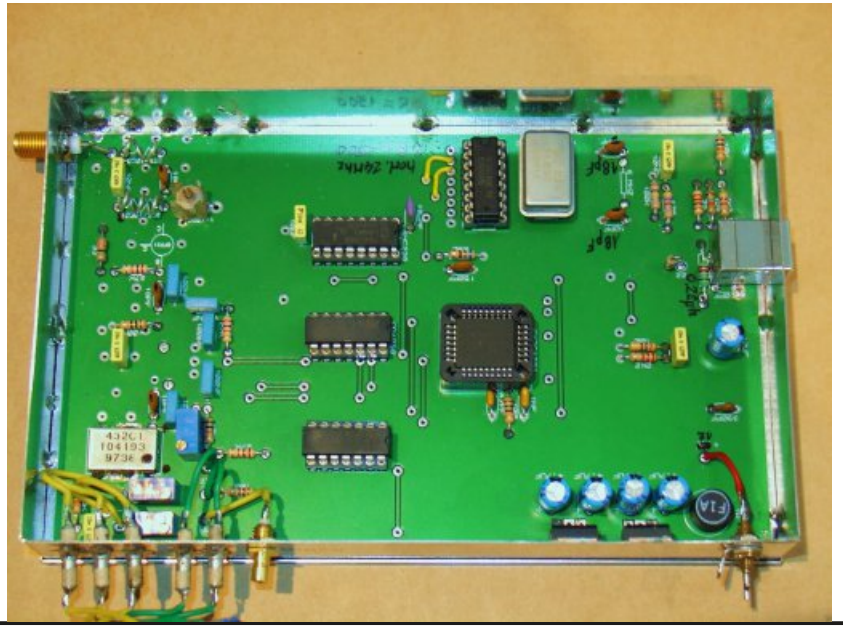
This new installation is a compilation of version 1, which included the QPSK card, USB card and the 437/438.5MHz transmitter.

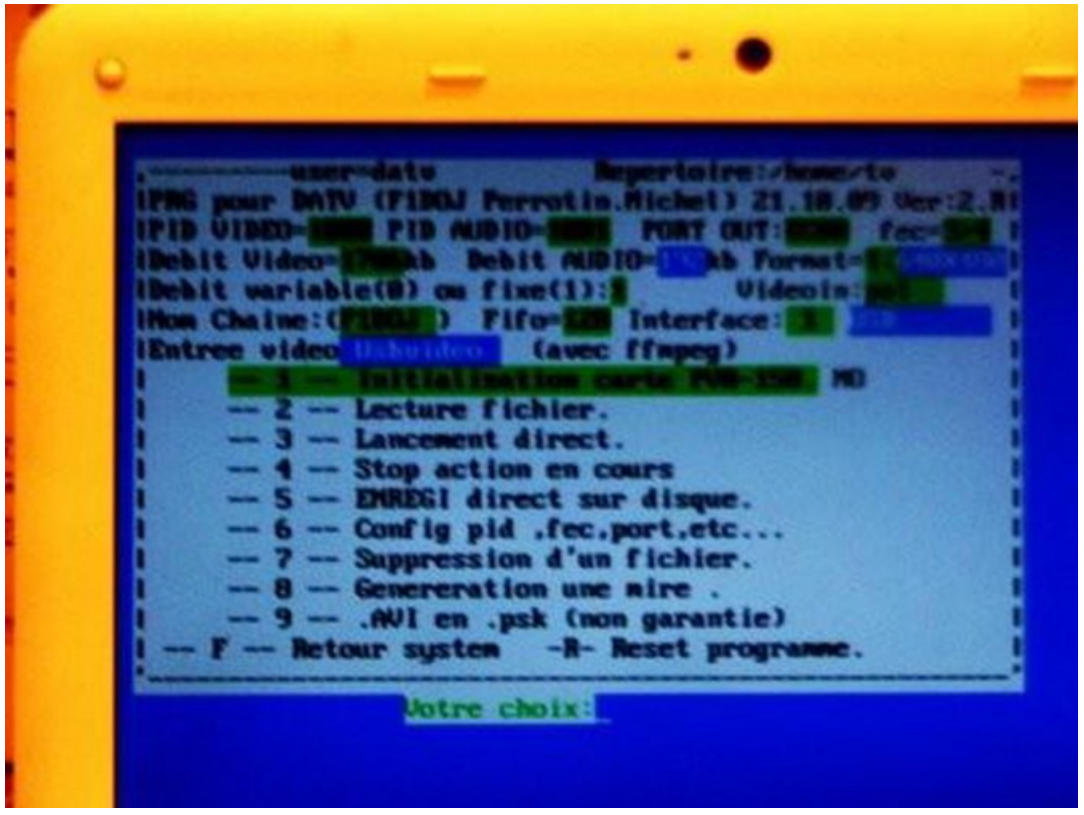
Some components have been removed, including parallel port connectors and resistor network. The QPSK generator is simplified with the use of a U2790B that allows digital/analog modulation with a switchable RF output 437/438.5MHz.

Using a double-sided PCB with plated through holes, soldermask and silkscreen, simplifies assembly and reduces the risk of a short circuit between tracks.

Mounted in a Schubert housing of 100x160, this set is very compact.

USB input, UHF output bushings for switching of digital/analog and 12V power supply.





By starting the computer with this USB key, software launches automatically, no need to install Linux on the hard drive. Linux is transparent! All functions are available except the option screen capture as the graphics mode is not present on the key (compact mode).

Now, if you want all of the options you install Linux on your computer by following the instructions here.
List of all features:

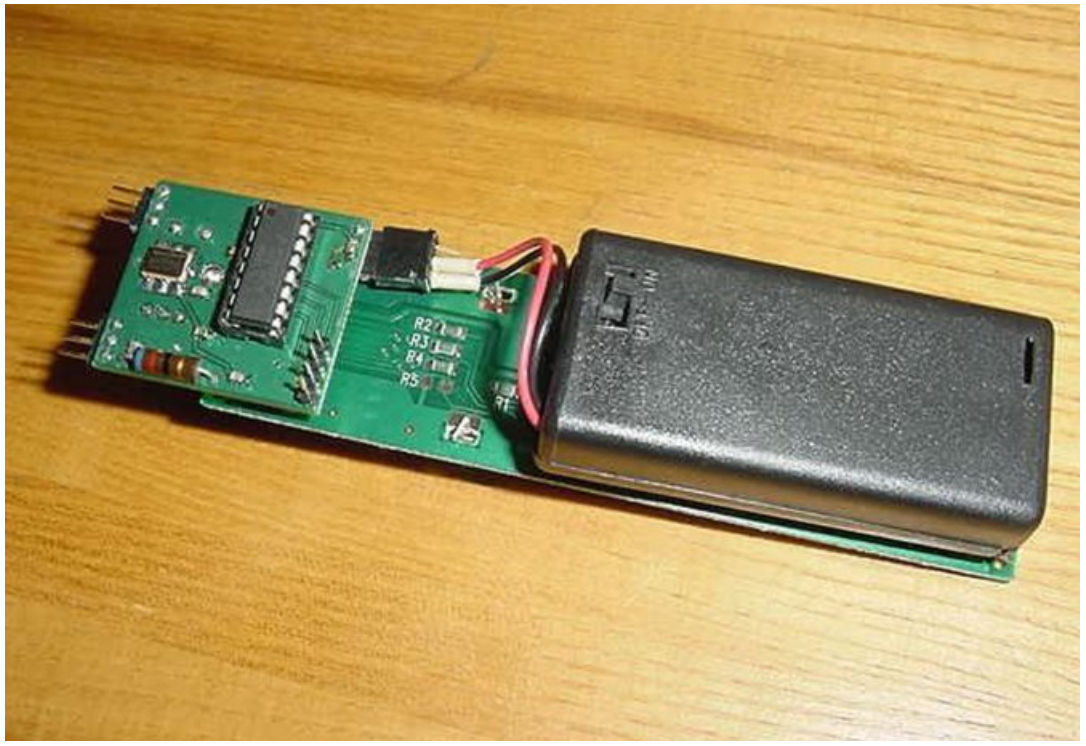
- *Editable SR * by clock change.*
- *FEC: 1/2, 3/4, 7/8.*
- *Configurable PID.*
- *Image Format: 352 x 258, 352 x 476, 640 x 480, 720 x 756.*

- *Audio Output: Stereo 192Kb.*
- *Video Bitrate: Adjustable (4500Kb tested with an SR 3000).*
- *Dual stream: live on Channel 1, Channel 2 on sight.*
- *Methods and tag with relay settings.*
- *Creation of test patterns and video in a few clicks.*

* In the assembly, the clock allows a flow 1500Ks/s (24MHz: 16) but any setting of the divider is used to select the desired flow rate (SR), for example:-

For de1667 flow, you can use a crystal oscillator and divider 26,670MHz 16.

We also tested a K5BCQ generator (model CMOS) Si570, it works perfectly.



List of components:

Resistors:

1 x 33 ohm	2 x 22 ohms
4 x 100	1 x 470
1 x 680	1 x 1.5K
1 x 2,2	1 K x 4.7K
3 x 10K	3 x 27K
1 x 100K	(1 x 400 K) replaced with 500k trimpot

Capacitors:

CMS: 1 x 1 nF and 10uF

5 x 18pF	1 x 47 pF
2 x 150pF	1 x 180pF
1 x 390pF	1 x 1nF
6 x 10nF	5 x 100nF
4 x 4.7uF	1 x 10uF

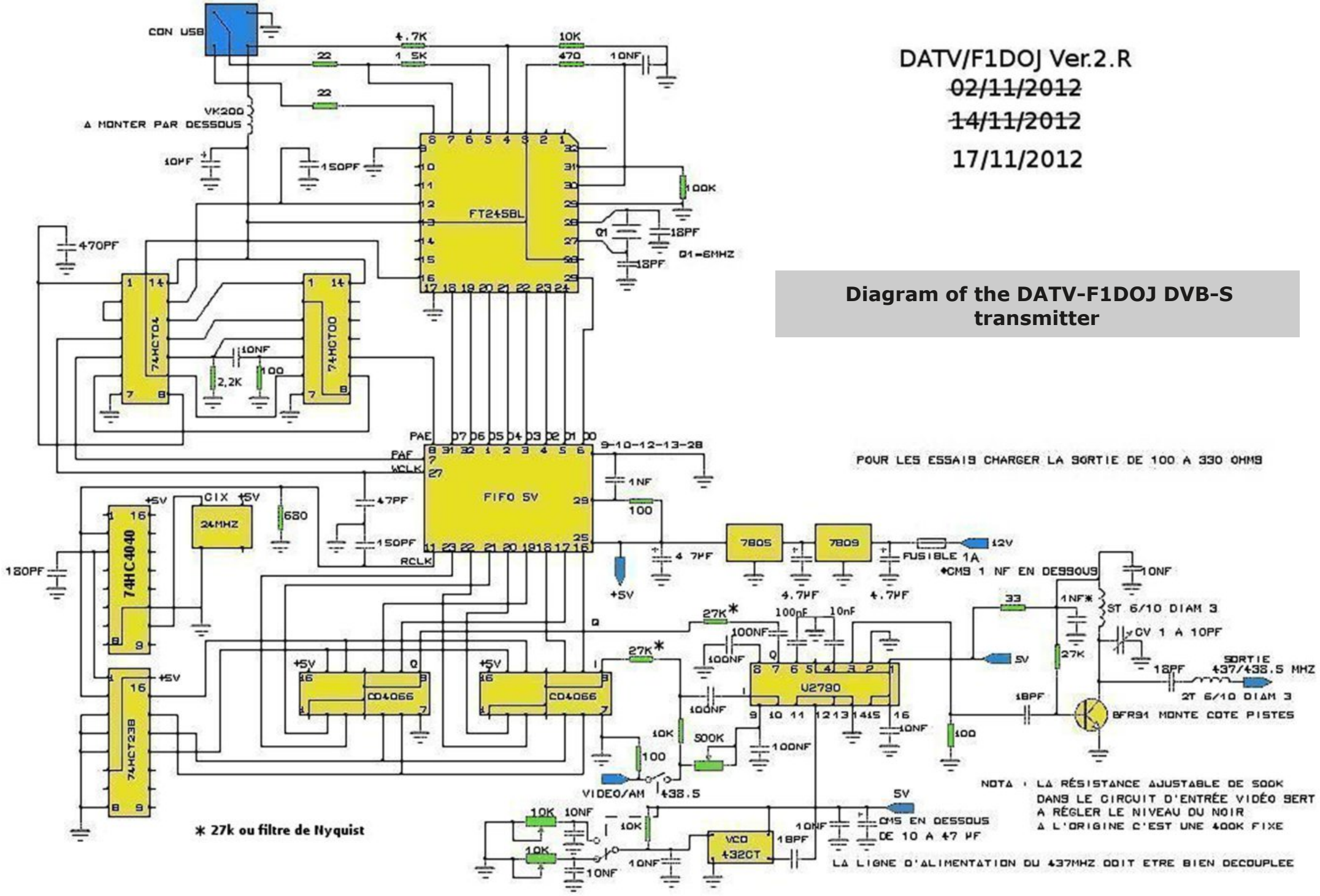
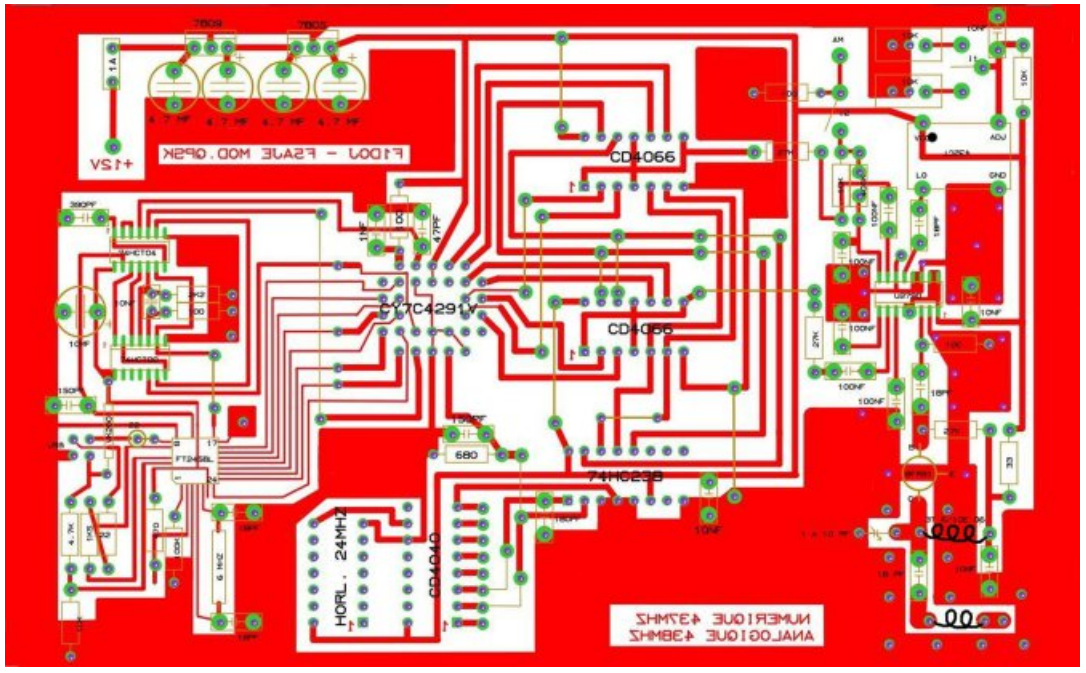


Diagram of the DATV-F1DOJ DVB-S transmitter



Component layout: side view components transparency. On the PCB with plated through holes, the components are printed

Active components:

1 x BFR91	1 x 24MHz clock
1 x CY7C4291FIFO*	1 x 74HC4040
2 x CD4066	1 x 74HC238
1 x VCO (432CT)	1 x fuse 1A
1 x 7805	1 x 7809

SMD:

1 x 6MHz Crystal	1 x 74HCT00
1 x 74HCT04	1 x FT245BL (USB)
1 x U2790B (mod. Quadra.)	

1 x PCB CIMKO*

Trimpots:
2 x 10K, 1 x 500K

Trimcap:
1 x 1-10pF

1 x VK200 or 22uH inductor

1 x Double Inter 3 positions

1 x USB2 chassis connector FEMALE COUSBCIMP-B

IC Sockets:
3 x 14pin 2 x 16pin
1 x PLCC32 *

Wire for coils

*Check with CIMKO: 0240345657 Phone (info in the blog)

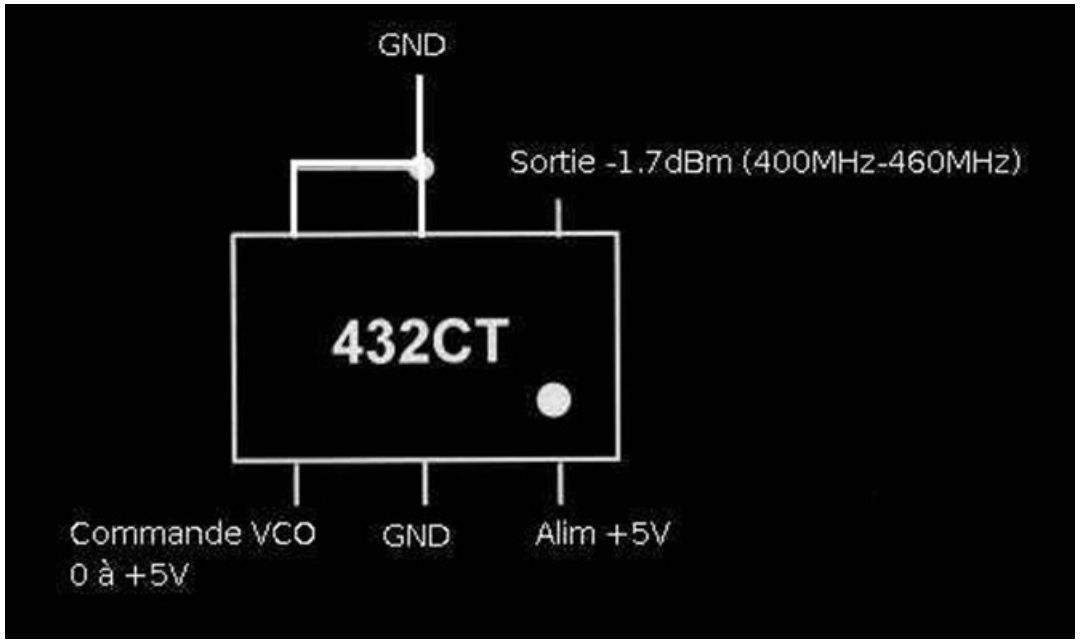
Note on VCOs:

We used 432CT we had in the junk box. This VCO puts out the right level for the U2790. Many OMs have them. This component is unfortunately obsolete and rare. By searching the internet you will find in England and Italy. The 432CT400 oscillates on 437MHz, there is no need to change it. You can also use for example: ZCOMM-V400ML01 *, or create your own VCO.

