

<http://cq-datv.mobi>

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Welcome to the September issue of CQ-DATV.

The IARU contest has already been and gone and we have published the results. Is the June date working for this contest ? Well one member in Slovenia Rudi S58RU thinks not, read his opinion. But we would love to hear from others with similar or different opinions or even a third option if you have an idea.

The contest might be over, but still to come for UK members is the CAT 17 get together at Finningley ARS on the 9th and 10th September 2017 and for those of you further afield there is TAPR September 15 - 17, Saint Louis, MO. Then in October the AMSAT-UK Colloquium will this year be on October 14-15. It will be also, for the first time, be incorporated into the RSGB Convention at the Kents Hill Park Conference Centre, Timbold Drive, Milton Keynes, MK7 6BZ.

So lots to look forward to before winter starts to rear its ugly head and here in the UK and we disappear indoors and start looking at constructional projects. But then some of us have already started.

Patrick Tilborghs ON1BTE has found a source of MRF6VP3450H PA's that cover 436-860MHz on e-bay that do need some modification, but he shows you how in this issue.

Mike G7GTN has been looking at the I2C bus and how to interface and control the PIC 18F2520.

Grant VE3XTV has come up with a repeater controller that looks like it will surpass any repeater controller so far seen.

Trevor has been looking at Open Shot, a free Non-Linear-Vedio-Editor and how to get it into operation.

So, lots happening on the ATV front..please sit back and enjoy CQ-DATV 51, but remember, issue 52 is now in production and we need your copy.

For those of you with a facebook account please join our group [CQ-DATV](#).

Remember, if it's happening in ATV in your part of the world we would love to share it with our readers.

You can contact us at [editor@cq-datv.mobi](mailto:editor@cq-datv.mobi)

### CQ-DATV Production team

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## ATV meeting 2017 in Gloevzin



With fine wheather conditions around 59 guests came to see the lectures at the northern Germany ATV meeting 2017 in Gloevzin (between Hamburg and Berlin). For XYLs without interest for technical lectures Marita Rehm (wife of meeting organizer Rolf Rehm, DJ9XF) started a visiting tour of Wittenberg/Elbe.

At first Jens, DH6BB, demonstrated on the big video projector screen devices and plans of AMSAT-DL for the two Ham Radio transponders on the geostationary TV satellite "Es?hail 2" from Katar which is planned to launch in 2018. For ATV hams useful is the broadband transponder (10 MHz wide) allowing several RB-ATV channels side by side. Using 2 MHz rf bandwidth the transmitting ATV station on earth needs 100 Watt output power on 2405 MHz into a circular polarized feed in a 120 cm dish (pointing to 25,5 degrees east geostationary position). For ATV RX a decent DVB-S2 receiver and a special LNB for 10491-10499 MHz in a 75 cm parabolic dish is needed.

Then our youngest contributor, 13 years old student Dan, DN3XW, from Tangermuende, exhibited his latest project with LED arrays controlled by an Arduino microcomputer. Hartmut, DM2CFL, showed many pictures about the most eastern ATV repeater in Germany, DB0LAU on Lausche mountain near Zittau (it has to be relocated because of a new public tower building at the site).

After launch in the restaurant nearby the general meeting of AGAF e.V. confirmed all five board members (and enabled the long awaited registration of the new main office at the register of associations in Berlin).

## Hamvention live



In May 2017 the US based "Hamvention" fair opened for the first time at the new site "Greene County Fairgrounds and Expo Center" in Xenia, Ohio (20 minutes by car from Dayton).

Therefore the slogan was called "Same friends, new home". The old home "Hara Arena" is not available any more because it's in need of renovation.

The new halls had got names like Hertz, Tesla or Marconi, additionally some big tents were built up. With more than 30.000 visitors the Hamvention draws around the same admission like the Japanese "Ham Fair" in Tokyo, opening on the first September weekend.

Like every year since 2001 Tom, W5KUB, and his team webcasted live from his stand and partly mobile from the outside car park.

During one of his live talks Tom had NASA astronaut Doug Wheelock as a prominent guest. (In May 2015, W5KUB.COM was honored to win the Special Achievement Award which was given by the Dayton Amateur Radio Association at hamvention.)

**DL4KCK**

**Translations from TV-AMATEUR 185 by Klaus, DL4KCK -**  
[www.agaf.de](http://www.agaf.de)

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### **Latest news from HAMRADIO 2017:**

IARU Region 1 President Don Beattie G3BJ, gave an opening address at the Friedrichshafen HAM RADIO 2017 event in which he covered the radio spectrum challenges of today.

"It is of little value having radio spectrum allocated to the amateur service if it is made unusable by the presence of multiple sources of interference, be it electrical interference or intruders in the amateur bands.

And so IARU is deeply involved in the work of the international standards organisations, arguing for common sense in the setting of emission standards for electrical and electronic devices.

Areas which are of current concern are solar photo-voltaic generators, wind generators, digital devices, VDSL+ and

Wireless Power Transfer. Some would say that even with the work we are involved in on standards, much of the radio spectrum is becoming unusable in the suburban environment, and I have sympathy with this view."

[http://iaru-r1.org/images/PR\\_Communications/FHN-opening-address---G3BJ.pdf](http://iaru-r1.org/images/PR_Communications/FHN-opening-address---G3BJ.pdf)

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The 2017 Convention for Amateur TV (CAT17) will be held at Finningley ARS on the 9th and 10th September 2017.

To register your attendance this year, please fill out the CAT17 Registration form

[https://docs.google.com/forms/d/e/1FAIpQLSd6sRyQXdIwela\\_gOTasHPVPBzIAJ2rgOFglmXqXkLpYQB2gEQ/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSd6sRyQXdIwela_gOTasHPVPBzIAJ2rgOFglmXqXkLpYQB2gEQ/viewform?usp=sf_link).

Events will start at around 1:00 pm on the Saturday, and conclude mid-afternoon on the Sunday. Arrangements are also being made for an informal dinner at The Reindeer Inn on the Saturday evening. Latest news and discussion about the Convention can be found on the BATC Forum

<http://www.batc.org.uk/forum/viewforum.php?f=104>.

## DATV in Italy



DVB Transmitter software rel. v1.25 now works perfectly in Windows in Italian! The "Capture formats" now correctly appear in the drop-down menu. Great work Charles and all the team.

Now, back on FPS loss issue, I did several tests and here are the outcome I've understood and seen so far:

1) TUTIOUNE (by F6DZP) works great with ISS DATV transmission. No frame loss at all. Smooth video.

2) TUTIOUNE "works bad" with DVB Transmitter SW (FPS and freezing audio and video issues, SW's fault as we've understood its TS is not good)

..but...

3) DVB Transmitter SW works great with a professional commercial HUMAX DVB-S receiver !

Jean Pierre (F6DZP) wrote earlier:

*[...] By my side I think that it is impossible to use this software if you want to be sure to receive a good, fluid video and audio.*

*The only receivers that can receive are low quality Set top boxes that don't care of the synchronization.\**

*DVB professional receivers or software under windows, that need correct synchronization info, cannot work normally with the bad TS produced [...]*

....what does it mean? I cannot believe that one of the most sold set top boxes for DVB-S is a "low quality" one....Can anyone figure out this dilemma? I'm a bit confused....because either HUMAX is "rubbish" or I really don't know what to think...