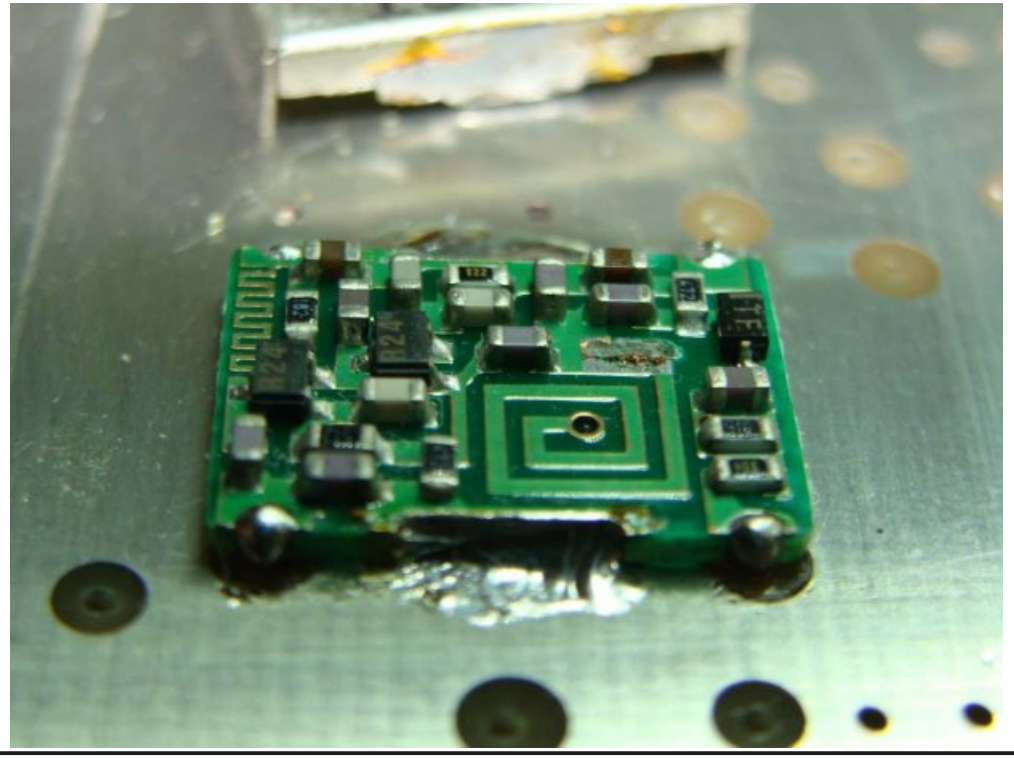
Beware the U2790B input level is very low: -10dBm (100uW). There is a risk of damage, if too high a level, get an attenuator adapted to the output of the VCO. This assembly is experimental and you can improve it

If you synthesize the VCO, pay attention to the phase noise. The VCO may be mounted in a small shielded enclosure above the pcb.
Calculating attenuators on the website of radio club CESTAS:

http://www.f6kuq.org/f1hru/Attenuateurs.html



Above: 432CT Pinout Below: 432CT without housing



Marking of the 432ct vco home rf electronica

432ct350: 432ct 9736 104193

432ct400: 432ct 9738 104193

F8CDM used the 432ct400 unchanged.

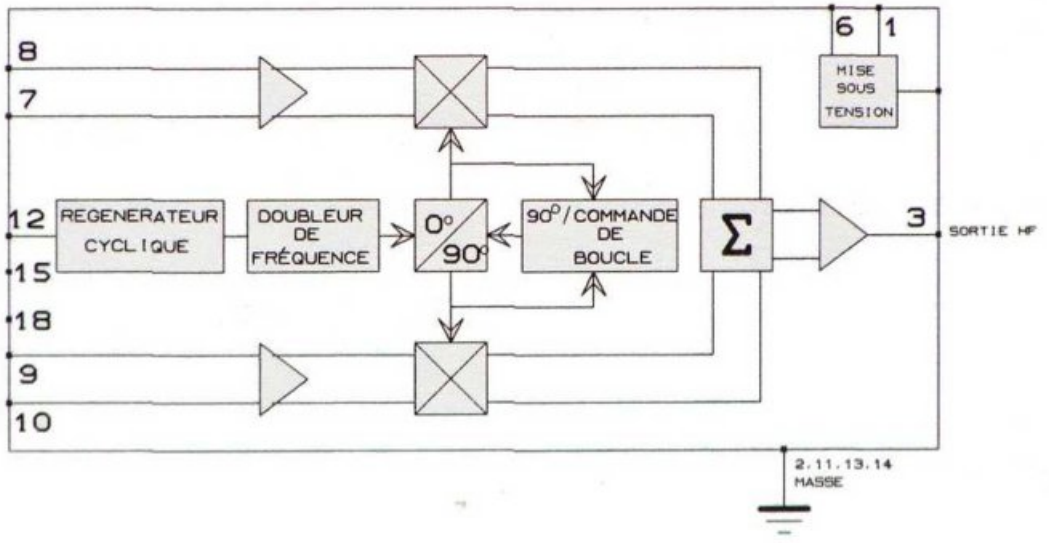
On the driving voltage, it is necessary to replace a 10k resistor with a 3.3k resistor at the output of the VCO attenuator.

Explanation of design:

The RF section:

The use of a quadrature modulator (U2790B) simplifies assembly. The 437MHz from a VCO is mixed (entry 12) with the I and Q signals from the CD4066. (inputs 7 / Q and 10 / I).

Synoptic U2790B



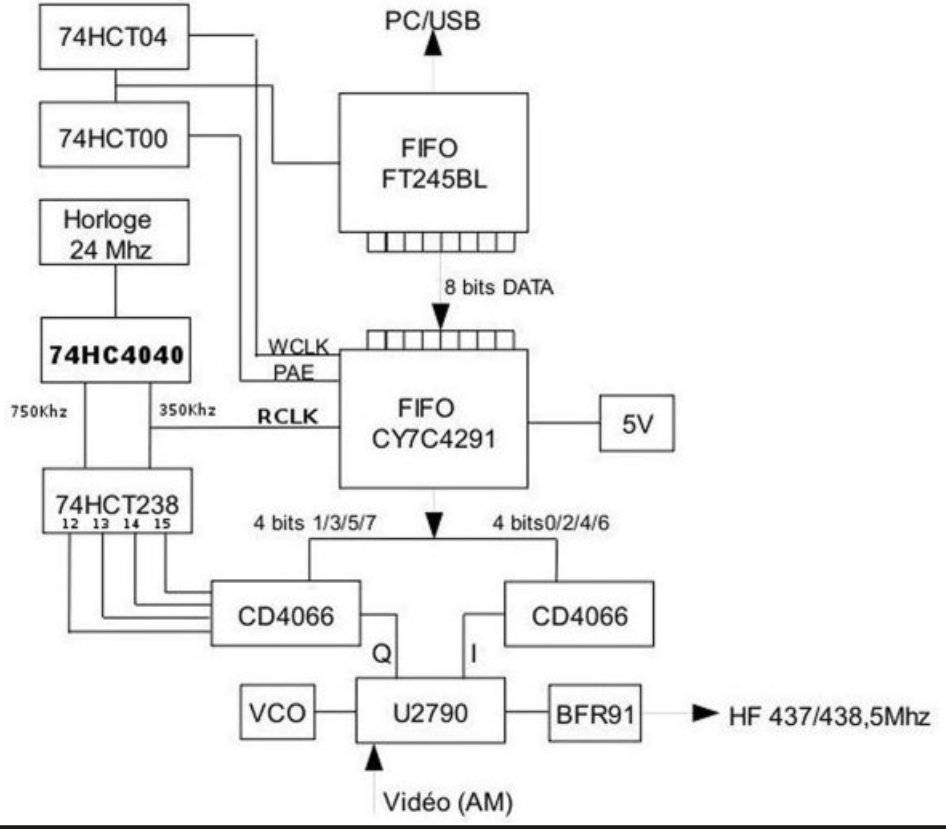
I and Q modulator:

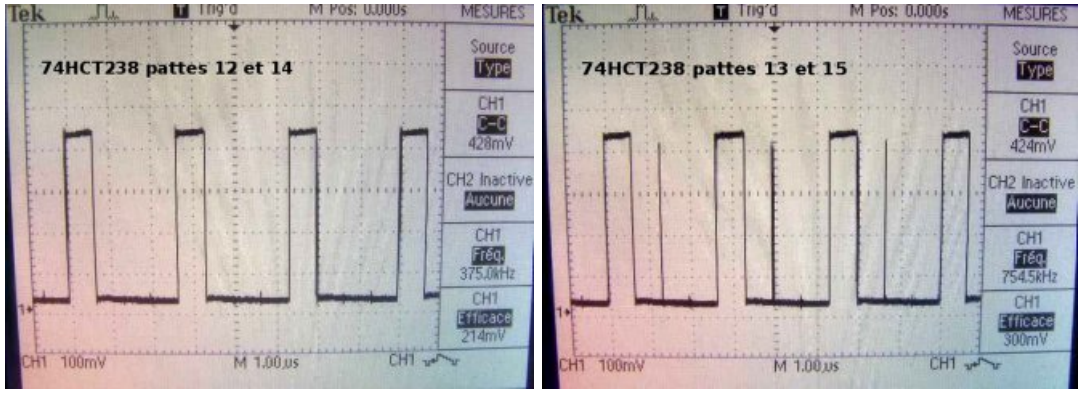
The USB port is followed by a component interface USB / parallel FT245BL.

NAND gates and inverters of 74HCT00 components and 74HCT04 are logic to the dialogue between the component and the USB FIFO component.

The 128k FIFO component is followed by a clock and a divider (CD4040) to choose the flow. A demultiplexer (74LS238) controls the 2 components (HEF4066) switching bits, 2 by 2, to obtain the two channels I and Q, which are injected into the quadrature modulator U2790B.

Block diagram:

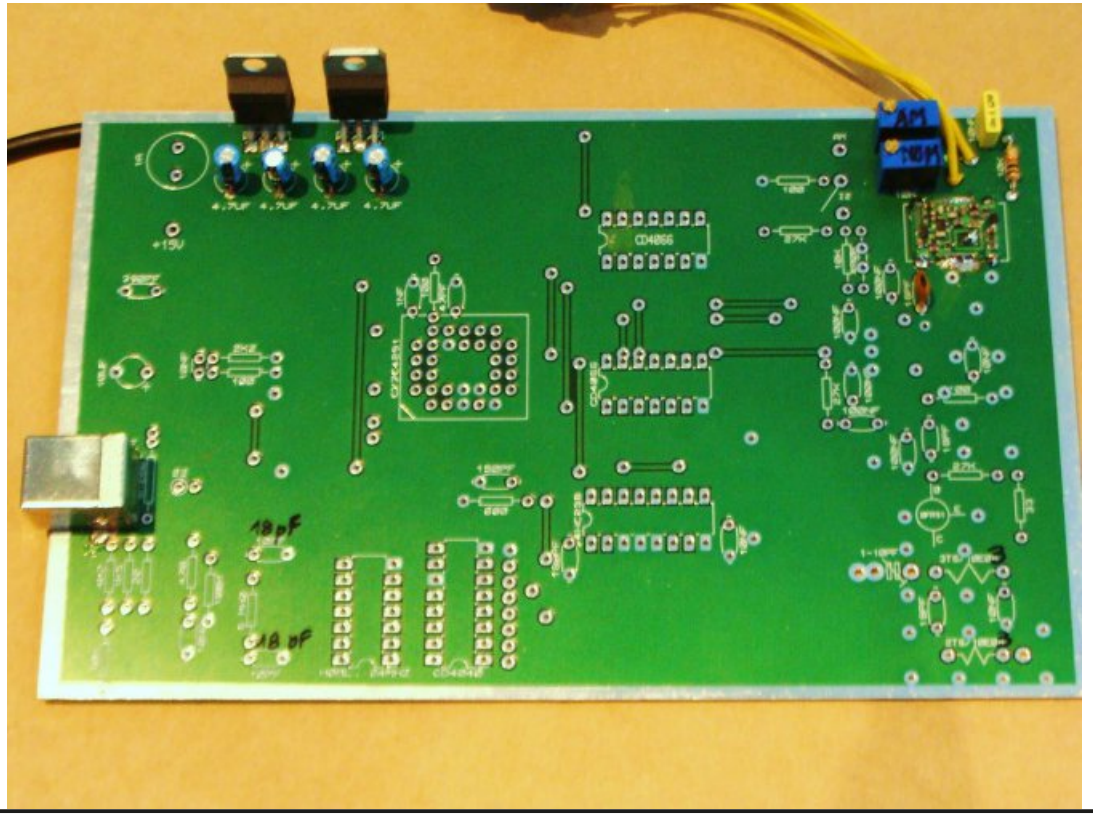




Left: 375Khz signal Right: 750Khz signal

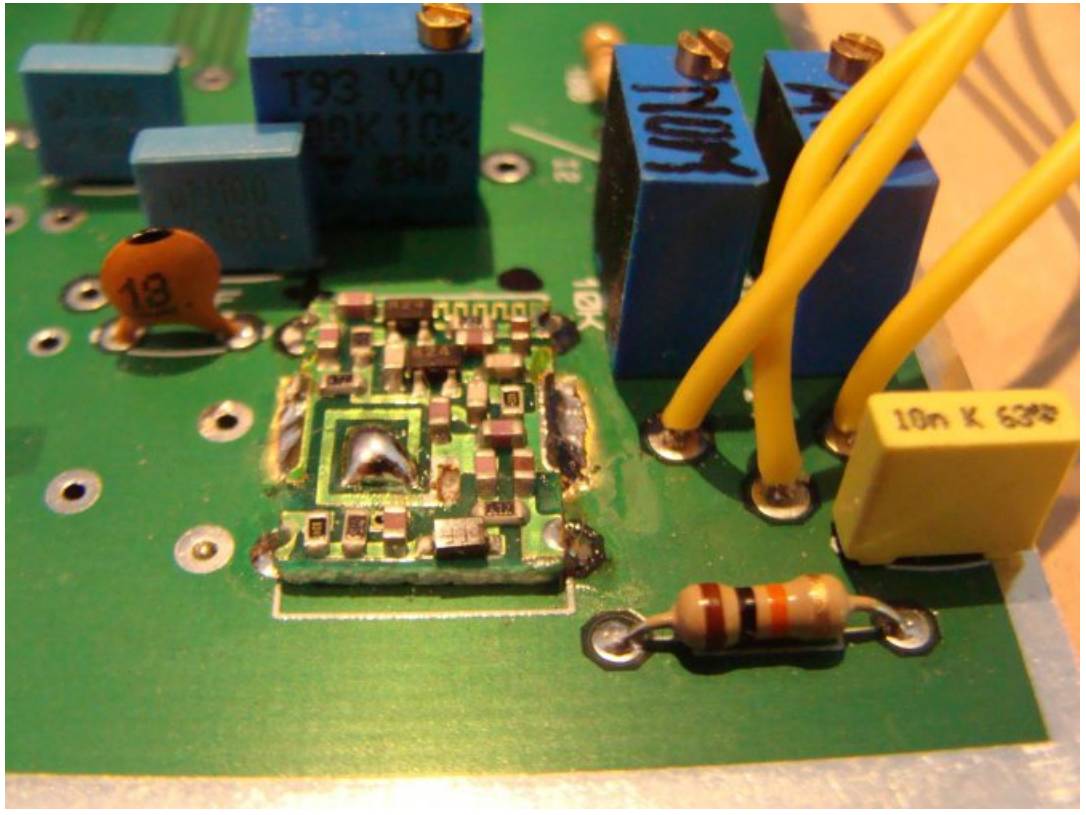
Construction:

For easy adjustment, you can proceed as follows: unsolder the 432CT VCO Case, the wiring on the IC and its power components.

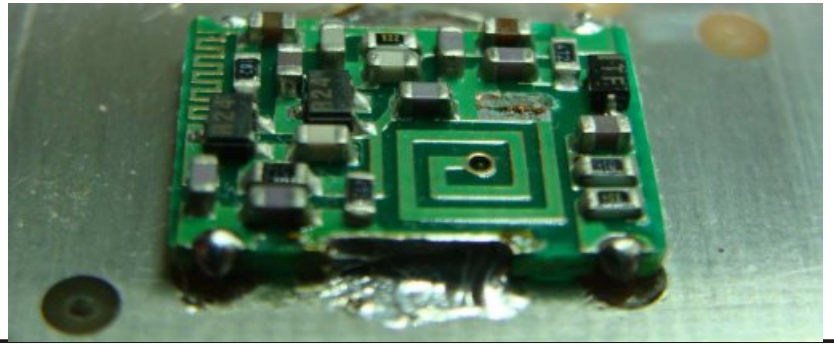


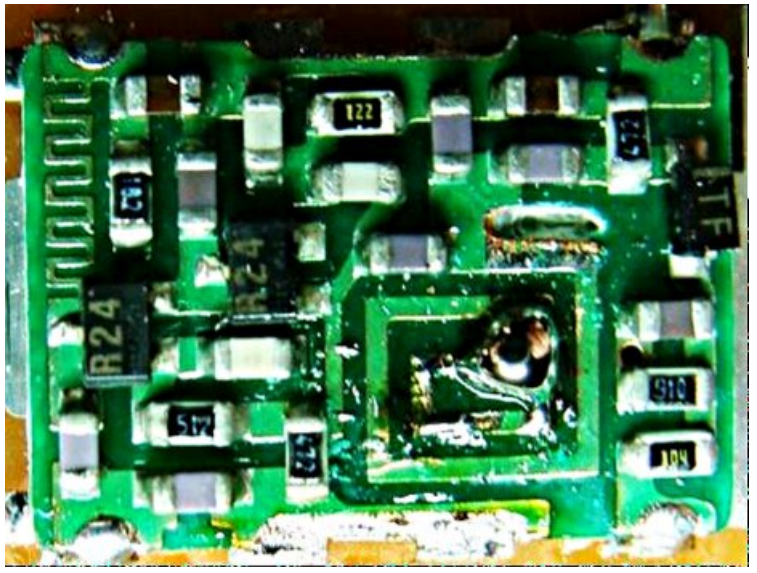
To mount VCO, use short wires and solder (see photos).

Removing the case bypass's a turn on the VCO 432CT and also decreases its output level. It is well suited to the modulator (-10dBm).

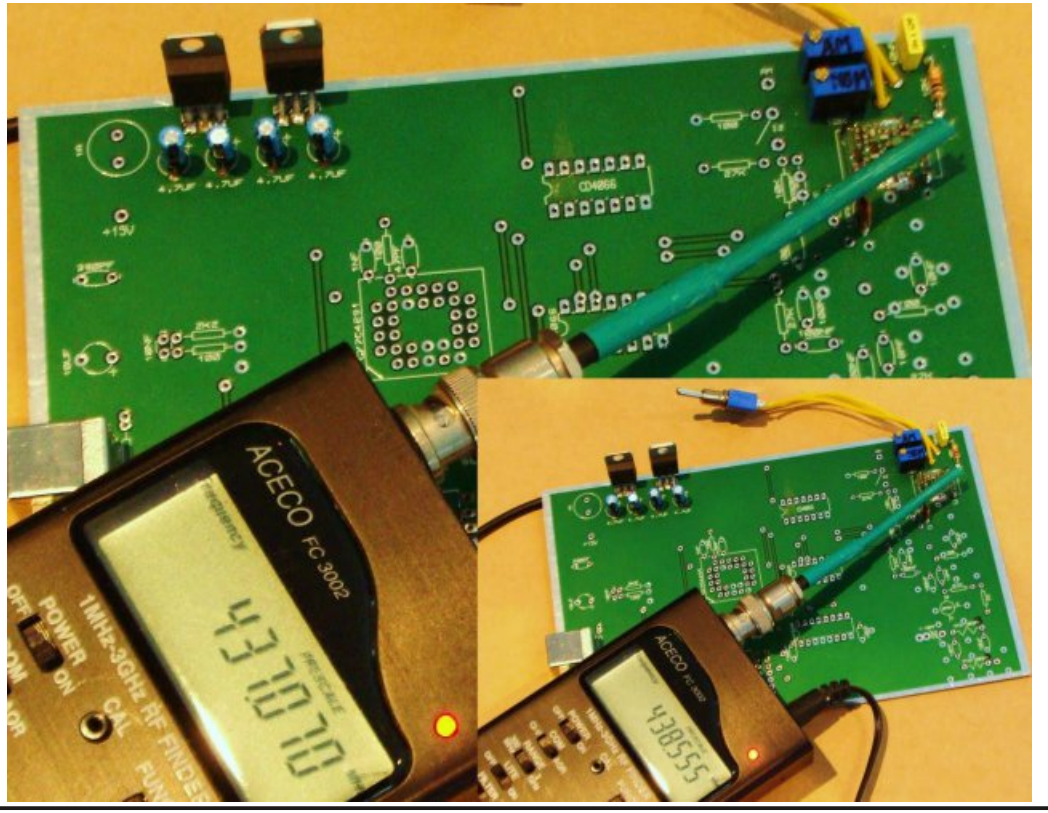


Before replacing the cover of the VCO, scratch the surface on the edges to be welded to the ground.





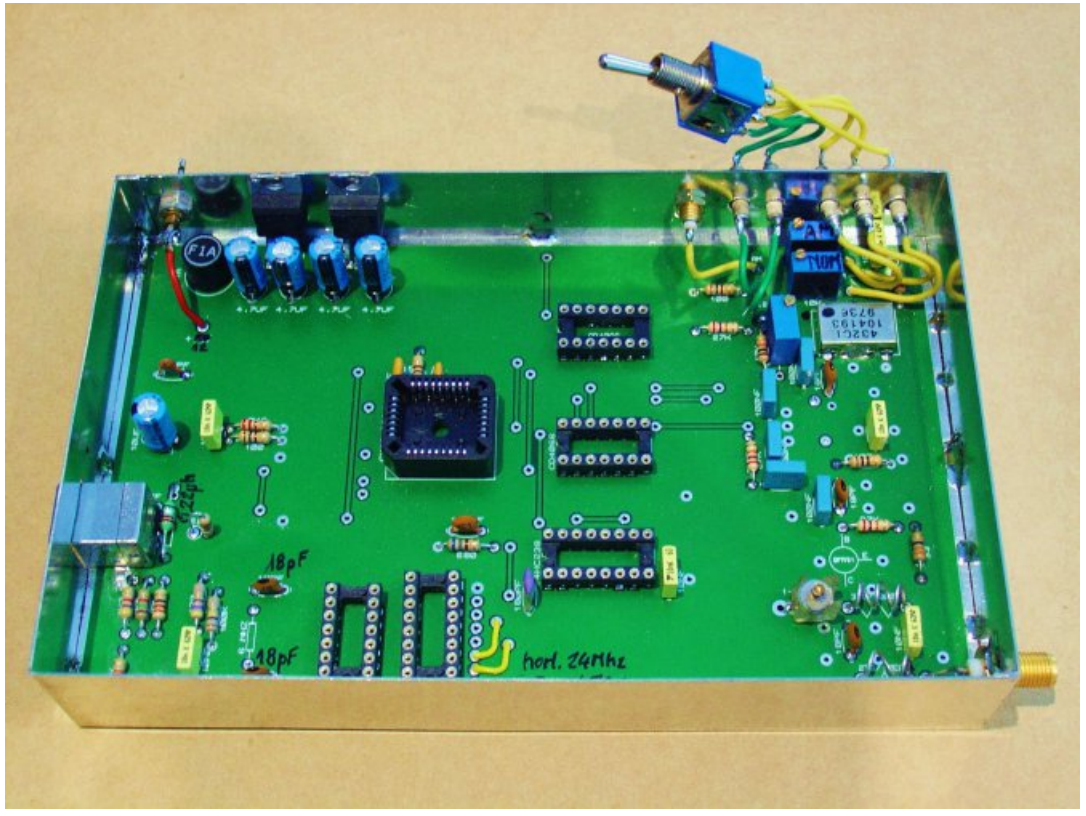
Set each multiturn 10K to bring the frequency to 437MHz and 438.5MHz.



Mount all other components.

Output choke wire 6 / 10th, 2 turns of 3mm diameter.

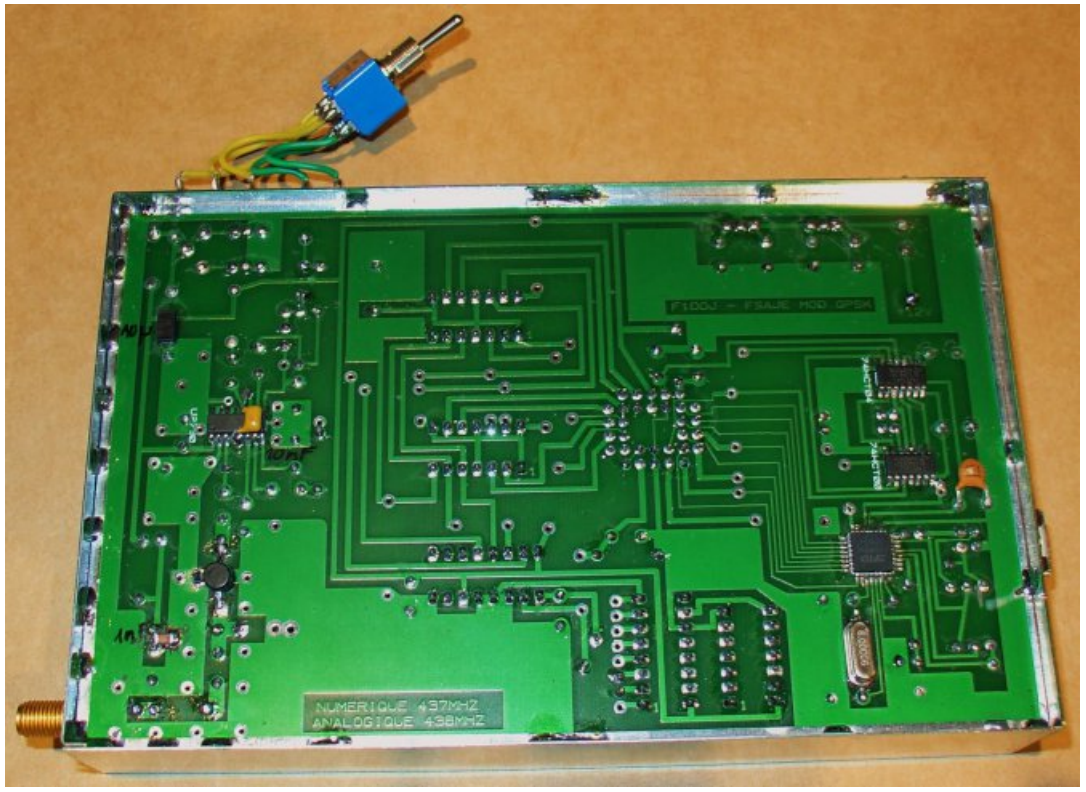
BFR91 and power choke wire 6 / 10th, 3 turns of 3mm diameter.



It is recommended to shield the deck with a box schubert 100 x160mm (in case you have a power amp that could interfere).

Cut and drill the box.

Mount the feedthrough capacitors and connect the dpdt switch, video output and antenna input connectors.



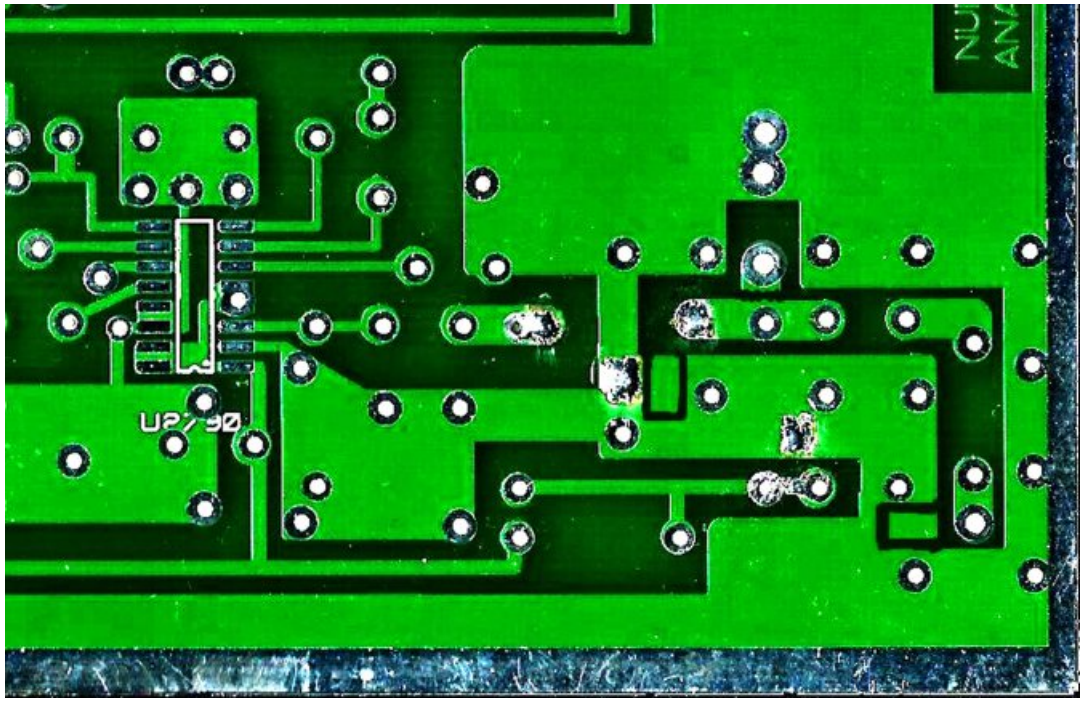
Bottom view with SMD components and BFR91. (CI plated through holes has been modified to allow the mounting of the output choke.)

Improved decoupling:

Over the case of U2790B mount a 10nF decoupling capacitance between the legs 4/5 (+) and 13/14 (ground), the holes are planned.

In the video input (AM) there are several holes that were provided for mounting potentiometer 500K. Originally it was a 400K resistor. The potentiometer adjusts the level of black.

Make adjustments of 2 frequencies, using 2 10K potentiometers (437 / 438.5).



Fit a power meter on the antenna output, set the CV and chokes (adjusting more or less for maximum output level).

Switch to analog mode and adjust the 500K potentiometer for black level.

There are no further adjustment.

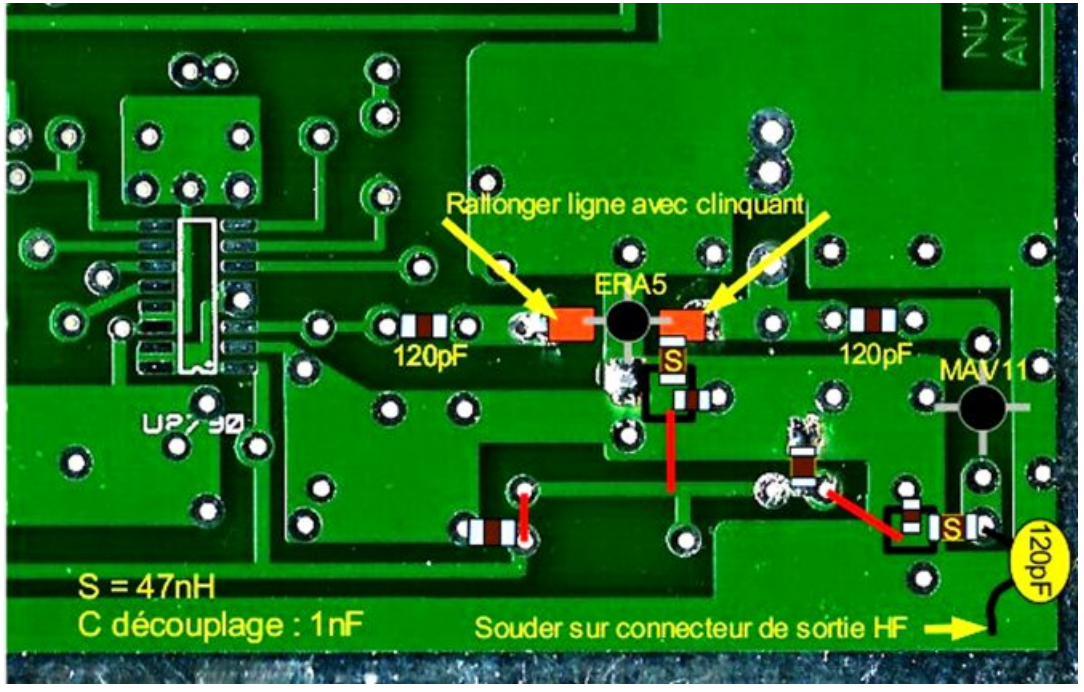
Good luck!

Appendix

Jean-Yves F1DJO proposes a change in the RF section that pulls + 20dBm (100mW).

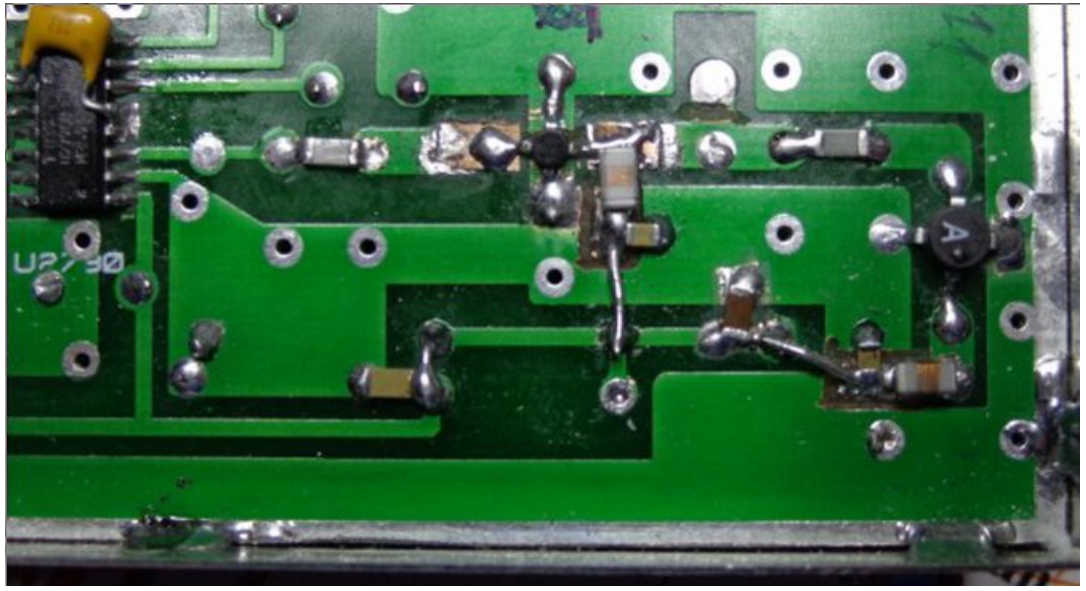
This variant allows to exit HF + 20dBm (100mW)., With 2 small changes of the printed circuit.

Remove the solder mask on the two pcb pads, as indicated, to make a bridge for mounting the inductors 0.47uH with their 1nF decoupling capacity.



Extend lines for mounting the ERA5 with 2 small pieces of copper foil.

Mount components.
Connect to 5Volts supply (3 red straps).



With the 437MHz output filter (insertion loss -3dBm), you have to 17dBm (50mW), sufficient to attach an F3YX type amp (2 x RA60H4047 coupled).

Some small details about the new circuit:

The BFR91 should be mounted underneath. PCB pads have not been made, so you need to scrape away the soldermask with a knife. The 150pF capacitor and VK200 are close to the USB input, and will be mounted from below the circuit, for reasons of space.

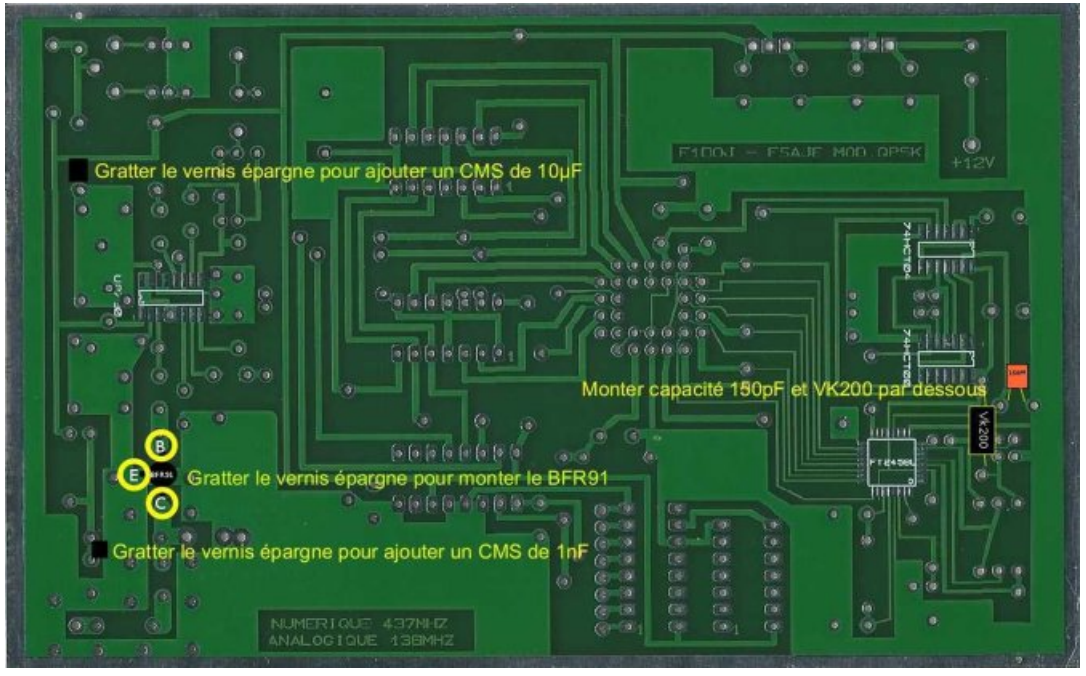
The 5 volt supply line to the RF section should be well decoupled. Please note, we are not in analog! Michel added a decoupling cap of 1nF and 10uF (CMS below the circuit). See the photo. On my installation the CD4040 clock did not divide. Michel advocates a 74HC4040.

It is imperative to load the RF output. Put 100-330 ohms on the antenna output, otherwise it will not work. Resistance can stay, you only lose 2 to 3 mW. We must remove the soldermask with a knife to connect the 432CT sheild to ground, the same for the case of the USB connector, 2 legs are folded on each other, so you have to scratch the surface for soldering the top (do not drill). If you are installing the system in a Schubert box, you must file 1mm on each side of the circuit.

F1HUS indicates that IC board can be mounted in a 3.5-inch external hard drive case. These boxes have an integrated 5V power supply. In this case, there is no need to mount the 9V and 5V regulators.

PS: These changes will be reflected on future versions.

Authors' note: this experimental set is scalable and all the improvements that you make can be uploaded, for the benefit of amateur radio community.