## 73 de Andrea, IZ3DVQ

Hello Andrea, If we use any DVB-S analyzer, it will find many errors/bad characteristic in the TS produced by DVB transmitter.

The TS has notably bad values used for frame synchronization. The result can be sometime acceptable or sometime difficult which may freeze ...



Standard commercial set top boxes very often don't take care of the synchronization, so they will not always show you the video and audio well synchronized.

Professional receivers ( more than 1000 or 2000 to 3000 Euros) uses the synchronization data to show you the video and audio at the exact time they must be presented.

<http://www.newtec.eu/products/receivers>

[https://www.advanceddigital.ca/products/receivers\\_decoders/](https://www.advanceddigital.ca/products/receivers_decoders/)

Humax Set top boxes are not "professional receivers", they don't take care of the synchro, so the bad synchro given by DVB transmitter are not used and the receiver shows you the TS packets when they arrive.

That doesn't mean that it is low quality video/audio but that it is low quality about some professional characteristics.

If you like it and are satisfied, use it, it is the best tool for you.

**73**  
**Jean-Pierre F6DZP**

## GB3FT

Just to let you know I'm soak testing the streaming box for GB3FT. The streaming hardware is very simple - Comag SL30/13, Raspberry Pi3 and video capture dongle.

What this means is - if you log onto the BATC streaming website and select the GB3FT stream you should see the test card.

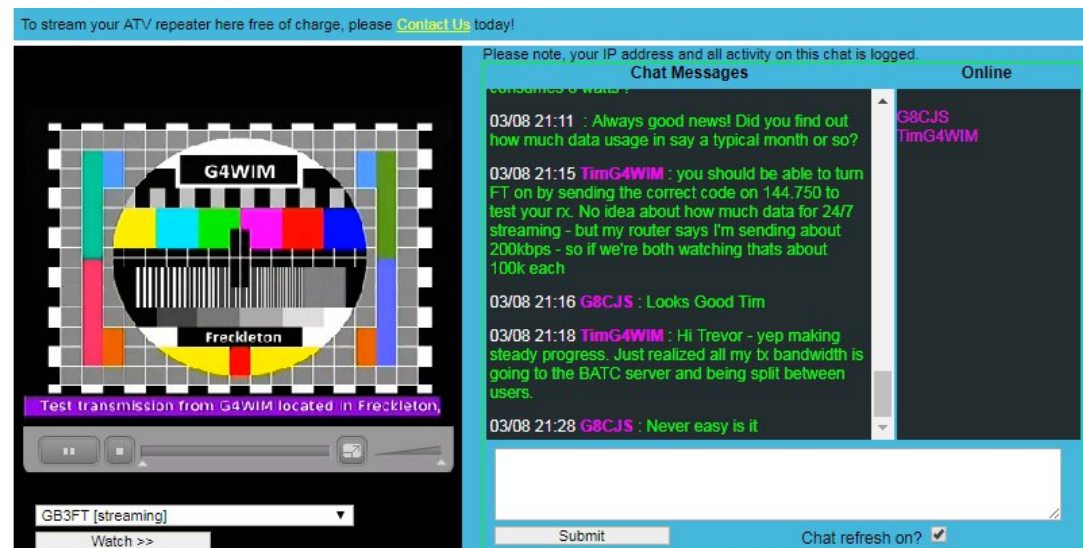
Here's a link [http://batc.tv/ch\\_live.php](http://batc.tv/ch_live.php) to the streaming site - but not sure if you need an account to actually watch the

streams. (ED - yes you can view the stream without being a member)

As the beam is pointing toward Blackpool, if you transmit on 1249MHz you should see how well you're being rx'd - it also has a 146.5MHz RBW rx attached and a 4 ele yagi pointing SSE.

You might also see our local drone which seems to be flying a lot these calm evenings! GB3FT TX can be turned on by sending 12301 DTMF on 144.750MHz

To stream your ATV repeater here free of charge, please [Contact Us](#) today!



**GB3FT test stream**

GB3FT is run by G4WIM and keeper G3WGU

GB3FT is currently located in Freckleton IO83NS before moving to its final location in Blackpool.

**73 Tim G4WIM**

## ADALM-PLUTO



For those who do not follow the BATC Forum, there has been a lot of discussion about a new SDR board called the ADALM-PLUTO from Analog Devices.

This USB2-based unit is full-duplex Tx/Rx and the current model can be software modified to operate from 48 MHz - 6 GHz on transmit and 70 MHz - 6 GHz on receive.

PLUTO produces about 1 mW output.

- 12-bit ADC and DAC
- GNU Radio sink and source blocks
- List price US\$150
- Introductory price US\$100

BATC Forum postings – in the DATV - Digital ATV section

Charles G4GUO has been quoted to say: "...Considering what [PLUTO] can do they are a real steal at that price."

Claudio I2NDT reported that more info can be found at <http://www.rtl-sdr.com/adalm-pluto-sdr-hack-tune-70-mhz-to-6-ghz-and-gqrx-install/>

Info from DigiKey is <https://www.digikey.co.uk/products/en?keywords=adalm%20pluto>

Both DigiKey-USA and DigiKey-UK were out of stock as of 22nd August 2017.

**73...de Ken W6HHC**

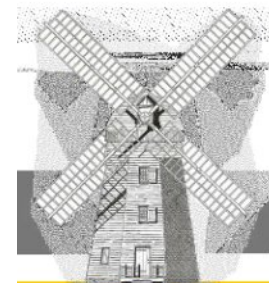
# DKARS MAGAZINE



### In dit nummer:

- ◊ De winnaar van de IC-7300 DKARS radiopanel verloting
- ◊ DKARS heeft een nieuwe voorzitter
- ◊ PEØGJG en z'n grid dippers
- ◊ En uiteraard nog heel veel meer...

Peter  
PD7PG



  
ISSN: 2452-1009

**DKARS**  
Dutch Kingdom Amateur Radio Society



Prijs / Price € 0,00 / \$ 0,00  
Augustus 2017 editie 34

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

# ARRL/TAPR DCC (Digital Communications Conference)

**September 15 - 17, Saint Louis, MO**

Mark your calendar and start making plans to attend the premier technical conference of the year, the 36th Annual ARRL and TAPR Digital Communications Conference to be held September 15-17, 2017. in St Louis, MO. The conference location is the Holiday Inn Airport West.

The ARRL and TAPR Digital Communications Conference is an international forum for radio amateurs to meet, publish their work, and present new ideas and techniques.

Presenters and attendees will have the opportunity to exchange ideas and learn about recent hardware and software advances, theories, experimental results, and practical applications.