DATV-Express Project - January update report

By Ken W6HHC

January was a quiet month for the project team.

Charles G4GUO spent some time looking at reducing the RF distortion (spectral interference) of RF amplifiers when used with DATV-Express using pre-distortion technology. He determined it is not easy to obtain much improvement in a simple way. Other pre-distortion approaches are complex and can not be implemented on the existing board.

Ken W6HHC has been working towards using the Logitech C920 web camera with the DATV-Express board. This could possibly allow the replacement of Hauppauge video-capture unit with just a web camera and some software changes. But it is a new learning experience in software for Ken.

Over the last three weeks he has learned to compile the Gstreamer v1.4.5 from source code on ubuntu. It is a slow learning effort and easy to make mistakes while building in linux,"one step forward and then two steps backwards". Also Ken took delivery of a new multi-protocol SetTopBox (STB) made by Amiko. The Amiko HD Mini Combo unit receives five protocols:

- *DVB-S*
- *DVB-S2*
- *DVB-T*
- *DVB-T2*
- *DVB-C*

Ken will use the codecs in this STB to decode the H.264 video coming from the Logitech web camera.

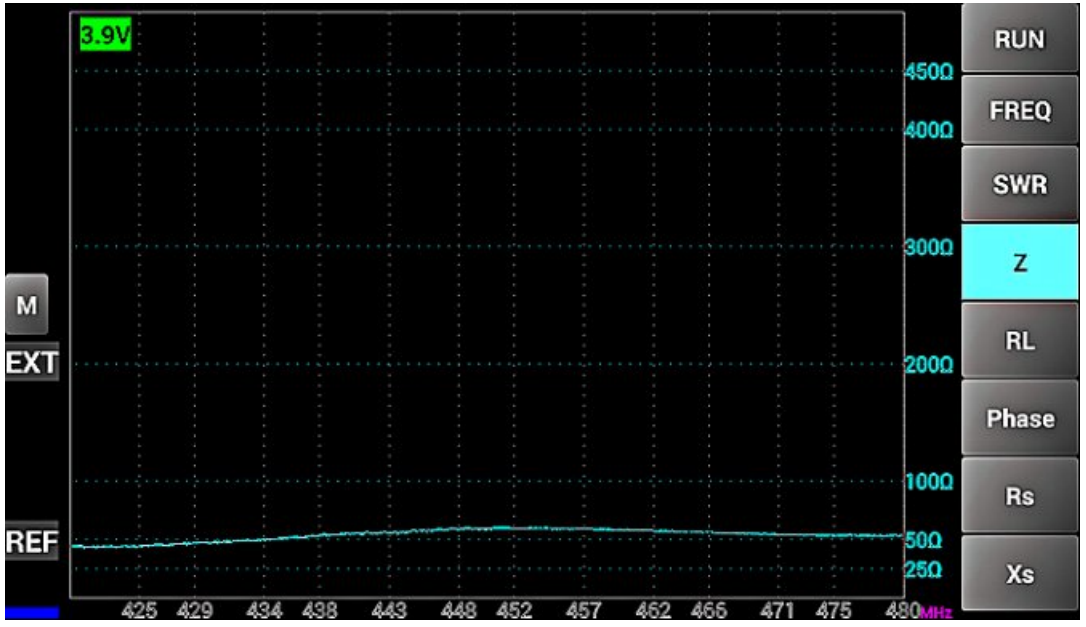
Art WA8RMC is still on vacation in Florida to escape that nasty weather hitting the East Coast of U.S.

"project is set to cruise speed"....de Ken W6HHC

Phased Antenna Array Design

Richard L. Carden VK4XRL

The following article is a look at the phased antenna array as used for television. It has been around as a good fringe reception antenna for some time now. With the advent of the introduction of digital television most transmission sites have gone with the Panel antenna for transmission. My first look at these antennas was with the first ATV repeater in Sydney in 1984. I built one as per the ARRL antenna handbook using half wave dipoles. Also it was brought to my attention that the new digital repeater VK4RDC in Port Pirie also has used this type of antenna. It's the classic text book design with the feed using a 4:1 balun. David provided me with a plot of the bandwith of the balun as shown below.



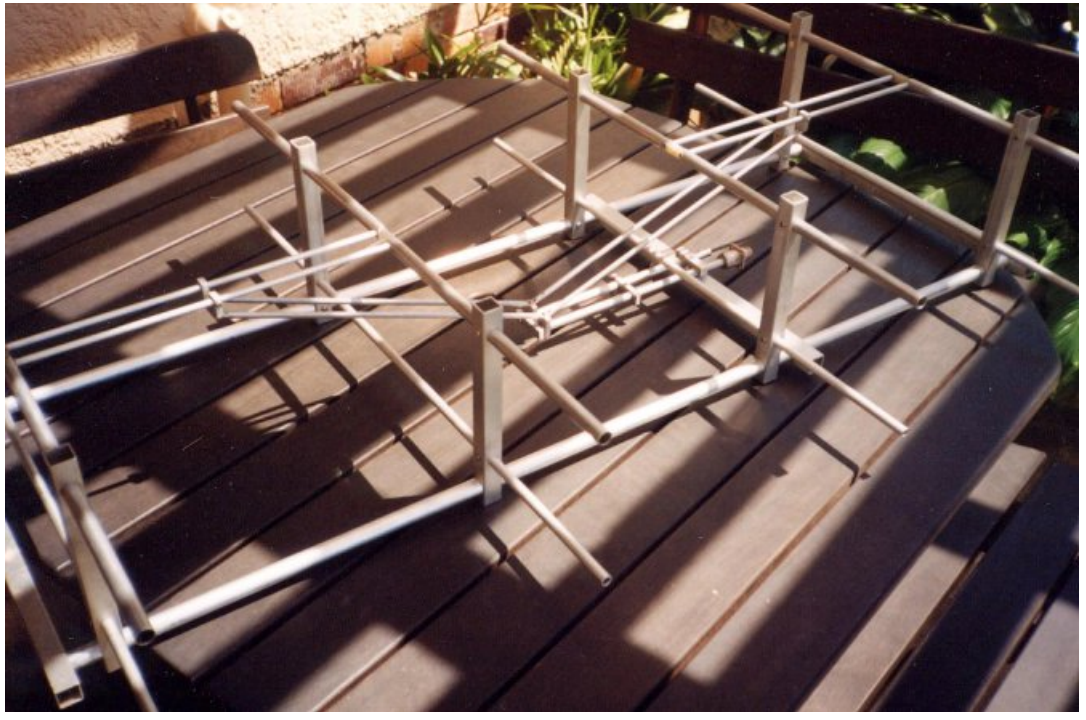
During the initial stages of the antenna considerations for VK4RMG Don VK4TVD and Richard VK4XRL built a 16-element phased array antenna to determine its suitability.

Don supplied the superb engineering that went into the building of this antenna and it was therefore unfortunate it wasn't used.

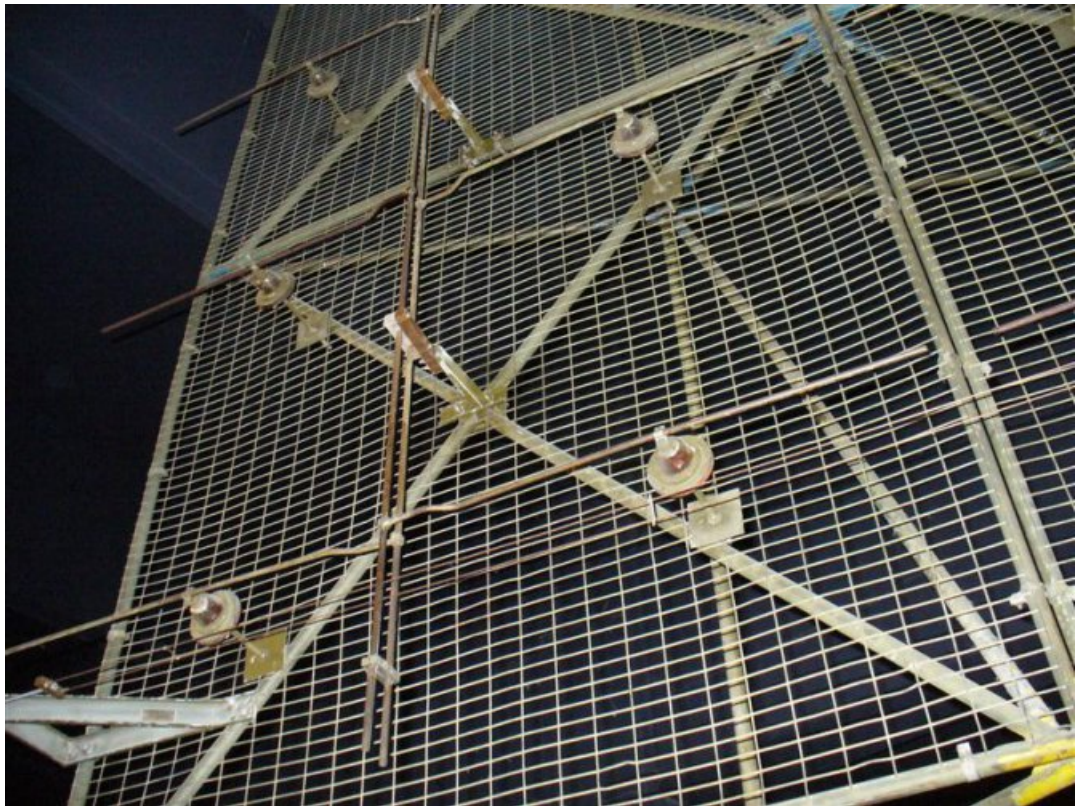
When designing an antenna for television transmission a number of considerations have to be taken into account. The first one to bear in mind is the required bandwidth, some 6/7/8 MHz per channel. The next is the gain requirements, consistent with the polar diagram. A number of antennas could be used, however let's look at polar diagrams. For an Omi-directional polar diagram one could use the Alford slot, or the spiral antenna. Other antennas also provide an Omi-directional polar diagrams such as the turnstile (crossed dipoles), also known as the super-turnstile or the phased array.

We will focus on the phased array antenna because it has a number of properties that make it a number one choice. First it has a gain of around 11db (8-halfwave dipoles) and a good bandwidth as well as being easy to make.

See photo of my first attempt of building one.
The phased array has been around for quite some time as a fringe-receiving antenna for television. It's also been used for radio astronomy and of course television transmission. It was also used as radar antennas during World War 2. Most antennas used here in Australia use these basic principles, even at UHF. So what is a phased array? The common name given to them for television is known as a panel antenna. It consists of four bays of dipoles connected together as shown in the photo below (This is from the Broken Hill Transmitters).



Spacing between the bays is held at half a wavelength and reflectors are nominally made 5% longer and spaced at 0.25 wavelengths, although this can and may vary. The phasing arrangement can also vary, however two methods may be used. When using half-wave dipoles the center points are at a minimum RF voltage and therefore can be mounted through the support beam. However you must remember the voltage maximum points are at high impedance around 1000 ohms or



Phased Array Radar Panel Antenna

more and therefore should have no insulation material which could overall degrade the antenna performance especially in wet weather. The nominal beamwidth at the 3db points is around 60 degrees. However by giving the dipoles a 10 to 12 degree angle in relation to the reflectors the omi-directional pattern can be improved.

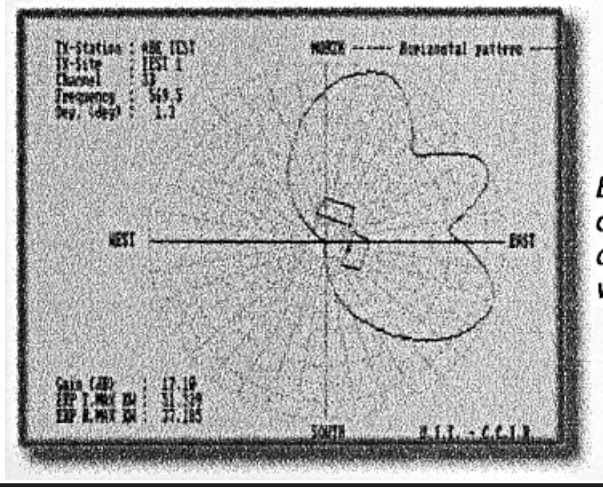
With reference to the antenna phasing, the common phasing arrangement of center feeding the array produces a impedance around 200 ohm at the feeder connection point.

Therefore two things need to be done, if connecting 50-ohm co-ax to the antenna a 4:1 balanced to un-balanced balun arrangement is required.
Also I found a universal stub tuning arrangement will be

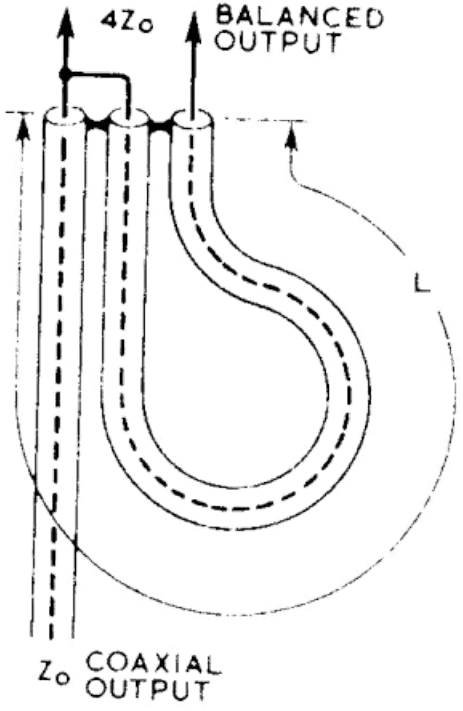
Myrtleford Translator Victoria, Australia

required if using the antenna for transmission to provide some form of adjustable matching.

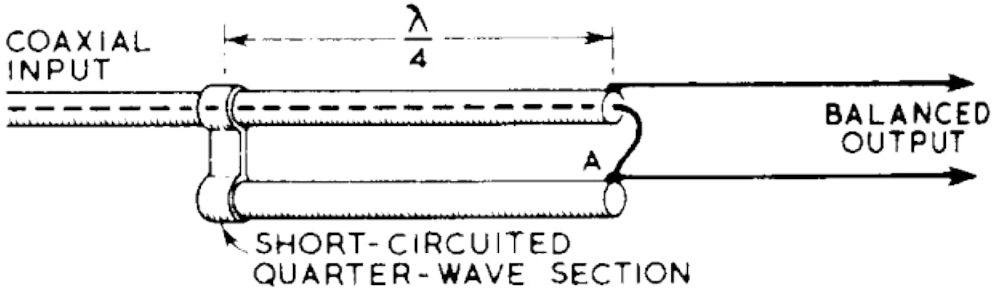
The second method uses multiple matching sections. The output impedance normally being 50 ohm balanced.



Example of radiation diagram calculations for an antenna array designed having 2 faces at 90°, with 8 panels on each face.



Therefore a balanced to un-balanced transformer arrangement is required. Coaxial baluns yield a 1:1 impedance transformation. Remember that these baluns can also be configured from normal tubing.



The balun is intended to present an infinite impedance to any RF currents that might otherwise flow on the outer conductor of the coax. To check out the operation, one of these units was constructed for 70cm operation. A 50-ohm known RF load was placed at the antenna feed point and with transmitter connected via a SWR meter, the adjustable short was set to obtain minimum reflected power. Next the load was replaced with a half-wave dipole cut using the formula 300/Freq (MHz). Now if we allow for the diameter of the tubing with respect to wavelength (see ARRL Antenna Handbook Page 2.3) then k=0.93 and therefore the length was reduced by this amount and the SWR was then about 1:1.

Now let's have a look at a half-wave transmission line matching unit where it can be used to good advantage in matching the antenna impedance to the characteristic impedance of the line.

Now Zi = Zo^2/Zl

Where Zi = impedance at the input end of the line

Zo = Characteristic impedance of the line

And

Zl = impedance at the load end of the line

Rearranging this brings us to the more familiar formula where;

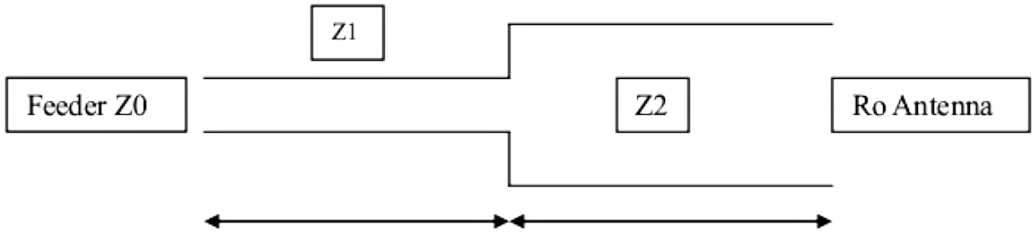
$Zo = \sqrt{Zi\ Zl}$

Practical range for Zo is from 50 to 600 ohms and practically any type of line can be used for the matching section including both air insulated and solid dielectric lines.

Example:

To match a 600-ohm line to a 50-ohm antenna feed impedance, the required Zo of the matching section is $\sqrt{600*50}$ or approx. 173 ohms.

Multiple quarter-wave matching sections can also be used to provide a smoother impedance transformation.



This method is used in the second phasing method where the following equations may be used to calculate the required characteristic impedance Z1 and Z2 for a two-section line.

$Z1 = \sqrt[4]{Ro*Z0^3}$

And

$Z2 = \sqrt[3]{Ro^2*Z1}$

For a worked example where Zo = 50 ohm and Ro = 800 ohm, then using the formulas:

Z1 = 100 ohms

And

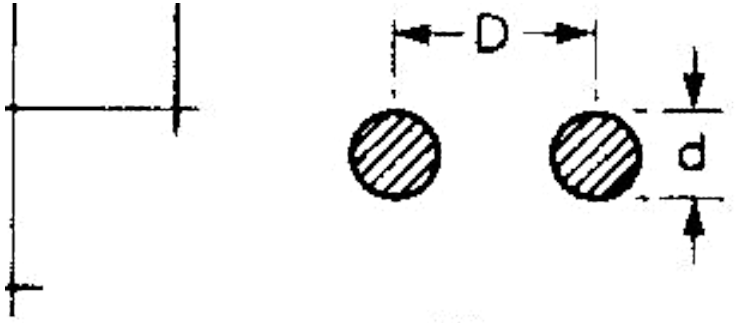
Z2 = 400 ohms

As a matter of interest, the virtual impedance at the junction of Z1 and Z2 is 200 ohms, this is the same impedance required for a single section quarter-wave matching section.

i.e. $Z1 = \sqrt{50*200} = 100$ ohm

And $Z2 = \sqrt{800*200} = 400$ ohm

As stated before, these matching lines can be made using air insulated lines. However for the required impedance's shown above tubing can also be used. Two-wire line can therefore be constructed using the following formula:



$$Z_o = 276 \log_{10} \left[\frac{D}{d} + \sqrt{\frac{D^2}{d^2} - 1} \right]$$

$$\simeq 276 \log_{10} \frac{2D}{d}$$

Lets work through an example:

Let's say we require a quarter-wave matching line of impedance

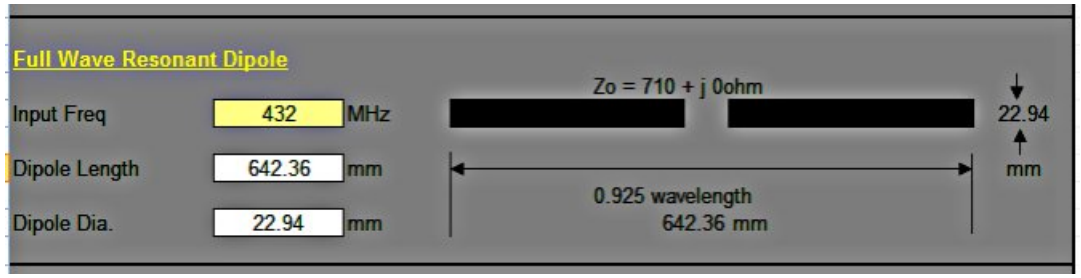
Zo = 400 ohms

We have two unknowns D = spacing and d = diameter of tubing. D is normally controlled by the spacing between elements and in this example we will make it 25mm.

Therefore 2D/d = Antilog 400/276 = 28.14

If D = 25mm then 2D = 50

Therefore rearranging the formula, d= 50/28.14 = 1.78mm



John Kraus in his book 'ANTENNAS', presents a diagram showing a full wavelength dipole as shown above.

As you can see I have made a small Excel spread sheet to determine all the dimensions required. This therefore could also be used as the basis of a four stack panel antenna.

Now I haven't been happy with the arrangement of half wave dipoles so I began searching the net for further information.

The only thing I found was reference to panel antennas from Korea. However the information contained when I first looked is now not shown on the updated web site.

However reference was made to the fact that the overall dipole length was 0.7 wave length.

Another reference I found was that the dipole impedance should be set to around 250 ohms. Therefore another antenna was constructed as shown at right.

The SWR meter shows an SWR of around 2:1 with 6w at 446.5 MHz.

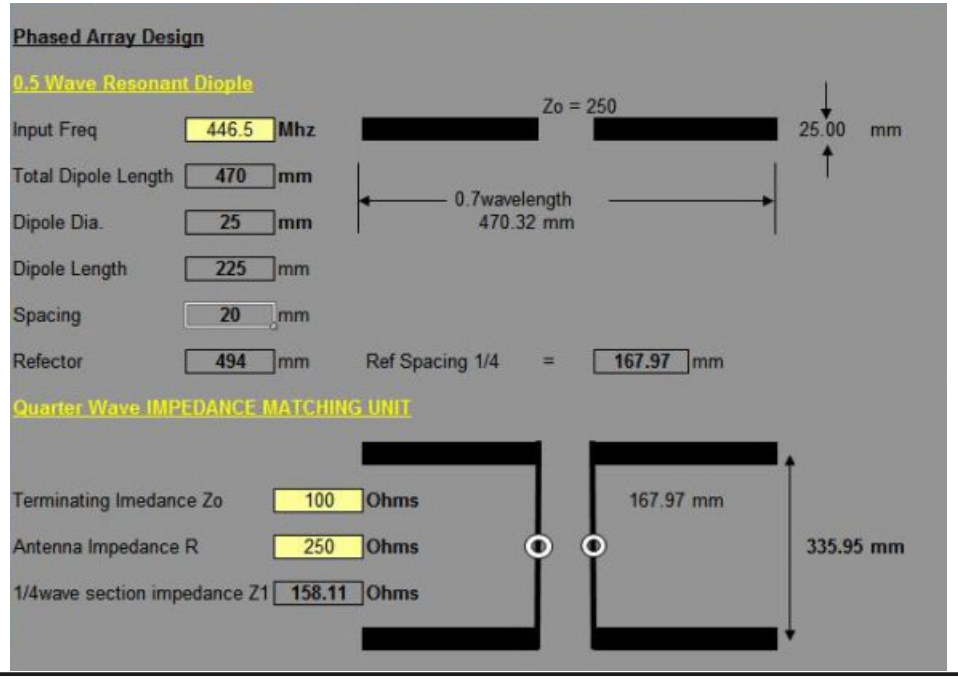
The two independant antennas were connected via 50 ohm balanced to unbalanced baluns to a 2 way combiner.

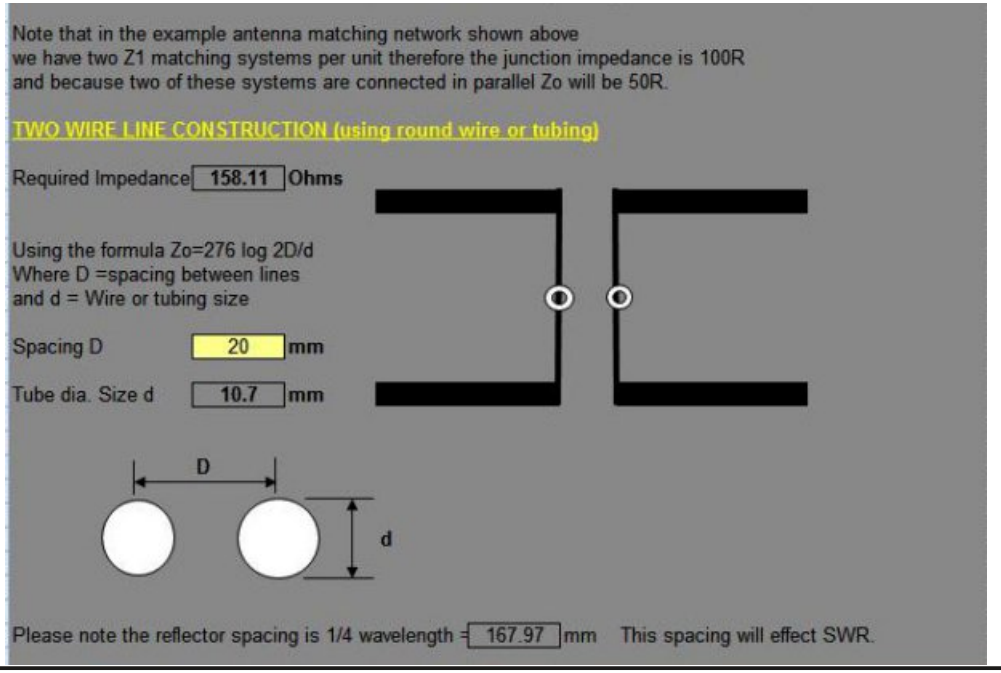
Reference:

(1) ARRL Antenna Handbook
(2) ANTENNAS (2nd Edition) John D. Kraus

Well that's about it for now, hope you enjoyed the article, see you all on DATV.

Richard VK4XRL





Omnidirectional 10Ghz TX Antenna, Vertical polarization

by Fabrizio Bianchi IW5BDJ

Many years ago we built this antenna to spread the Analog ATV. Over 10 years, it has always worked on a mountain in the province of Grosseto in Tuscany, Montieri (1000m above sea level).

It is a antenna that derives from a Horn evolution of a truncated pyramid.

The technical data and measurements were taken from a publication of Evans Jessop in the 1977 book 'VHF-UHF Manual'.

Here we will just give the data for the construction without getting into the rather complex design calculations. Those who want to try can buy the book on sale on Amazon:-

http://www.amazon.com/VHF-UHF-Manual-G-R-Jessop/dp/0900612312/ref=pd_rhf_se_p_img_1

The working frequency of the antenna that we have chosen is 10450 MHz and the gain that we want to achieve is 20 dB (G = 100 in absolute value).

Imagine building a Horn and make it rotate by 360 degrees, so we get two truncated cones which have double the length of the Horn from which they were generated.

This geometric structure as presented is able to emit on a horizontal plane by 360 degrees and its gain is 20 dB on each point of its circumference.

The emission in the vertical plane will be equal to that of a horn of the same size of opening, that is, about 25-30 Degrees.

Let's see how we can build it.

First, the two cones are constructed with the flat part housing the antenna.

The launcher be staying as if it were within driving d 'wave WR90.

In Figure 1 we see a picture that represents the size of the two truncated pyramidal and the flat part of 44 mm that is driving d 'wave which houses the launcher.

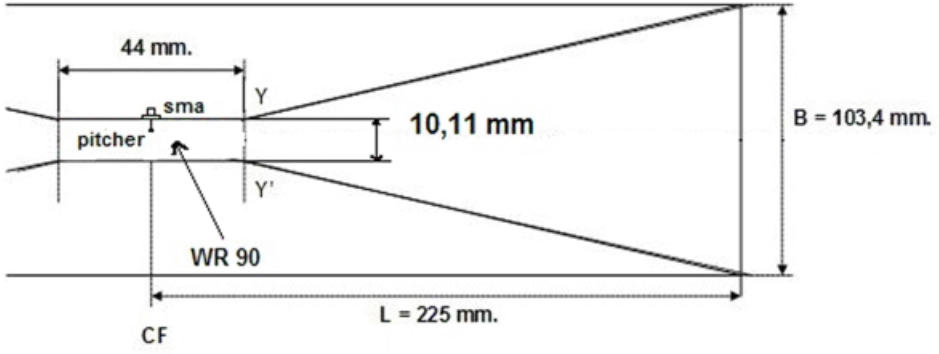


Figure 1

The launcher, visible in Figure 2, has a particular form, is housed in the old LNB that had input as a guide d 'wave WR90 and its dimensions were not changed, although it should be magnified by a few tenths of a millimeter because born for frequencies ranging from 10700 to 11700 Mhz, but it's good enough as we find in these LNB.

For the construction part is doing two copper discs of radius 230.29 mm with a hole at the center of 44 mm (22 mm radius).

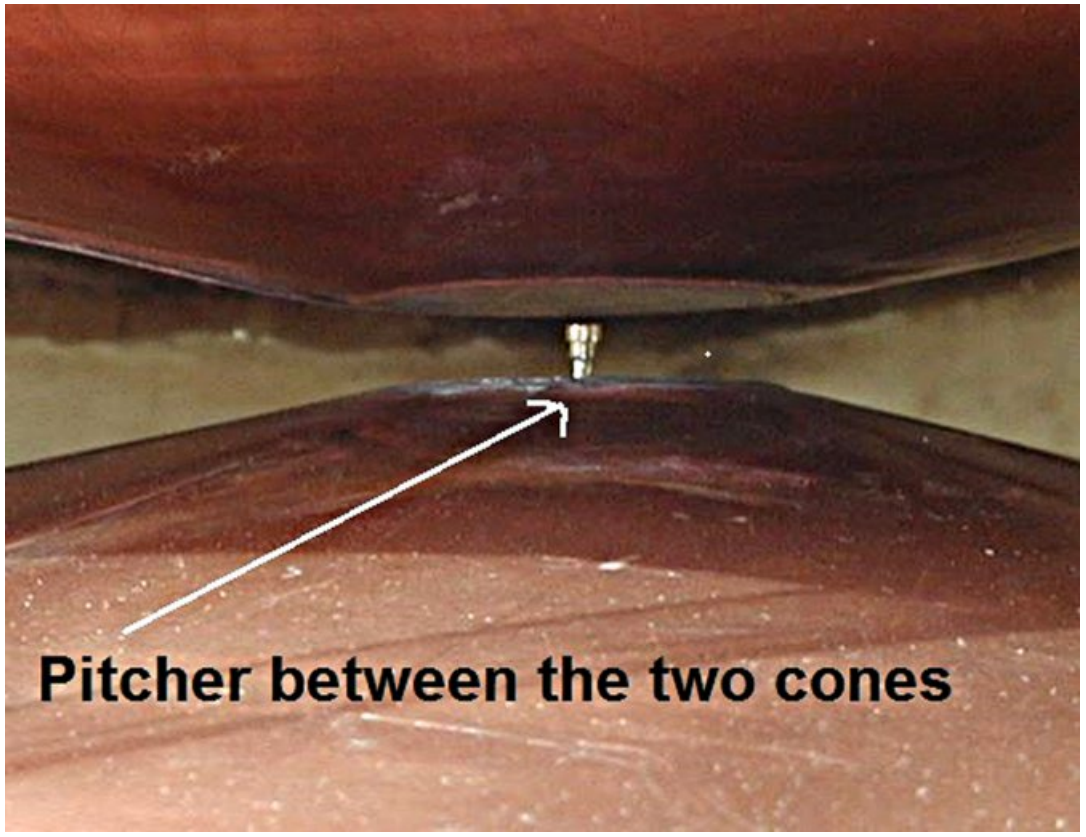


Figure 2

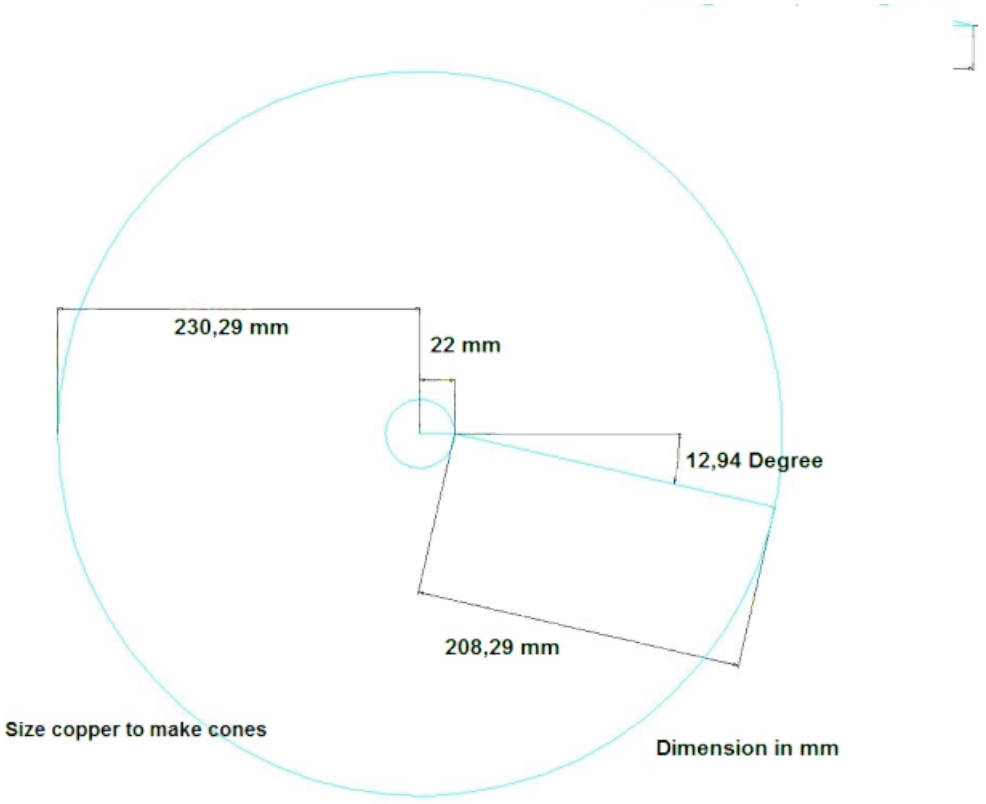


Figure 3

Prepared these discs is made a cut from the outside towards the 'following an internal radius of the circle.

Without this the two cut parts are overlapped by an angle of 12.94 degrees, so you get a cone with a certain angle and a reduced outer diameter from a size of 230.29 X 2 = 460.58 to a new dimension of 450 mm.

At this point the two parts are fixed surmounted and are welded to tin along the radius.

We will have a truncated cone shown in Fig 3, with a hole of 44 mm in the center of the summit.

This hole should be covered with copper suitably rounded and welded the hole of 44 mm, this is the flat part that forms the guide d 'wave WR90. The second disc is constructed the same way.

The two disks are now opposed and spaced as we see in Fig. 4 the extent of 'height of the guide d' wave WR90, that is 10.1 mm.

To keep the two cones spaced to the right size l antenna needs a solid support robust and lightweight.

The whole is housed in a round structure of aluminum of thickness 5 mm to 500 mm in diameter.

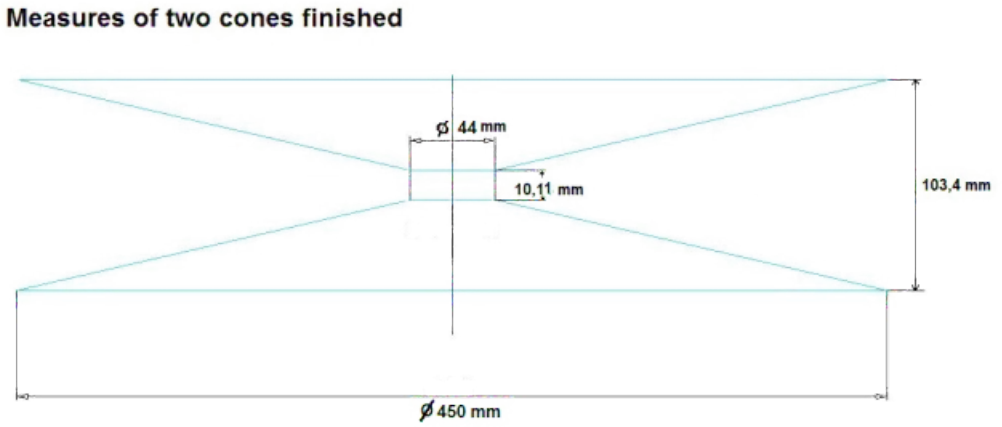


Figure 4

We help with some pictures of the prototype to see the mechanical construction.

Figure 5

Here we see in Fig. 5 the antenna assembled with braces Lexan to keep equidistant the two discs, the center is a Teflon spacer thickness 10.1 mm and is housed inside the launcher.

The antenna, Fig.6 and Fig 7, it needs a cover to be protected from the rain, and this is achieved with glass fiber 1.5 mm thick with reinforcements at the edges, the hat has a pyramid shape to facilitate the descent of the snow is as true in Fig 6 and 7.

Figure 6 (Figure 7 next page)

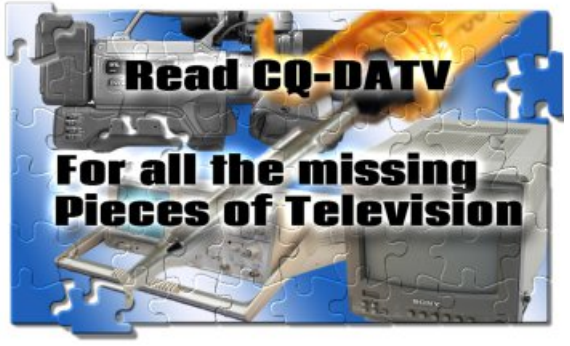
Here in Fig. 8 we see the 'complete antenna of the cap we note that there is an electrical connection between the two discs made with simple electrical wire.

This allows to ground the two circles so that they do not get charged with electrostatic energy.

Figure 7

Here the antenna to 10 Ghz, Fig 9, positioned on the support post with the two panels for the received signal at 1200 MHz.