Topics include, but are not limited to:

*Software Defined Radio (SDR),  
digital voice,  
digital satellite communications,  
Global Position System (GPS),  
precision timing,  
Automatic Packet Reporting System(tm)(APRS),  
short messaging (a mode of APRS),  
Digital Signal Processing (DSP),  
HF digital modes,  
Internet interoperability with Amateur Radio networks, spread spectrum,  
IEEE 802.11 and other Part 15 license-exempt systems*

*adaptable for Amateur Radio,  
using TCP/IP networking over Amateur Radio,  
mesh and peer to peer wireless networking,  
emergency and Homeland Defense backup digital communications,  
using Linux in Amateur Radio,  
updates on AX.25 and other wireless networking protocols.*

DCC Information at:

[\*ARRL and TAPR Digital Communications Conference\*](#)

Register for the DCC at:

[\*http://www.tapr.org/dcc.html#registration\*](http://www.tapr.org/dcc.html#registration)

To book your room, use the reservation link below or call the hotel directly at: 314-291-6800 and mention the group code DCC when making reservations.

To use the link below, click the link, then enter Check In & Check Out Dates, Click Check Availability, Choose Room Type and Click Book This Room

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Earth City, MO 63045  
314-291-6800

**Posted by: Mark Thompson** [\*wb9qzb\\_groups@yahoo.com\*](mailto:wb9qzb_groups@yahoo.com)



By Richard Carden - VK4XRL

## Repeater Input upgrading

Another project that I have been looking at is providing extra Inputs to repeaters which have in most cases that I have seen tending to use around four input which is fine until you want to put extra receivers into service for the extra bands etc. these either been Digital or FM. This was also brought to light when trying the PortsDown DVB-S TX from the BATC as it wouldn't open the existing receiver in the repeater so either a upgrade receiver or a new receiver may be required. Therefore extra facilities will be required and likewise you may wish to use Skype or IP networks as inputs, all would require extra switching and control facilities.

As I had a number of four by one audio and vision switchers I decided to make the switcher using two of these units all controlled by a PICAXE micro as I had these also on hand for another repeater project. A few minor changes were all that was required plus updating the coding to make it all work. Looking at the block diagram you can see that the A switcher has 4 inputs and therefore handles the requirements of receiver inputs. The output of this switcher feeds the first input of the B switcher. This then leaves three other inputs available for an Ident, Test card, or camera etc.



Therefore when any input on A Switcher is on then input one of the B switcher is also on and is off if any of the other B switcher inputs are in operation.

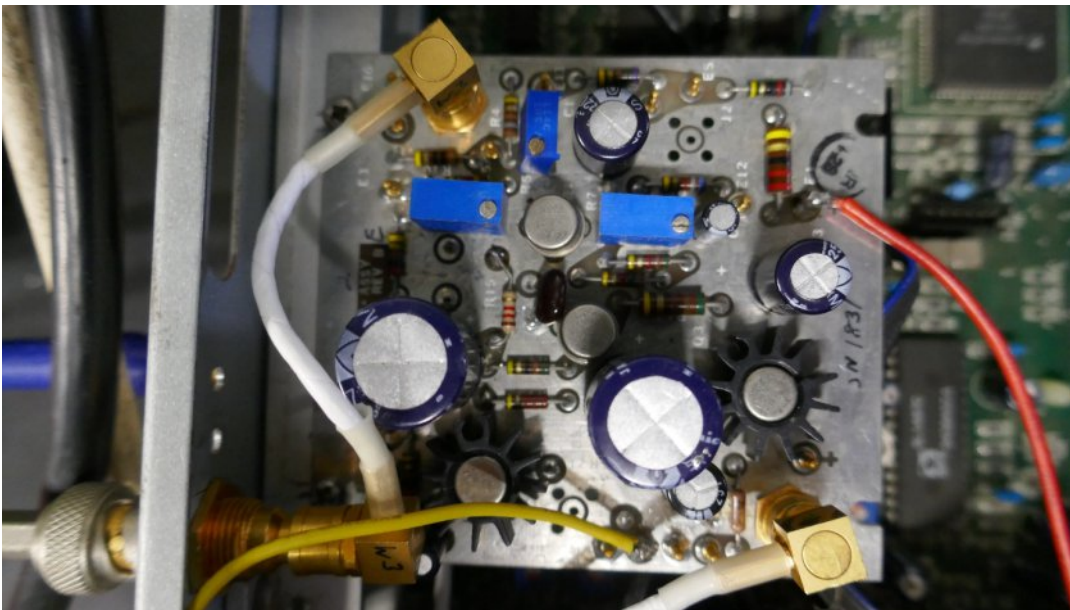
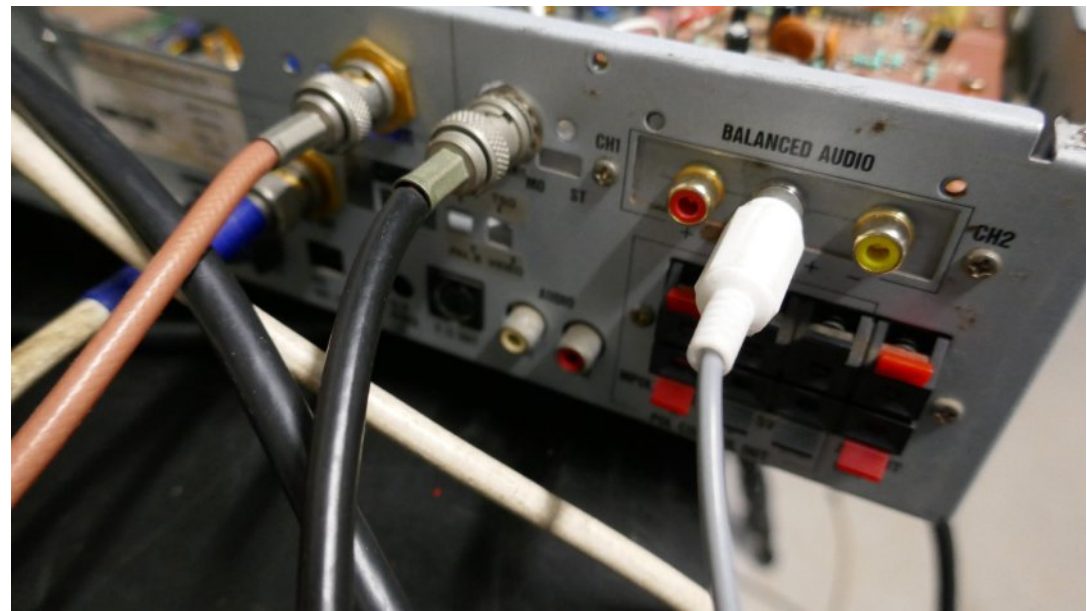
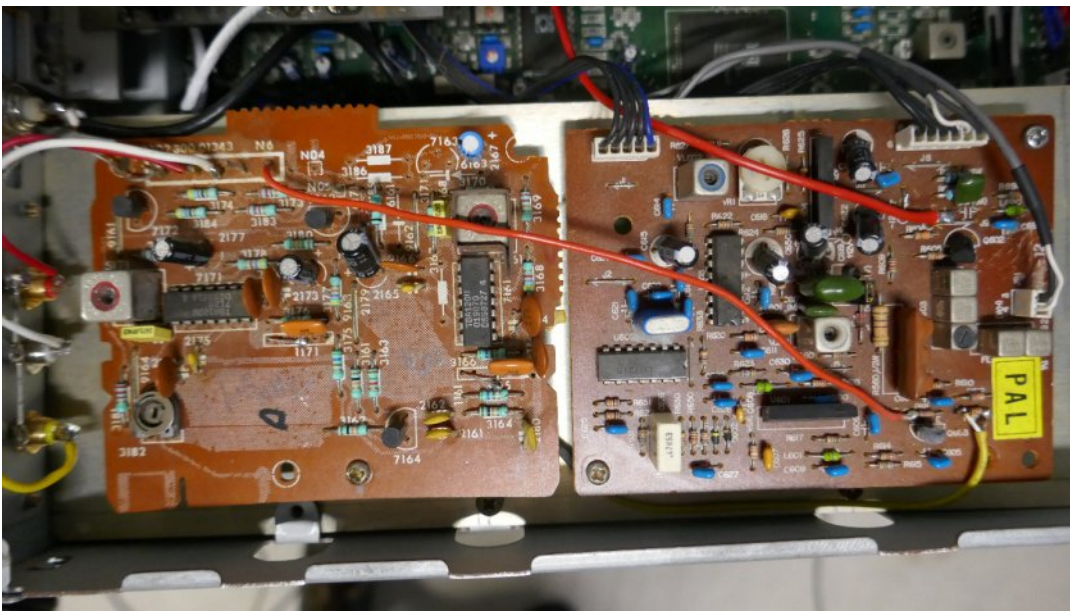
The PicAxe is programmed to provide 'ABC' outputs to a 4028 decoder chip and gives eight control lines for the two switches via ULN2003 buffer IC's. The reason is that the switchers requires a low to switch, however we have a problem in that output 5 cannot be used in this case and therefore an extra output from the PicAxe called 'D' is provided as the input 5 switch and is set low for Inputs 1-4 and high for inputs 5-8.