Article written by Fabrizio Bianchi IW5BDJ
Revised translation by Alberto Ciampa IW5ECU



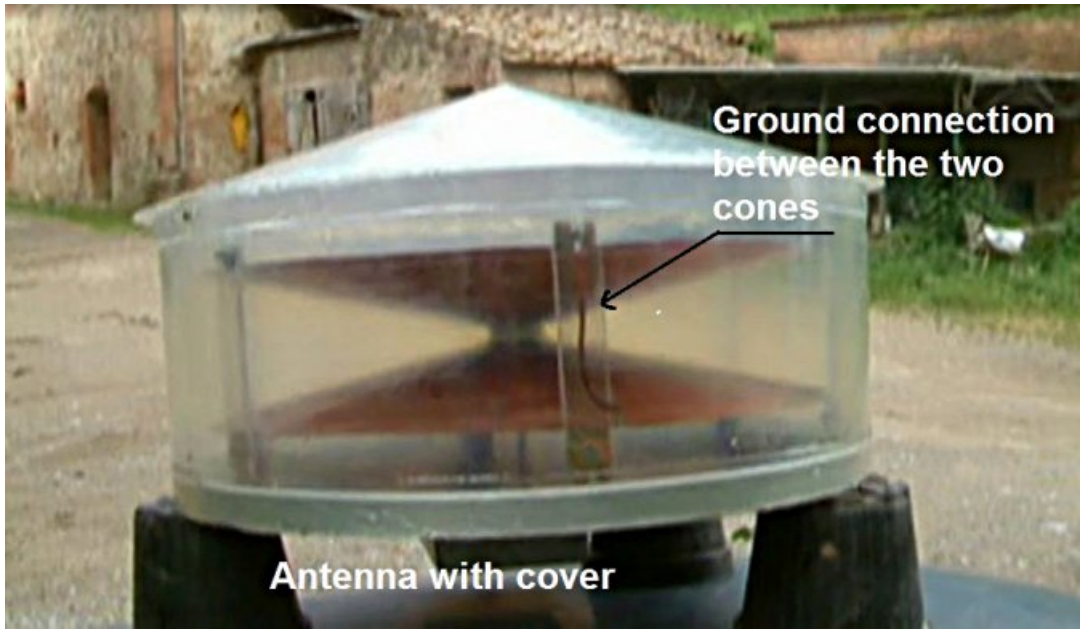


Figure 8 (above) Figure 9 (below)

Write for the CQ-DATV Magazine

Guidelines

The single rule for an article is that it must somehow be linked to ATV or one of its many derivatives, CCTV, repeaters, aerials/dishes etc.
Write your article in whichever software you choose. I would recommend LibreOffice (this is cross platform). But please spell and grammar-check it!

Writing

There is no word limit for articles, but be advised that long articles may be split across several issues. In your article, please indicate where you would like a particular image to be placed.

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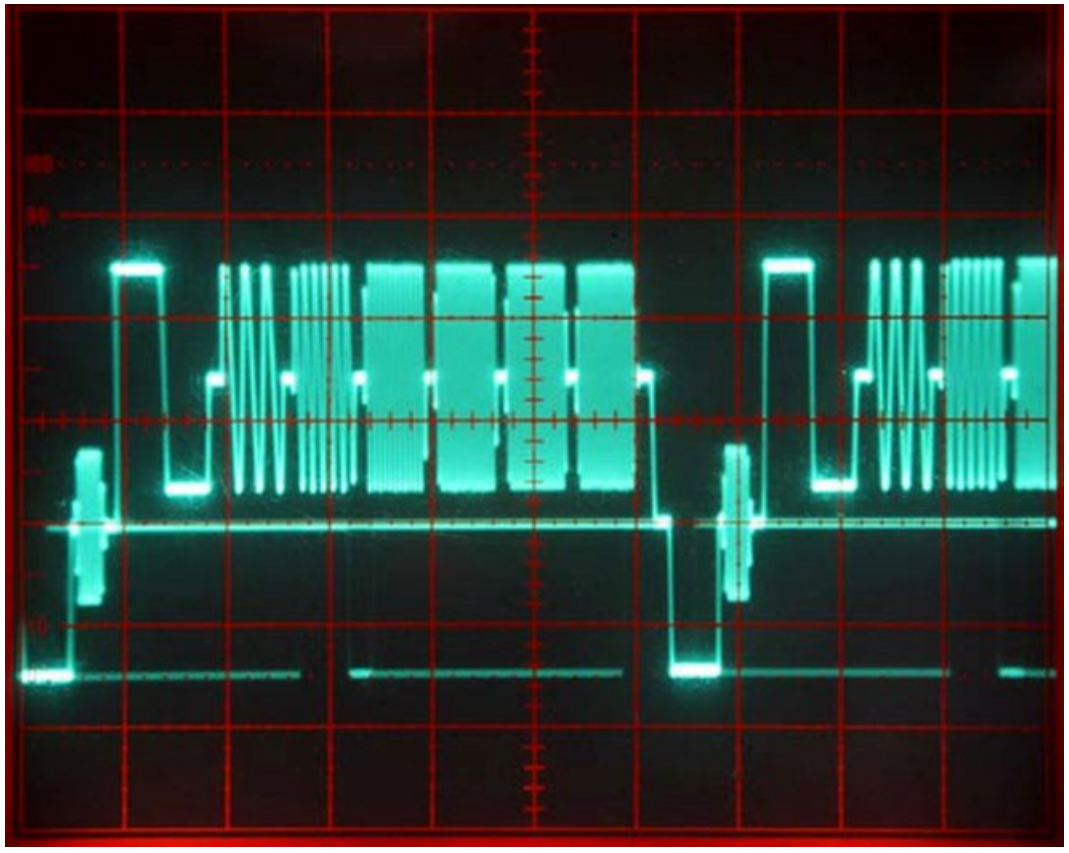
When you are ready to submit your article, please email it to:
editor@cq-datv.mobi

Micro Controlled Video Sweeper

by John Hudson G3RFL

We all stride to reduce degradation of the analogue video signal around our shack. The problems of non linearity differential gain, chrome Luminance cross talk and poor frequency response are always with us in the analogue world, ready to spoil our video signal.

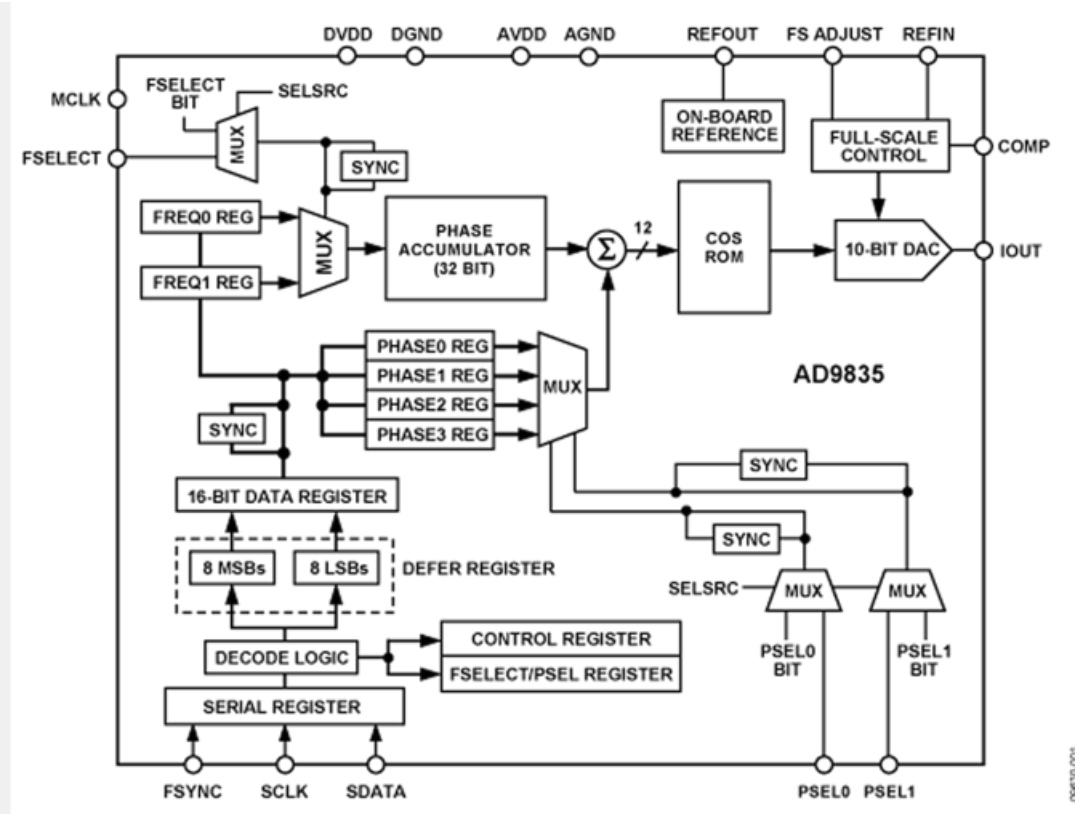
All of these problems require test equipment to diagnose, some of it very complex some of it, less complex. The least complex is something to look at poor frequency response which can result, from badly designed equipment right down to long cable runs, where the higher video frequencies are attenuated more than the lower video frequencies.



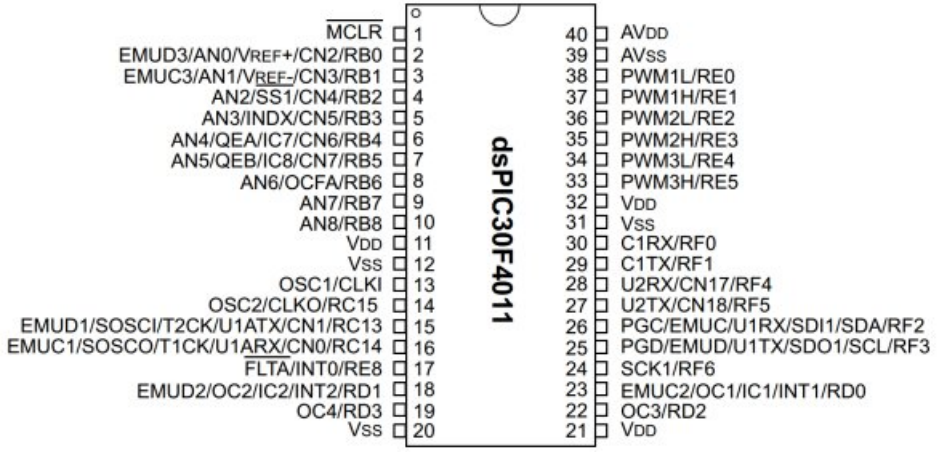
Conventional Multi Burst

The signal normally used is multi burst where several burst of an increasing frequency signal are assembled along the TV line. Test equipment to generate multi burst are often large pieces of broadcast equipment, because there is filtering involved to get a pure sinusoidal waveform. I considered such a design and thought about simplifying it down to a home construction project.

What I came up with is a three chips design based around the AD9835 which is a numerically-controlled oscillator employing a phase accumulator, a COS lookup table, and a 10-bit digital-to-analogue converter integrated on a single CMOS chip. Modulation capabilities are provided for phase modulation and frequency modulation.

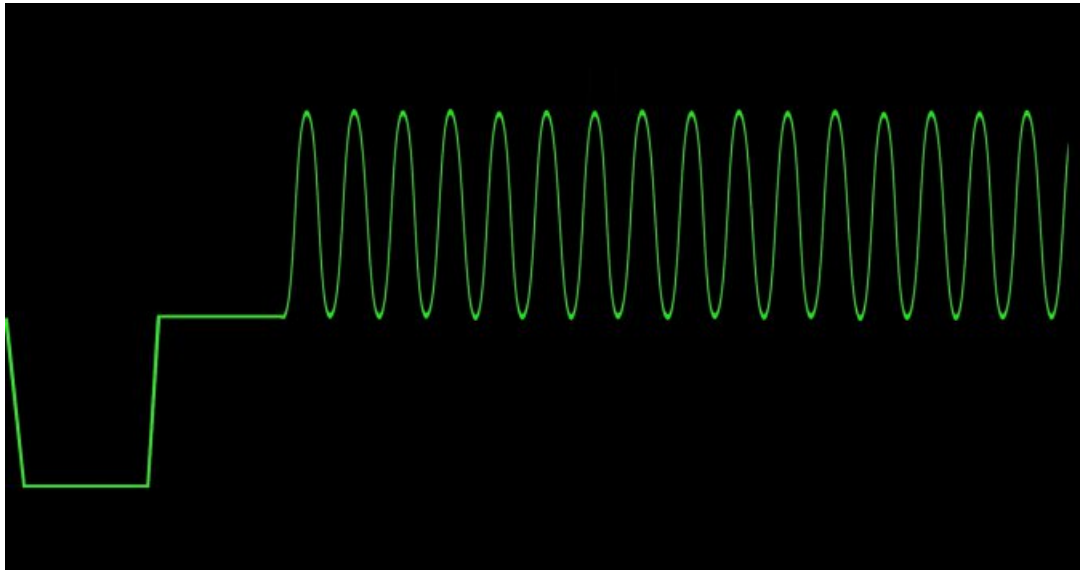


The AD 9835 will support a clock oscillator or of up to 50MHz Frequency. Accuracy can be controlled to one part in 4 billion. Modulation is effected by loading registers through the serial interface.

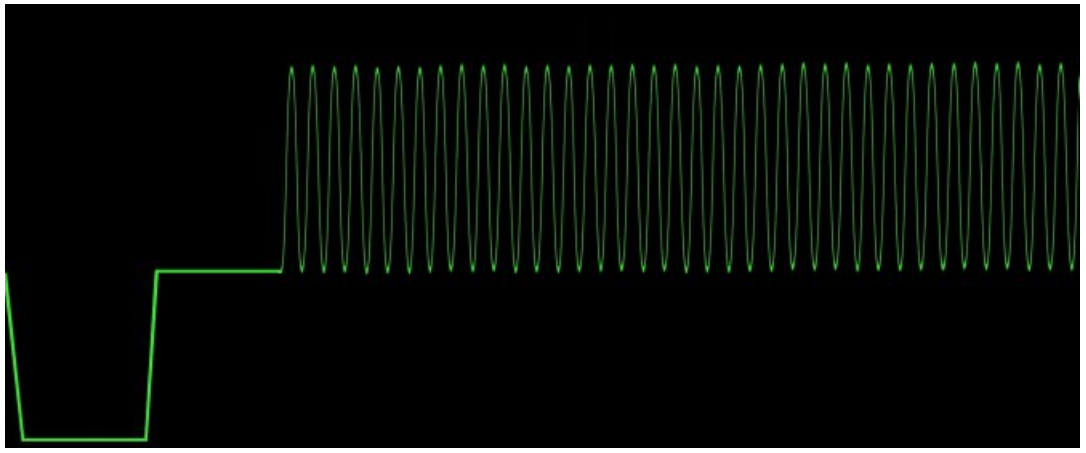


To control the Oscillator I used a ds30F4012 PIC Micro Controller which did need some code writing for it. The code is available via the CQ-DATV download site. The micro will not run fast enough to enable multi Burst style signal, but it will provide the numerical values required by the AD 9835. Life is never easy, so our humble sweeper is locked into 13 preset frequencies. The frequencies are 20KHz, 62.5, 125, 250, 500, 1M, 2M, 3M, 4M, 4.3M, 5M, 6M, 6.5M and are preselectable by an increase and a decrease push buttons.

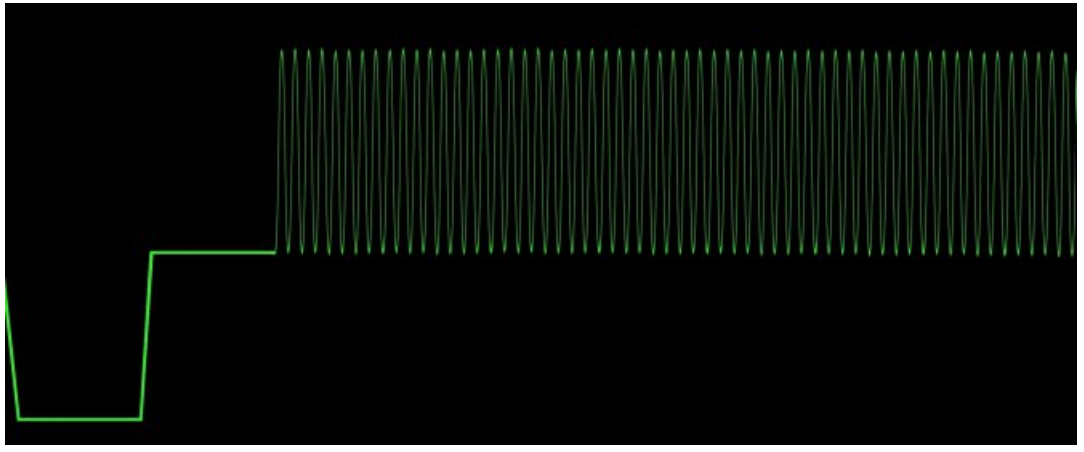
The important thing is that all the outputs of the sweeper are at the same level, when they leave the sweeper and I hope that is the case when they have been passed through your station. If not well I hope it helps you identify which parts of your kit are not quite performing as they should and will give you some sort of performance measurement to bench mark, the before and after of any modifications or repairs you make.



250kHz



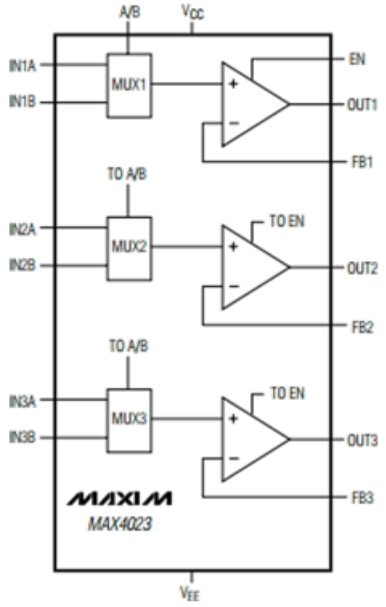
1MHz



5MHz

The final chip was the MAX 4023 which enables syncs to be added to the output waveform by a simple multiplex action so as not to cause any distress to picture monitors in the chain.

The sync pulses are also generated by our ds30F4012 controller, they are not quite broadcast in there timings, but they will enable monitors to lock to this signal and can be used to trigger the measuring oscilloscope. They also enable this sweeper to be a standalone piece of test equipment.