Note that the coding has a switcher test sequence at start-up for checking system operation. Note also that the audio switchers are also 4x1 so the switching is also fed to the audio switches and in my case was by ribbon cable separated into four wires each for the A and B switches via DB9 Connectors.

In the last issue of CQ-DATV Trevor mentioned receivers for the reception of FM and in particular the Scientific Atlanta B-Mac units as used in Australia these are basic B-Mac received these also been fitted with PAL boards for analogue reception.

There are a few modifications that I have fitted to improve the facilities as required in use in Australia. Because we only use half the normal satellite bandwidth of 36MHz (i.e. +/- 9 MHz) then the output level would only be half that of a full 36 MHz satellite signal.

This is fairly easy to get around, the original output is U-linked and fed to an internal video amplifier to give a 1 volt peak to peak with two outputs, one applied via a BNC connector and the other by a RCA connector making things easier to facilitate. The gain should be adjusted to 1 volt p/p when fed into a 75 Ohm input.



The second requirement for our usage is stereo or dual audio output. This can be provided by using either an old sound stereo demodulator board from a TV or VCR or making your own using a TBA 120u x 2 which can be used for the 6 and 6.5 MHz after replacement of ceramic filters.

Also a dual decoder can be made using a TDA 9821 with the required filters mentioned above.



## DATV-Express Project - July update report

By Ken W6HHC

Charles G4GUO and the rest of the Project Team have decided to proceed with beta-releasing v1.25 of the DATV-Express-for-Windows code....even though only two alpha testers provide any feedback of their results (both positive). The Project Team had hoped to also hear from users in Japan using "Windows for Japan". This new version cleans up a few problems:

- *Should work with non-English versions of Windows (such as Japan, etc). This mainly applies to users of languages other than English and French. This change should now allow you to select video capture formats using non-English versions of Windows.*
- *Not all possible FEC rates are permitted for each type of digital modulation or protocol. The GUI had been trying to set illegal values (or no values at all).*

Finally, The Windows beta software for v1.25 (and a more-detailed NOTES file...aka README) is now available on the normal

<http://www.DATV-Express.com> DOWNLOADS page.

Ken W6HHC reports that he has repaired the deleted download files for the [DATV-Express.com](http://www.DATV-Express.com) website.

The project's web server SAN Storage system had 3 drive failures at the same time during a power outage.

The missing files (now restored) were mainly:

- *Windows download software releases (linux .DEB files somehow not affected)*

- *User Guides*
- *TechTalk articles on DATV*
- *Open Source DATV-Express hardware files - like schematics, specs, and BOM*

Art WA8RMC continued to "hack away" and electrically re-design for a smaller/cheaper PCBA for the MiniTiouner V2 designed by Jean Pierre F6DZP. So far, Art has finished a draft of a schematic in AutoCAD and layout a draft of a PCB with placement and routing in AutoCAD. The next step after a design review will be to turn over to Tom WB6P to capture and do a gerber producing PCB layout with PADs/Designer DX. The goal is to have an assembled-and-tested version of the MiniTiouner-V2 that could be sold to hams for less than US\$100+shipping (+VAT where applicable).

Charles G4GUO reports that he has now finalized on using PIC as the micro to allow interfacing the Express-Frequency-Extender concept add-on-board to the DATV-Express board (see June Project Report for details). The PIC code is running and Charles is currently obtaining RF amplifier samples from MiniCircuits.

**"Project speed set to back-burner" .... de Ken W6HHC**

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**By Rudi Pavlič S58RU****IARU***International Amateur Radio Union  
Working for the future of amateur radio*

Let me first introduce myself and provide a short history lesson, I am Rudi Pavlič S58RU and as you will gather from my call sign I live in Slovenia, where until 2004 we had our own ATV contest, which we then dropped and adopted the IARU R1 ATV contest in its place. There was some initial confusion on where to send the logs and how to see the results, thank you CQ-DATV, for publishing the results, we are indebted.

The organization of IARU ATV Contest has now passed to the Dutch Radio Amateur Association and in turn we now have a new calendar for the IARU ATV competition, the contest used to be in September and run from 18:00 GMT on Saturday till 11:59 GMT on Sunday.

Now the IARU ATV contest is in June and runs from 12:00 GMT on Saturday until 17:59 GMT on Sunday, I am sure there was a good reason for this, but am I the only one who finds this difficult particularly for portable operation.

The revised end time, does not leave enough time to de-rig everything and pack the car, while there is still enough daylight, particularly if you run 1.2 - 2.4 - 5.6 - 10 and 24 GHz set-ups. This was bad enough for the IARU UHF & UP Contest in October, but for the ATV contest you need even more kit.

If you only enter the contest for pleasure or if you only send in check logs, then yes you can finish early while there is still enough daylight to pack the kit away, but if you seriously wish to compete from a portable location on all the ATV bands, then please IARU we need some de rig time.

The second problem is moving the contest from September to June, this might not be a problem if the only contests you enter are ATV, but June is already a busy month for contests.

The first weekend of June, being the national associations VHF Contests, on all frequencies, the second weekend of June is the IARU ATV Contest, on all frequencies, the third weekend of June is Alpe Adria Contest UHF & UP, from 432 MHz & UP.

I understand the September date clashed with the IBC TV exhibition in Amsterdam, but how many ATV operators attend IBC and are there sufficient numbers to warrant this change.

It would seem we have fixed a small date problem that I suspect was not really a problem and in the moving process we have created a contest duration problem that I can find no justification for at all.

So we have now have both an inappropriate weekend and an unworkable time slot for this important TV event, please IARU can we have a rethink for both the new date and the revised slot.

**73 S58RU**

# DATV Repeater Project

**By Grant VE3XTV**

I have been building ATV repeaters for some time now, the main difference between ATV and standard repeater controller is the wide range of hardware configurations you have with ATV.

With a FM voice repeater you can have a common controller design in a thousand or more repeaters world wide, with ATV you would be lucky to have two maybe three repeaters with common hardware configuration. Now with DATV long side ATV requirements you need a level flexibility in your controller design, how is the best way to do this?

The basics of an ATV repeater controller are:

- 1. Detecting incoming video, be able to switch between repeat and beacon modes.*
- 2. Display video information pages about the club or individuals, with a callsign.*
- 3. Have a control input, this is normally a DTMF decoder on a FM voice channel.*
- 4. Must have some form of video feedback to the user, (video text overlay).*

This has not changed with DATV you still need to detect the incoming transport stream and be able to switch to repeat mode, but DATV this is done with ASI switching.

To provide flexibility with hardware devices I use RS-232 to communicate with switching devices, by doing so this will simplify the controller hardware. This way I can use common layout and change software to suit these hardware I am using on the universal asynchronous receiver/transmitter (UART).

With my last ATV repeater I run to limitations with this idea and I started thinking how could make the hardware flexible in the same way as software. I knew the only way this could be done was to come up with new design based around using a Field-Programmable Gate Array or (FPGA) and to have expansion boards.

So this is what I am working on at the moment, have a basic controller that can be used both for ATV and DATV repeater configurations. To do this I added in extra (UART's), long side extra ports that can be connected to add in other type of hardware modules. Therefore the micro-controller does not need to connected to all the hardware, but just the key parts and the FPGA becomes an input/output (IO) expander. This then becomes a software change for the micro-controller long side the FPGA to accommodate future hardware configurations. Using 64k EEPROM I also add in hardware profiles for new devices that can be controlled via RS-232, maybe something like my MKIII FM receiver board.

These days it is common place to use a Raspberry Pi computer long side the repeater controller these parts work together, but have two very different jobs to do. The repeater controller does all house keeping for the repeater and the Raspberry Pi provides a video slide show (the repeater information pages) also can be setup as web-server to show repeater status information, there are many more applications that the Pi can be used for.

## Progress so far:

I have been testing the new sync detector design, this is needed due to amount of noise and various forms of interface that we are dealing with these days. I am looking at a dual system to detect both line and field signals, long side a mute level adjustment. I have found that a low pass filter connected to a LM1881 as a sync separator, with two LM567 works very well.

I have tested the code for the FPGA all the logic is working well, I will need to add in four optocoupler's to isolate 3.3v input side from external devices.

I have been informed by Mike (WA6SVT) that there is a interface LED modification for the HiDes receivers. I have also added in an UART expander that has four RS-232 ports and an Ethernet interface.

As for the HiDes equipment, once the ASI in / out are available, I have found an Audiovisual supplier, who has a four in / one out ASI switcher. This switcher has an RS-232 connector fitted and I can drive it directly from the controller, along side the Kramer 8 x 8 Audiovisual switcher.

I have also been looking at my EEPROM space and I have room to add in hardware profiles for the HiDes equipment (if they are able support RS-232) on the units. As you can tell there is a lot of software to write, and this will be where most of my time will be spent on this project.

This board has two dual sync detectors with four digital inputs and four RS-232 ports. There is also two auxiliary audio inputs, one for control and the other for a back chat channel to be mixed into both sound channels. All crystals are through hole so they can be changed for PAL or NTSC sub-carrier frequencies, most of the other components are SMD. This is done to keep the board size down and cost.

I have started the PCB layout last weekend, this should keep me busy for a few more weeks yet to come. I know many of you that have built ATV repeaters in the past and have your own ideas on how a repeater controller should work, so therefore I expect that the demand for my design will be somewhat limited.

So on that basis I plan to build a small number of boards for my own requirements.

## Features:

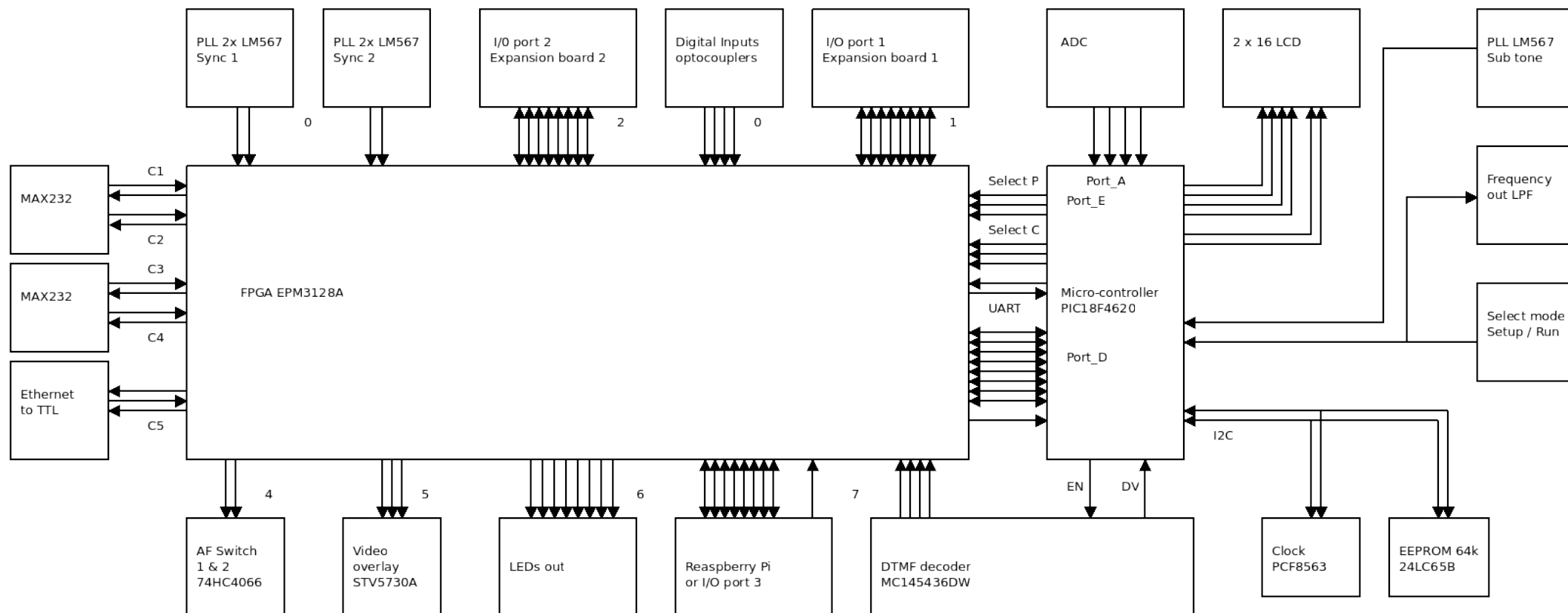
- 1. Video overlay to display functions, visual feedback.*
- 2. To turn on and off transmitter and links.*
- 3. Switch between RX aerials.*
- 4. To work with more than one sync detector (more than one analogue input).*
- 5. To turn on and off sync detector inputs or digital inputs*
- 6. To switch between beacon mode and repeat mode*
- 7. Remote control of multiple AV inputs and outputs*
- 8. Work with up to four digital inputs*
- 9. Switching auxiliary audio inputs*
- 10. To be able to monitor temperature*
- 11. Easy to configure and to setup*
- 12. Real time clock and timer*
- 13. Morse code tone generator*
- 14. Expansion boards used to change hardware configurations*

I can add more in at a later date with software upgrades.