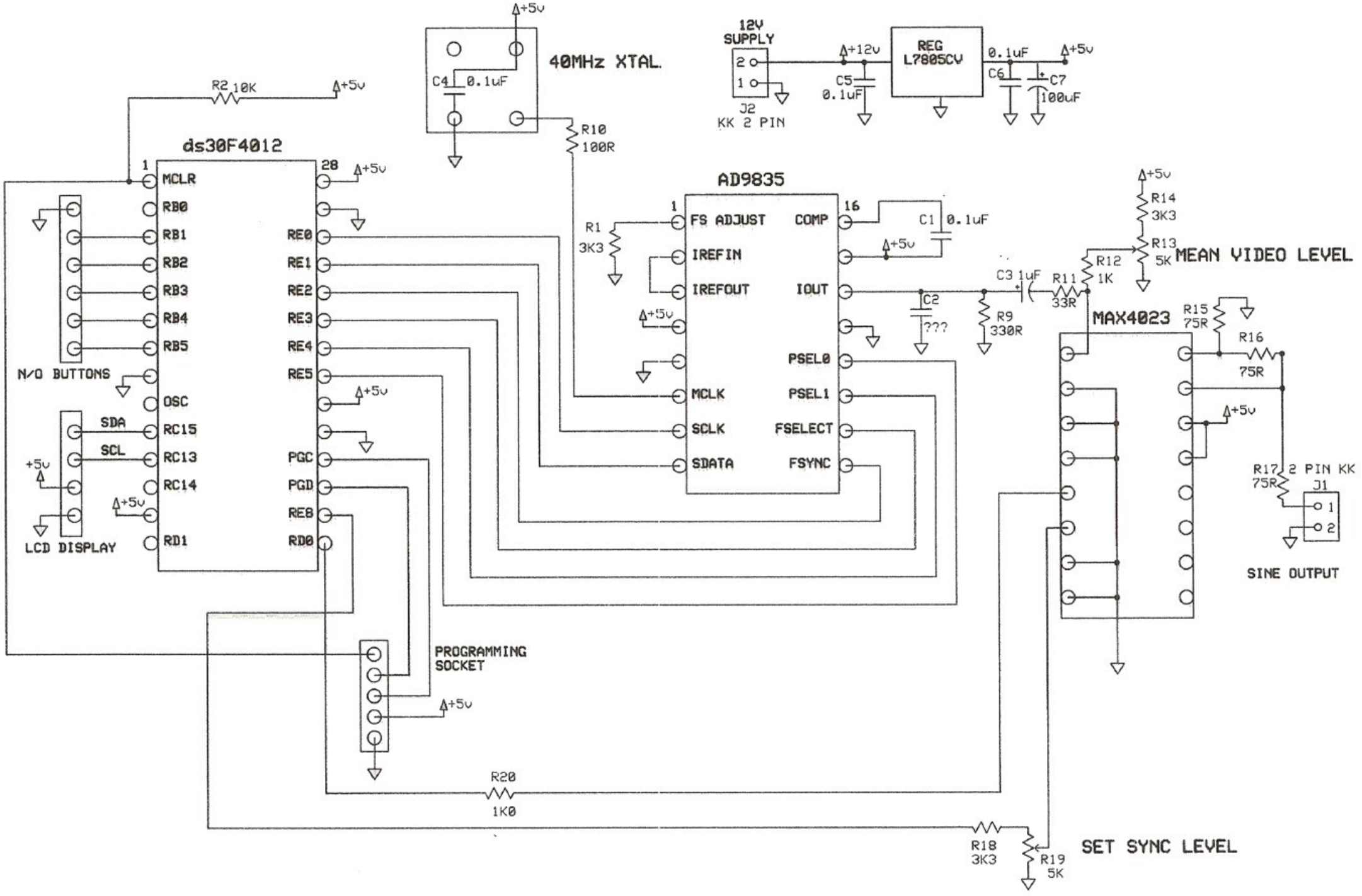


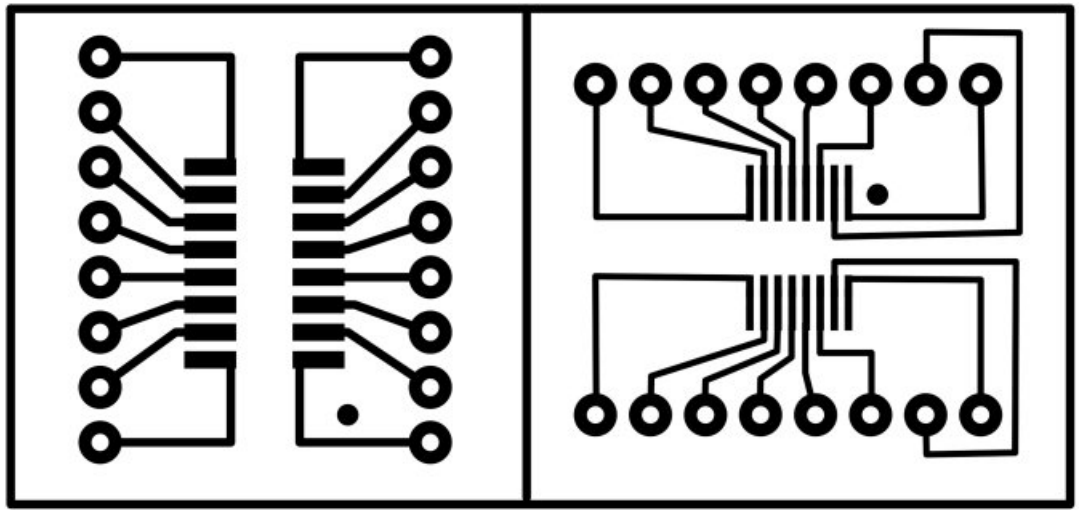
All three chips require a simple 5v supply which was provided by a L7805CV regulator. The prototype took several evenings to design and I was unfortunate enough to encounter a faulty Xtal oscillator module, I had my suspicions confirmed when the replacement arrived and plugged into the prototyping board and the unit started to deliver the frequency sweep I had been hoping for.

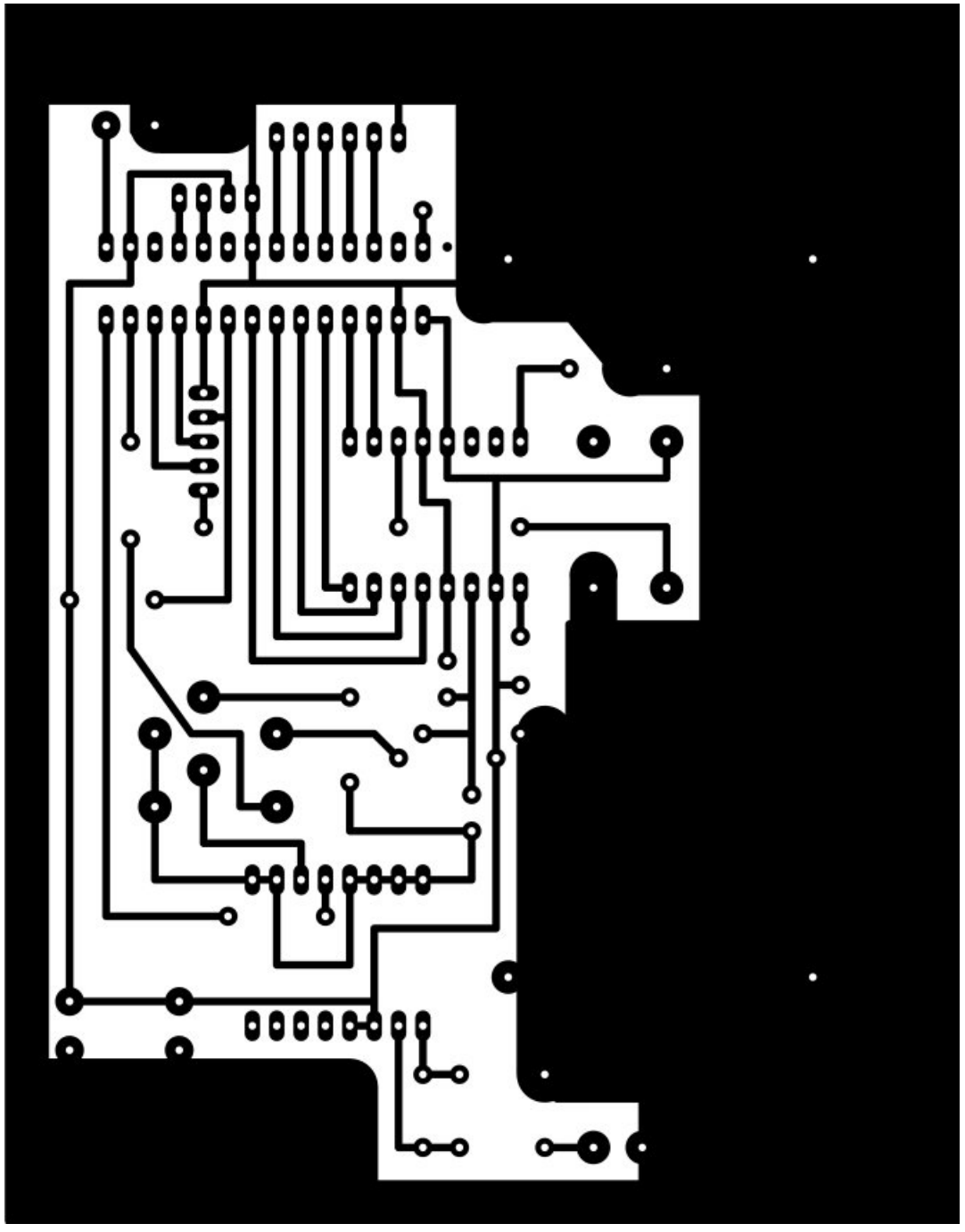
The printed circuit board took a couple more evenings to design etch and drill, but this gave me a chance to try out my new PCB bubble bath(more in another issue). The display was added to the I2C bus, and that did work first time, so my code writing was not as bad as I first thought it might be.

The PCB had two daughter plug-ins to make it easy to mount the two SMD chips which had 0.6 inch pin spacing.

The main motherboard was then designed to hold the rest of the components, with the exception of the L7805CV which was mounted on the case which provided some heat sinking. All the push buttons were normally open push to close.


+5v
40MHz XTAL.
C4 0.1uF
R10 100R
12V SUPPLY
J2 KK 2 PIN
+12v
C5 0.1uF
REG L7805CV
0.1uF
C6
C7 100uF
R2 10K
ds30F4012
MCLR
RB0
RB1
RB2
RB3
RB4
RB5
N/O BUTTONS
OSC
SDA
SCL
RC15
RC13
RC14
RD1
LCD DISPLAY
RE0
RE1
RE2
RE3
RE4
RE5
PGC
PGD
RE8
RD0
PROGRAMMING SOCKET
AD9835
FS ADJUST
IREFIN
IREFOUT
MCLK
SCLK
SDATA
COMP
IOUT
PSEL0
PSEL1
FSELECT
FSYNC
R1 3K3
C1 0.1uF
C2 ???
C3 1uF
R9 330R
R11 33R
R12 1K
R13 5K
R14 3K3
MEAN VIDEO LEVEL
MAX4023
R15 75R
R16 75R
R17 75R
2 PIN KK J1
SINE OUTPUT
R20 1K0
R18 3K3
R19 5K
SET SYNC LEVEL



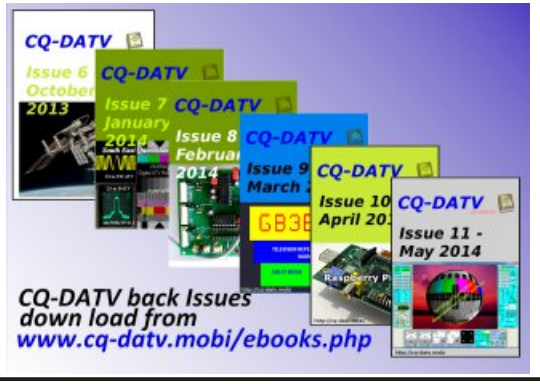


The display was driven through an I2C bus that was also provided by the ds30F4012, (no point on having a micro, if you do not use it to drive these bells and whistles).

The assembled unit prior to fitting in the case, the message, well I was just getting cocky with the PIC code writing.

I hope this picture provides a view of the completed construction in sufficient detail for you to figure out the component placing of all the parts. Good luck and I hope this inexpensive piece of construction helps you improve your station.

Any problems you can always reach me via the CQ-DATV editor.



AD9835

The AD9835 is a numerically-controlled oscillator employing a phase accumulator, a COS lookup table, and a 10-bit digital-to-analog converter integrated on a single CMOS chip. Modulation capabilities are provided for phase modulation and frequency modulation.

Clock rates of up to 50 MHz are supported. Frequency accuracy can be controlled to one part in 4 billion. Modulation is effected by loading registers through the serial interface. A power-down bit allows the user to power down the AD9835 when it is not in use, the power consumption reduceds to 1.75 mW.
The part is available in a 16-lead TSSOP package.

Applications

* Frequency stimulus/waveform generation
* Frequency phase tuning and modulation
* Low power RF/communications systems
* Liquid and gas flow measurement
* Sensory applications: proximity, motion, and defect detection
* Test and medical equipment

MAX4023

The MAX4023–MAX4026 family of voltage feedback multiplexer-amplifiers combine low-glitch switching and excellent video specifications with fixed or settable gain.

The MAX4024/MAX4026 are triple and quad 2:1 multiplexers, respectively, with amplifiers that have a fixed gain of +2.

The MAX4023/MAX4025 are triple and quad 2:1 multiplexers, respectively, with adjustable gain amplifiers optimized for unity-gain stability. All devices have 25ns channel switching time and low 10mVP-P switching transients, making them ideal for high-speed video-switching applications. These devices operate from a single +4.5V to +11V supply or from dual supplies of ±2.25V to ±5.5V, and feature an input common-mode voltage range that extends to the negative supply rail. A low-power disable mode places the output in a high-impedance state.

The MAX4023/MAX4025 have -3dB bandwidths of 260MHz and up to 330V/µs slew rates with a settable gain to equalize long cable runs. The MAX4024/MAX4026, with 200MHz -3dB bandwidths and 363V/µs slew rates, have a fixed gain of +2 for driving short back-terminated cables.

The MAX4023/MAX4025 internal amplifiers maintain an open-loop output impedance of only 18? over the full output voltage range, and minimize the gain error and bandwidth changes under loads typical of most rail-to-rail amplifiers. These devices are ideal for broadcast video applications with differential gain and phase errors of 0.07% and 0.07°, respectively.

Radio is .....

TV without pictures

Manufacturing a tri-Band Dish feed, addendum

Steve Noll WA6EJO

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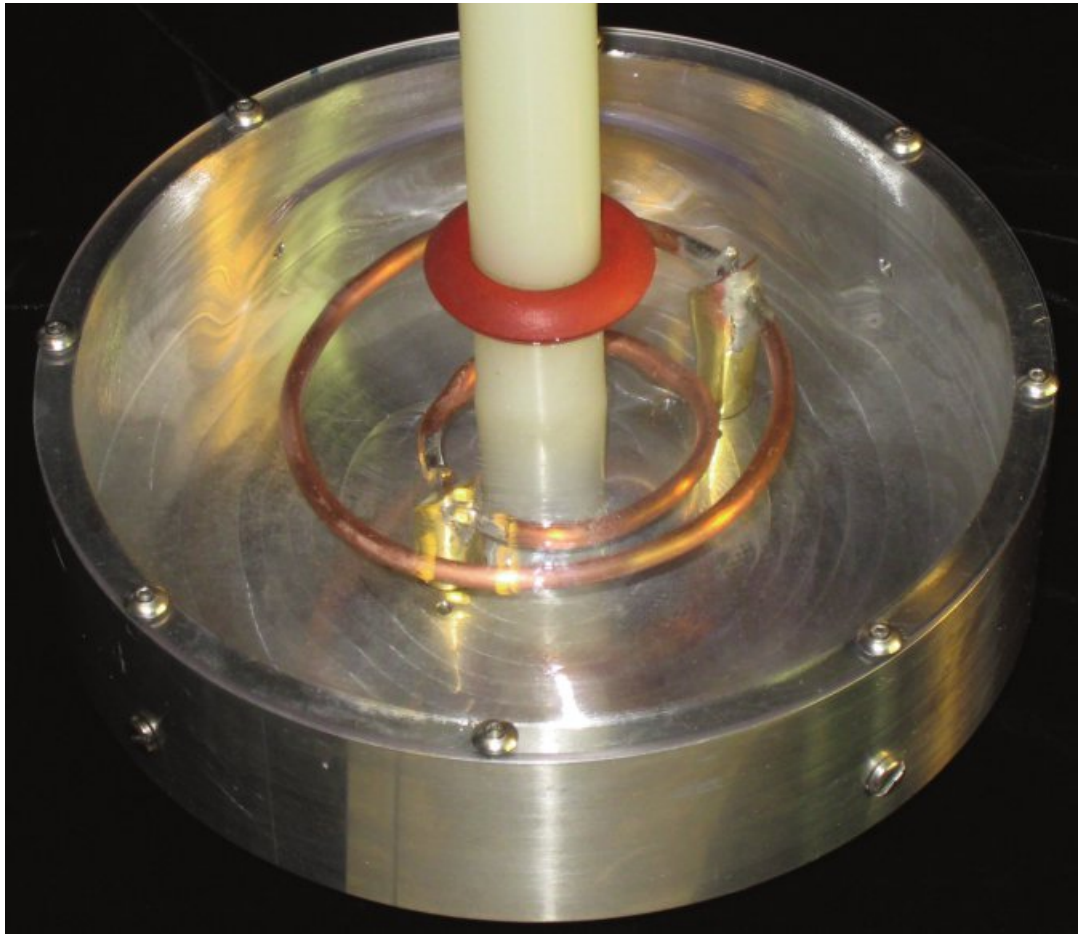


Background

After construction of the tri-band feed for Oat Mountain, two 2-band feeds (each 13 cm and 23 cm) were built for Ord Mountain and Cathedral City ATV repeaters. These feeds were to be mounted using a coaxial Nylon rod identical to that used by Kevin Jacobson, AD7OI, for his Phoenix Arizona dish feed.

Construction

A different technique was employed to form the radomes.

Fig-1 Vacuum pump connected to the lathe

Polycarbonate (a.k.a. Lexan) was again used for its superior strength and crack resistance compared to acrylic (a.k.a. Perspex.) As the 23 cm loop is close to the height of the rim of the reflector the proximity of even the thin 0.0625-inch (1.6 mm) plastic affects the tuning.

The radomes were bowed to provide added clearance by using vacuum forming. After the reflector was machined, but before the loop supports were installed, a 3/8"-16 fibreglass

hex head cap screw with a hole drilled through its axis was installed in the central hole that would later be used to fasten the 3/4inch (19 mm) Nylon rod to the reflector.

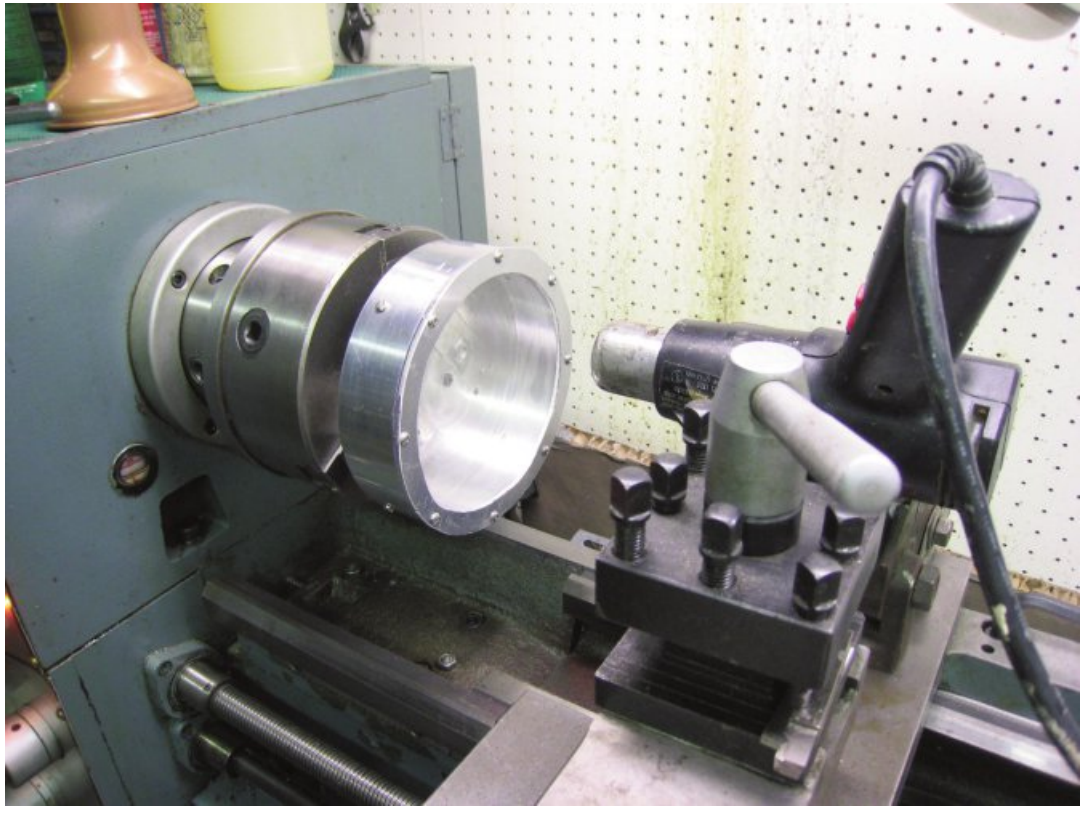


Fig-2 Heating the polycarbonate disk

A high vacuum hose connects this screw to a vacuum pump with the hose running through the hollow chuck and lathe spindle. A swivel at the vacuum pump allowed the hose and reflector to rotate. The loop support holes were sealed with tape and a polycarbonate disk was mounted to the front of the reflector. The lathe rotated the reflector mounted disk while directed heat from a heat gun softened it enough to be sucked into the reflector. The softening point of polycarbonate is quite critical and it took a couple tries to get a useable radome. After the radome cooled it was remounted on the reflector, now with the sucked-in portion sticking out, and a 1" (25.4 mm) hole drilled through the centre while still in the lathe. This hole was lined with weatherproof silicone rubber edge trim (McMaster-Carr 4869A681) to provide a tight seal for the Nylon rod.