## Add-on boards and Expansion boards.

- 1. From the main board you can add in an Ethernet board that lets you interface to controller setup and control.*
- 2. Relay expansion boards, you are able to fit up to 16 Relays with two boards that has 8 relays each.*
- 3. UART expansion board this will give an extra four RS-232 ports.*
- 4. Input expansion board has eight optocoupler's and four ADC inputs.*
- 5. Sync detector input expansion board this add an extra four analogue inputs, that is if you need more than two.*





6. I am also testing out another expansion board to display a audio level meter within the analog video signal, using the good old STV5730A video overlay chip. Since this is part of the new controller design, it becomes as case of sending the level information from two LM3916 IC's back into FPGA. This is to help users to see if their audio levels are correct or not, very important when it comes to repeater linking. I hope to have this video display working in the next few week on one of my prototyping boards.

There is only room for two of the boards to be connected to the main board, this should provide more than enough flexibility for many types of repeater configurations.



## I2C Bus - Creating Your Own Custom Slave Devices

By Mike Stevens G7GTN

Following on from the technical introduction given in CQ-DATV 50 by Trevor G8CJS on the I2C bus I felt inspired in to looking at creating some custom devices.

As we know the devices that we connect are termed as slaves on the bus, as in the master controlling device initiates communication using a given address and then can send information and also receive data back.

I had some Microchip 18F parts and decided to use these for the experiments. Equally knew that I did not want to spend days pouring over the minute details in the PIC 18 datasheets. So an easier and more basic solution was sought. This landed in the form of Great Cow Basic (GCB) and with the more recent updates this package is starting to look more commercial than the free download available from <http://qcbasic.sourceforge.net/>

I started off by controlling 4 LED's using one of the sample files via an Arduinio sending I2C commands to the PIC device. Thinking the editor would have some trouble relating where this was going I looked around and a previous project from Richard VK4XRL with his video switching system came to my mind.

I set out with much more humble aspirations to create a simple 4 channel video only switcher controlled via I2C commands.

So we have none of the nice bells and whistles that Richard added to his personal project. We just send a commands via I2C and control the pins (S0-S2) on the video multiplexer.

Also in this project I have connected the Enable pin (8) to +5V.

We should come back and firstly control some LED's to check our slave compiler code is fully working as expected. Shown in Figure 1 is the simple PIC circuit that I used, alongside the actual breadboard layout for testing purposes.

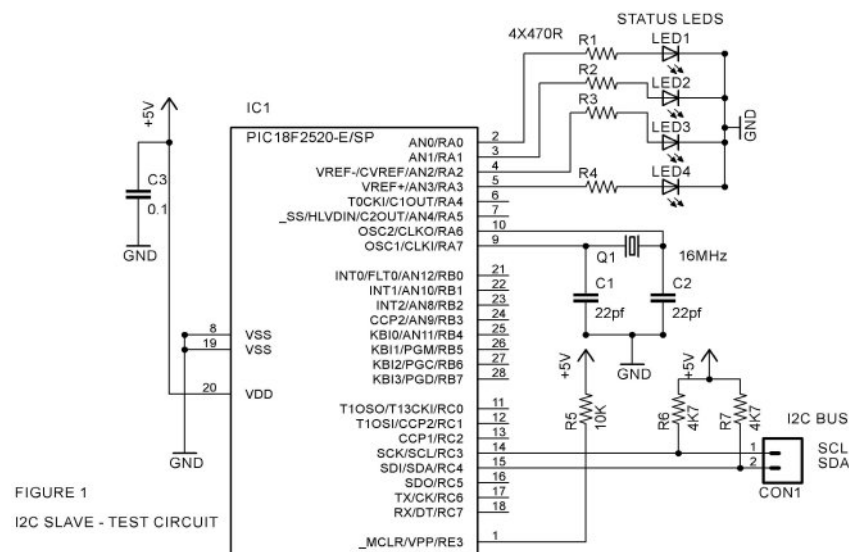


FIGURE 1  
I2C SLAVE - TEST CIRCUIT

With the PIC 18F2520 programmed and the I2C address being set to a custom value, we can use an Arduino running some simple scanning code via the serial monitor to look for our new custom device. The Arduino was just used as it made a simple and immediately available test platform, it goes without saying that you can use any device that has commands available for communicating with I2C.

Once we have our first confidence check that the slave is being found on the bus at our configured address we can move on to sending some commands to switch the four installed test LED's firstly we need to send the address of the device we wish to talk to, in our case we have set this as 0x99 hexadecimal next we have to send a command to initiate an action from our slave.

If we look at our GCB code towards the end we see the range of commands that we can use being from 0x00 to 0x04 (again we are dealing in hexadecimal) you can freely change these to anything that makes sense to you.

Further Ardunio code is supplied so you can see the simplicity of controlling our own slave devices.

The documentation from the compiler developers on this 12C Slave and also Master configuration and control would be best described as being very comprehensive.

I will leave those interested in understanding the under lying coding & control techniques to really dive in to the full nuts & bolts of operations.

Do not forget that you do require the two pull-up resistors on both the SCL & SDA pins, a value of 4K7 has worked well for me.

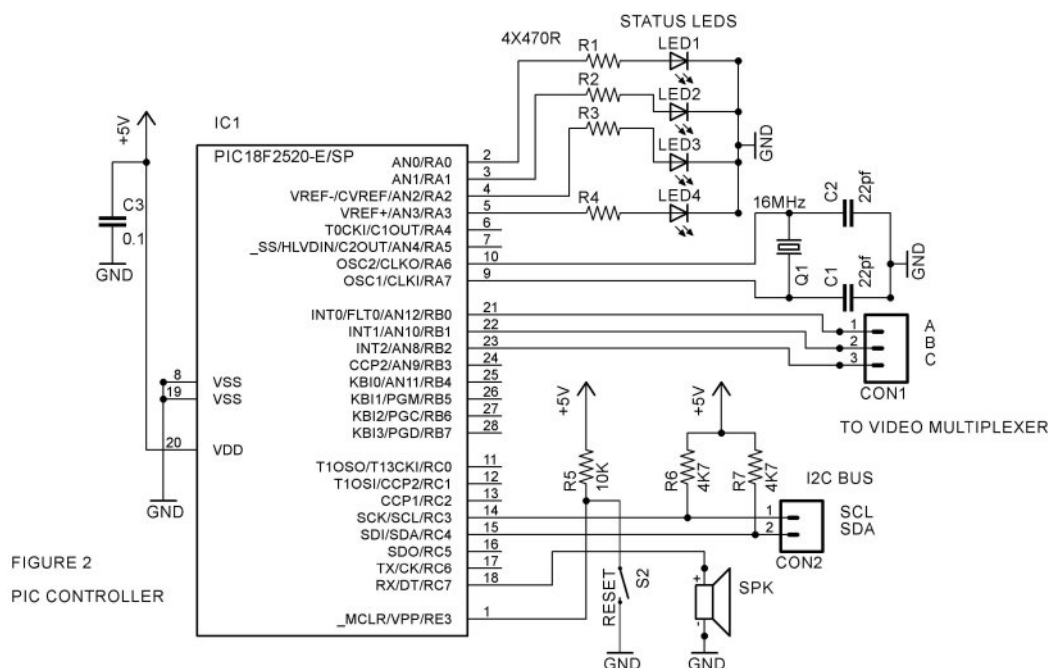


FIGURE 2  
PIC CONTROLLER

## Now A more practical television related project

To put this in to a more ATV related field again we will come back to our video multiplexer - or simple video switch.

As mentioned we will use elements of the original design done by Richard VK4XRL but with some dramatic simplifications. Firstly instead of 8 channels I have gone with just 4, you can add more back in if required.

The full truth table of the CMOS 74HC4351 device is shown within the code. No further I/O pins are required on the PIC since we are already fully driving pins (S0-S2) the video op-amp output section remains exactly the same as the original.

Shown in Figures 2 & 3 are the full circuit diagrams of our new switcher.

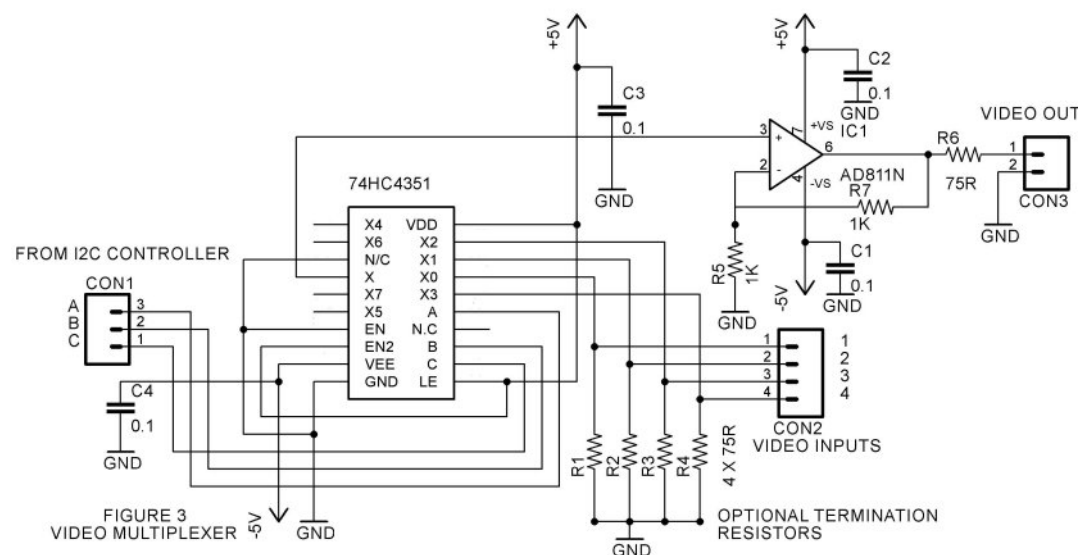


FIGURE 3  
VIDEO MULTIPLEXER

Again our PIC Processor is clocked via a standard 16MHz XTAL and associated 22pF loading capacitors, the only real change from our first experimental circuit is the use of Port Pins RB0 - RB2 to correctly load the multiplexer with the required logic levels.



We still have the four status LED's to show when our I2C commands have been received and hence actioned. In addition we have an optional small 8R speaker giving acknowledgement tones.

## External Processor Control Sample

To demonstrate how to actually control the switcher I have provided a simple Arduino sketch to control this from a user serial menu.

Whilst this is a very trivial example it shows real world control with sending the required I2C commands. No special libraries are required apart from the standard wire command. The connections between the PIC are SCL to Arduino Pin A5 and PIC SDA to PIN A4.

## Alternative Video Devices?

An alternative device for the 74HC4351 & video op-amp would be a Maxim MAX455 or MAX4315 if you have some spares available. Note that the selection pins are however different.

I have provided a truth table within the GCB source to depict the differences, we also now have no LATCH pin to be concerned over.

The MAX455 does however default to channel 4 if the selection pins are allowed to just float on power up, a small subroutine is very simple to write to ensure we always start on Channel zero before receiving I2C commands.

The video op-amp from Elantec EL2030 is also now becoming more difficult and pricey to obtain and a device such as the Analog Devices AD811 would be found suitable in this instance.

## PIC Device support

The GCB library has support for several of the more modern 16F & 18F parts. The main requirement for any device that you want to use is having SSP or MSSP available.

The availability of the library file with the installation could enable modifications to be made reasonably easily. Among some lower end 16F parts the 16F88 and 16F690 are specified as being fully tested by the software developers in a slave configuration. A good place to keep an eye on all the developments, or indeed to ask your own questions is the support forum

<https://sourceforge.net/p/gcbasic/discussion/?source=navbar>

## Conclusion

Using the power of a high level language we have the ability to create custom I2C slave devices with now relative & reliable ease. Whatever we can dream up can be created, and for those that insist on using PIC assembly language you might be interested to know inline assembler is also catered for within the Basic compiler.

Since the basis and working of the supplied library is an Interrupt Service Routine (ISR) certain other functions may not end up playing nicely together.

This is up for more personal experimentation in my home workshop as I can see the power of making our own unique and therefore custom peripherals.

As a last comment if you use the GCB hex file from the project code download I2CSLAVE.ZIP the bus address will be 0x99 unless you install the compiler and change this yourself to your own required address and re-compile your new file.

# Open Shot Video Editor

By Trevor Brown G8CJS



Non linear video editing software has really taken off. You can now do on your desktop what I used to do with over £500k's worth of linear editing hardware.

It's all down to being prepared to invest time in learning and how to drive the package. That's about all it has in common with linear editing. Open Shot works well, it's simple, friendly and you can soon get to grips with it.

Yes, all desk top packages they have their limits, but if all you want do is cut down the clips you have filmed, lay them down in the order you want to present them, which may not be the order you filmed them in.

Sort out the sound, removing any unwanted sound, usually in my case where I have been shouting directions at the people

unfortunate enough to have volunteered for my projects and replace that sound with something more appropriate, i.e. the sound after my bellowing, where I have kept the camera rolling, then Open Shot might just be for you.