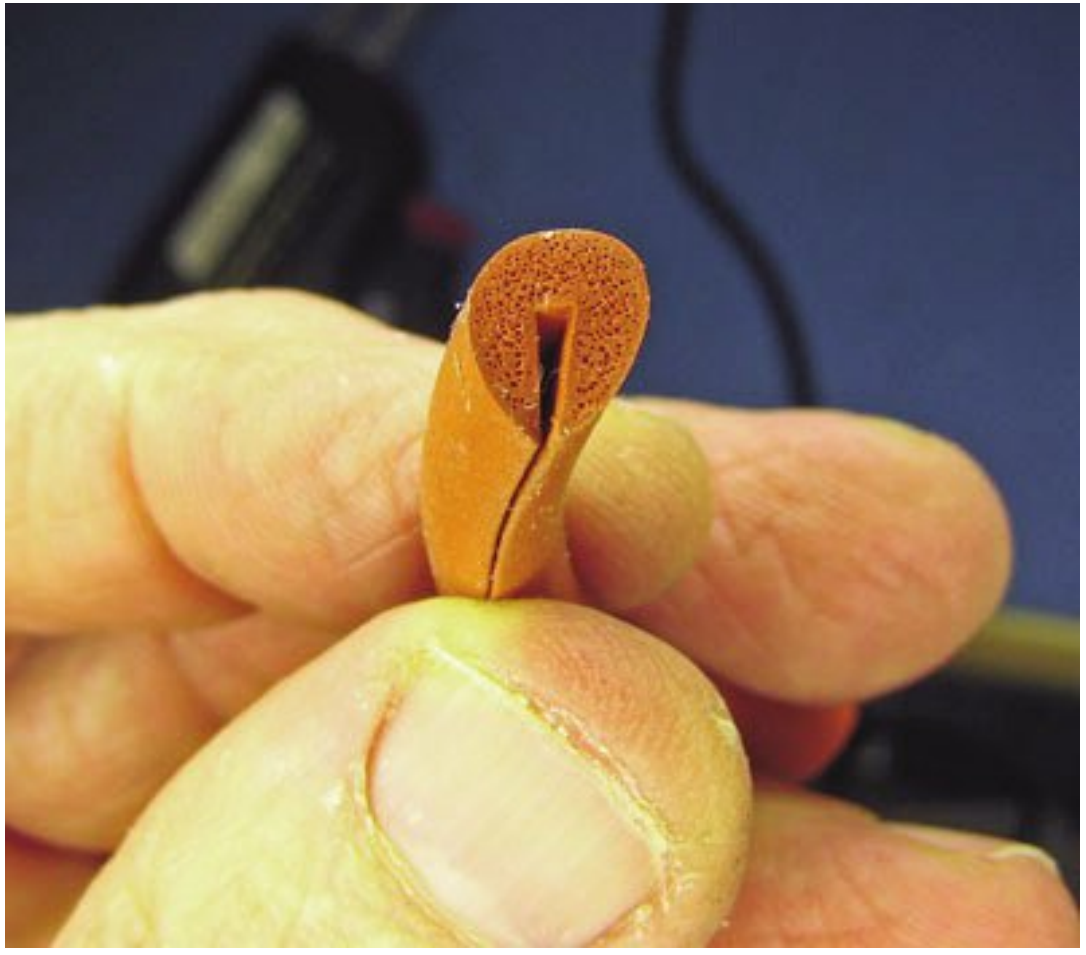


Fig-3 Photo of the rubber seal

The nylon rod allows this version of the dish feed to be used with surplus grid dish antennas by cutting off the old feed about 4 inches away from the focal point, pulling out the centre conductor from the old feed horn mounting pipe-feedline, and inserting the nylon rod into the open end of the mounting pipe.

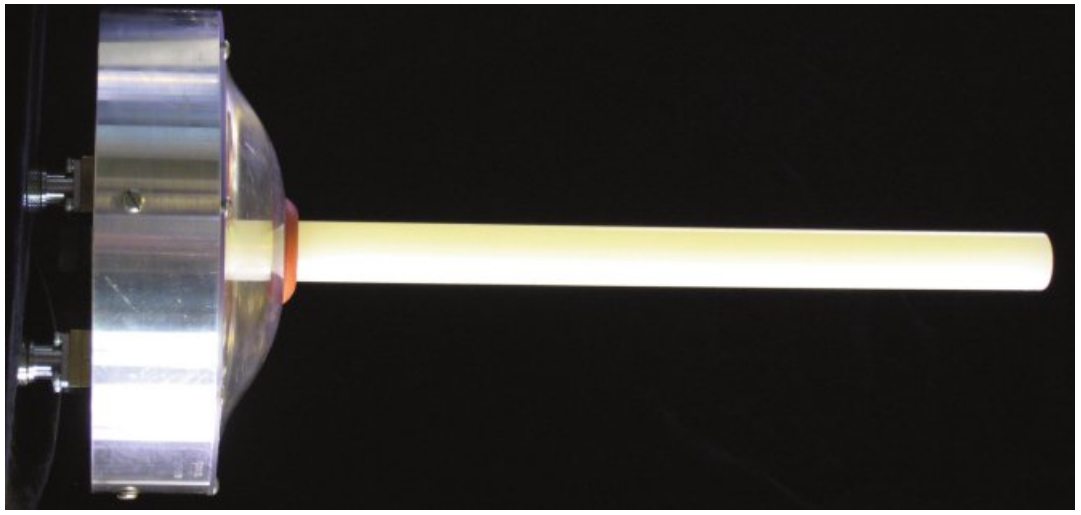
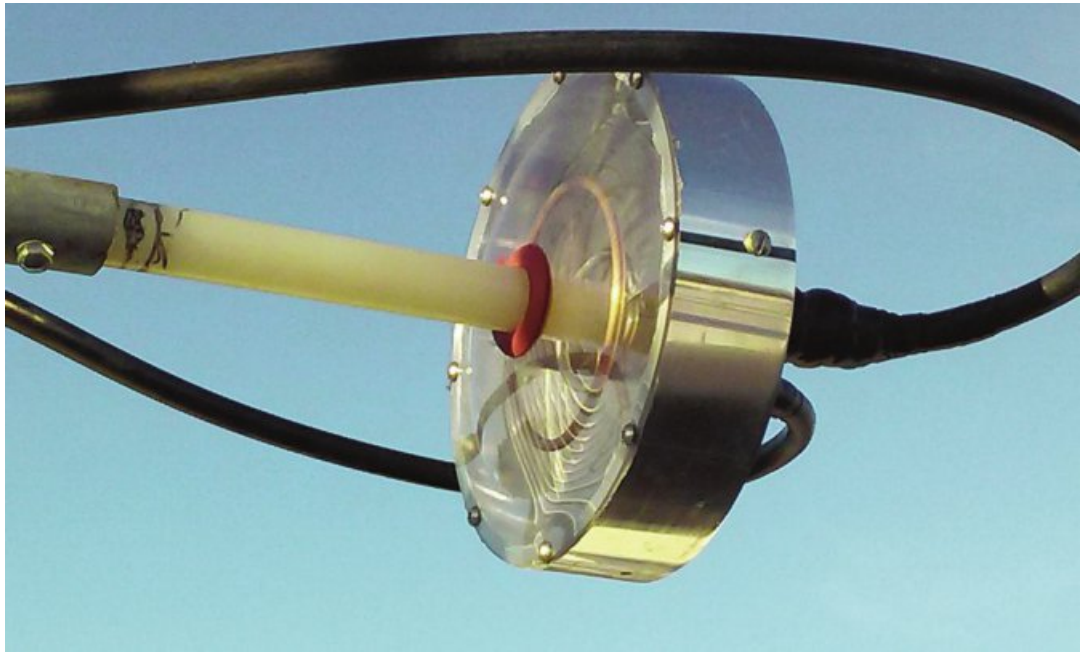


Figure 4 Side view of the completed dish feed



Performance

In the photo above Earl Holtman KJ6DQR replaced a dipole feed for 1.2 GHz RX with the new feed and he obtained a 5 dB improvement and using the same dish for 2.4 GHz TX

Fig-5 Feed mounted on a 8 ft. grid dish

allowed removing a 2nd smaller dish from the rooftop. The combination of the feed and larger dish gave a substantial improvement in ERP.

This site is used as a boosting station to fill in coverage in Cathedral Canyon 1.5 miles distance for the W6ATN Snow Peak ATV repeater. Amateur Television Network has been replacing simple dipole dual band dish feeds with this new dish feed and consistently obtaining 4 to 5 db improvement at each. Isolation of 18 to 22 db between bands will require that a filter be used on the RX side to filter out the TX signal used on the other band of the feed from brute force overloading the receiver.

73, Steve WA6EJO

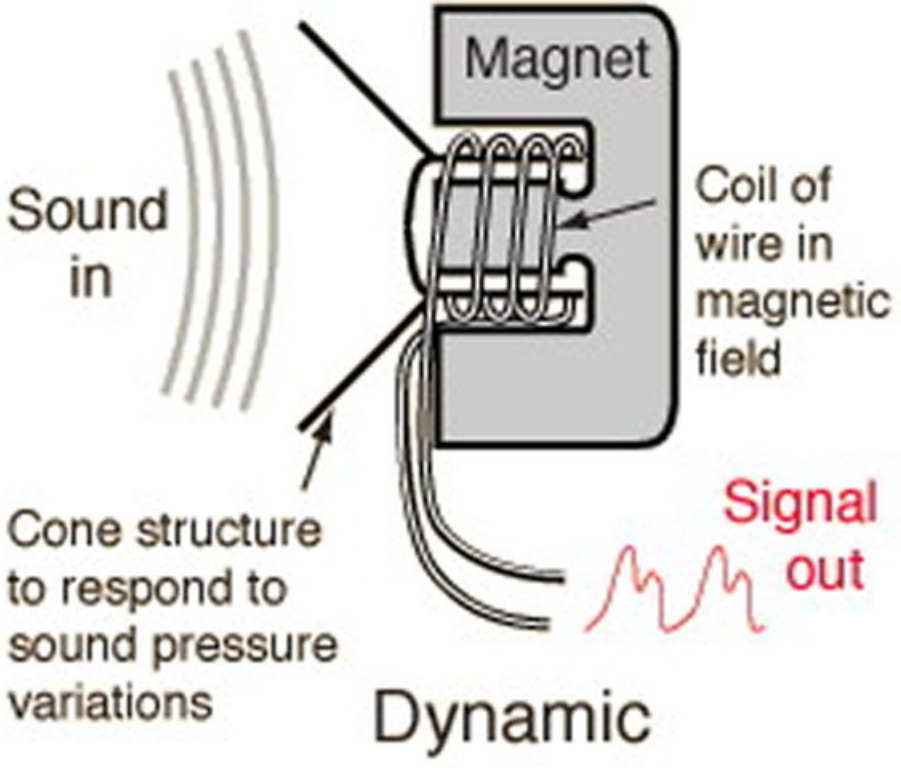
Moving on with film making - Part 3

Trevor G8CJS

In the last Issue we looked at recording sound separately from the camera and talked briefly about cables and connectors. Lets now look at some of the microphones, their characteristics and uses.

The first is the dynamic moving coil type of microphone probably the most robust of microphones.

Dynamic mic's work on the principle of moving a coil of wire in a magnetic field, generating a voltage. The coil is attached to a diaphragm, this diaphragm is vibrated in response to incoming sound wave and so an audio signal is created by a sort of loudspeaker in reverse.



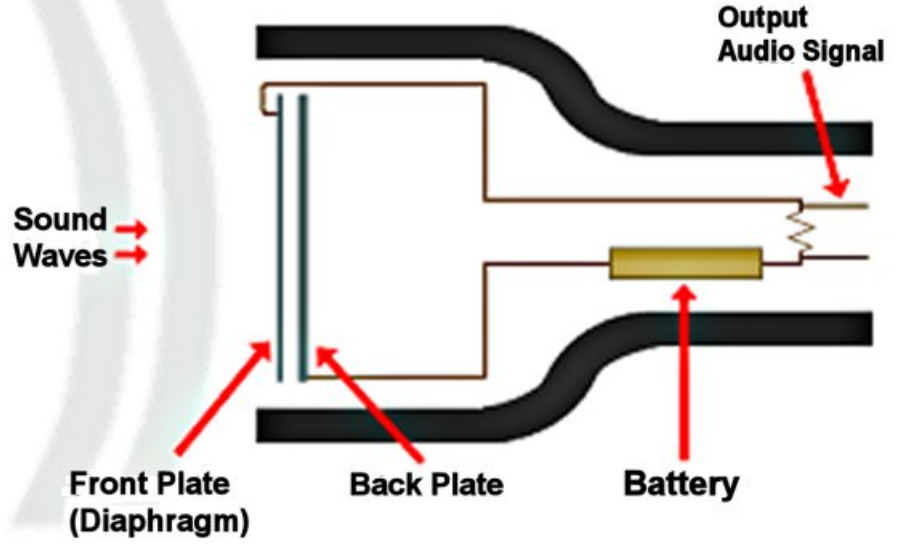
Not the most sensitive of microphones and not known to have particularly flat frequency response, but they do not require an external power and are ideal for loud sound sources.

For not so loud sound sources and where a better frequency response is required we have the Condenser microphone and the construction is as follows.

A capacitor has two plates with a voltage between them. In the condenser microphone, one of these plates is made of very light material and acts as the diaphragm. The diaphragm vibrates when struck by sound waves, changing the distance between the two plates and therefore changing the capacitance, when the plates are closer together, capacitance increases and a charge current occurs. When the plates are further apart, capacitance decreases and a discharge current occurs.

These are powered microphones. The required voltage is supplied either by a battery in the microphone or by an external supply some have both options.

Cross-Section of a Typical Condenser Microphone



The resulting audio signal is a stronger signal than that from a dynamic mic given the same sound source. Besides being more sensitive, condenser mic's also tend to have a better frequency response. They are not ideal for loud sound sources, as their sensitivity makes them prone to distortion.

When these microphones are powered externally it is done by what is commonly called phantom power. In the last issue I explained the XLR connections, 1 screen 2 live 3 return so the microphone sound signal is between pins 2 and 3.

The DC phantom power is transmitted simultaneously on both pin 2 and 3, with the shield (pin 1) being the ground. Since the DC voltage on the "hot" and "cold" pins (2 & 3) is identical, it is seen by equipment as "common mode" noise and is rejected, or ignored, by the equipment.

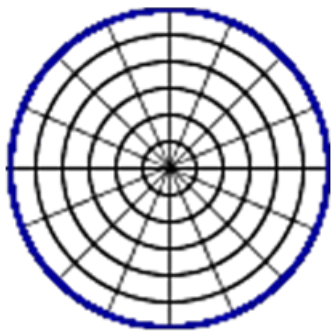
The test for this phantom power is with a multi meter on XLR pins 1 & 2, or pins 1 & 3, you will see the 48v DC phantom power, but if you meter pins 2 & 3 (the audio carrying wires) you will see no voltage.
Phantom power is now the standard, but we once had T power and A B power, which should be long gone.

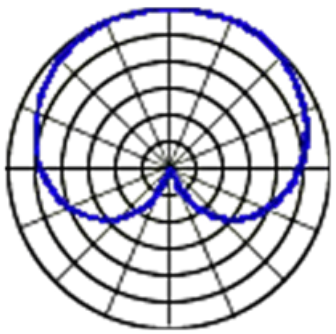
This phantom power is provided by most of the mixers, cameras and associated equipment that the microphones are connected to and often has a switch for phantom power on off, if your mixer or camera does not supply phantom power and your condenser microphone does not provide the battery option, you are in trouble.

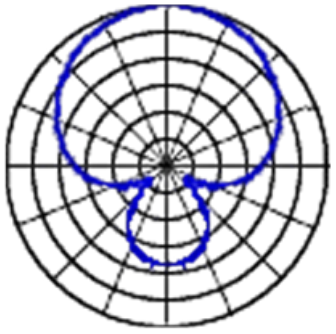
Just like an aerial microphones have a polar diagram

Omni

Omini can be a blessing and can also be annoying when unwanted sound is present







Omni **Cardioid** **Hypercardioid**

Cardioid

Cardioid means "heart-shaped",

Hypercardioid

Directional properties of microphones come into their own when isolating wanted sound from unwanted sound.

That just leaves us, which microphone to use for which purpose, ask two sound engineers and you will get two answers everyone has their favourite microphone for each situation. One thing sound engineers will agree on if there is going to be a lot of sound go Dynamic.

Low sound levels where the source is small such as picking up the bat hitting the ball in a cricket match, then go for a long shot gun which will have a tight Hypercardioid.

Short shot gun microphones, I like if I am working with a fish pole, keep it out of shot and point it at about 45 degrees to the presenter, beware if sound is off mic axis, it will sound very thin.

Lavalier

The term *lavalier* originally referred to jewellery in the form of a pendant worn around the neck. We know them better lapel microphones. Not my favourite microphone they never have the rich sound of a boom mic. They are often a source of stray pickup. The possibility of material scratching against the microphone is a risk. To minimize this, sound engineers wrap the head of the microphones in moleskin or place it inside a hollow centred column-shaped sponge.

Sound like pictures has a range of levels and there is no lighting to lift the dark parts nearer the light parts, there are compressors that will amplify the quiet parts and attenuate the loud parts. What we see more and more these days is the poor man's compressor (the Y cord) so the same sound can be recorded on two channels at different level settings. One been normal and the other low. So if we have a subject to record that has a high dynamic content, let's say "Jack Hammers for beginners" then on the normal track is all the dialogue and if the hammers is started and it distorts we can cut in sound from the low level track. With digital recording more tracks are becoming available to the engineer and ways to use them are changing, might be you will never need to work with jack hammers, but a wedding video where the choir walk in and sing, you might have a mic in position, but if the choir or you were not there at a rehearsal, how are you going to guess the levels?

The internet is full of help and advice I hope we have opened a door here and shown, you can do so much more than rely on an in-camera microphone that has had it's position dictated by the position of the camera.

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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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