It's a free download and as a CQ-DATV reader, this might just be in your price bracket. It is available as a Linux download, OS X download or Windows download, so no excuses.

Yes it will do more than cut the clips, swap their order and replace the sound, but let's just learn to walk first. Then, and only then, have a look at the example links.



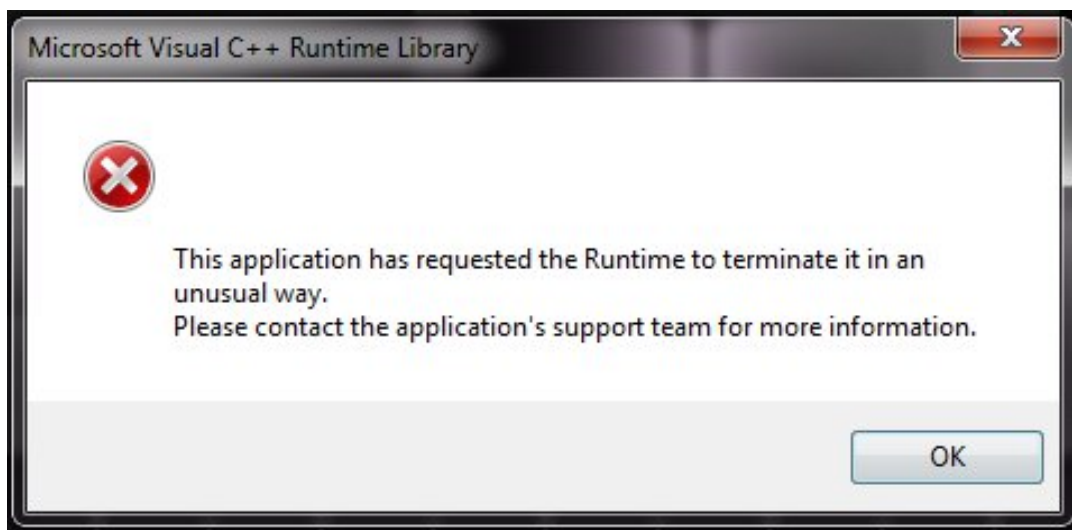
**Opening screen of Open Shot video editor Showing the start of the clip with the car in shot that needs removing, by moving the clip start point, so we can see the pub that the scene was meant to start with. These thing happen and are why editing was invented**

Let's start with what Open Shot will not do and that's capture your clips from a tape, which might just have fallen out of your flares pocket at the back of your wardrobe, even if it is one of the trendy formats like mini DV that enables you to plug a a firewire cable into your camcorder and capture clips. So Open Shot is is not the answer to any tape based recordings. However don't throw out the tapes there is a solution for firewire at least and I will cover firewire capture in CQ-DATV 52.

Open Shot relies on the clip you want to work with already being on your hard drive. It does what it says on the tin, it edits video files, that's not to say that there is no other software around that will capture these older tapes and then they could be edited in Open Shot, just not captured via Open Shot.

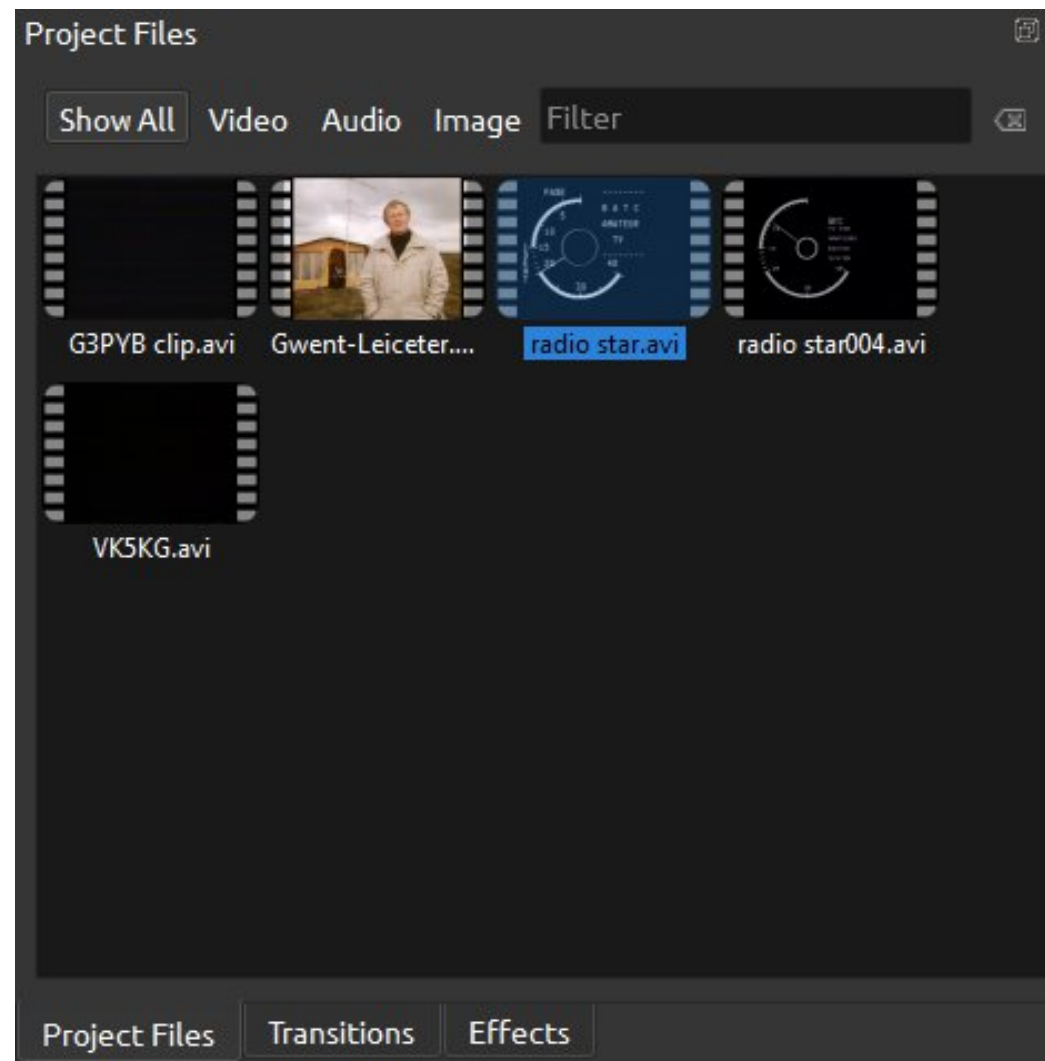
If you have a JING Bar for capturing screen grabs, this will also capture live video and create an .SWF file. This is the file extension for a Shockwave Flash File this is also a no-no, but I have yet to find a package that will let you edit these files.

Try to import one of these files into the clip bin and you will get the message.



*DON'T PANIC!!! For those of us who run Open Shot on a proper operating system, neither Microsoft or Visual C++ are known so we will never see the above dialog box! Doesn't it give you a warm glow of self satisfaction.*

No way out other than to close the programme, but on restart, it will then recover your project or it has done every time I have tried it.



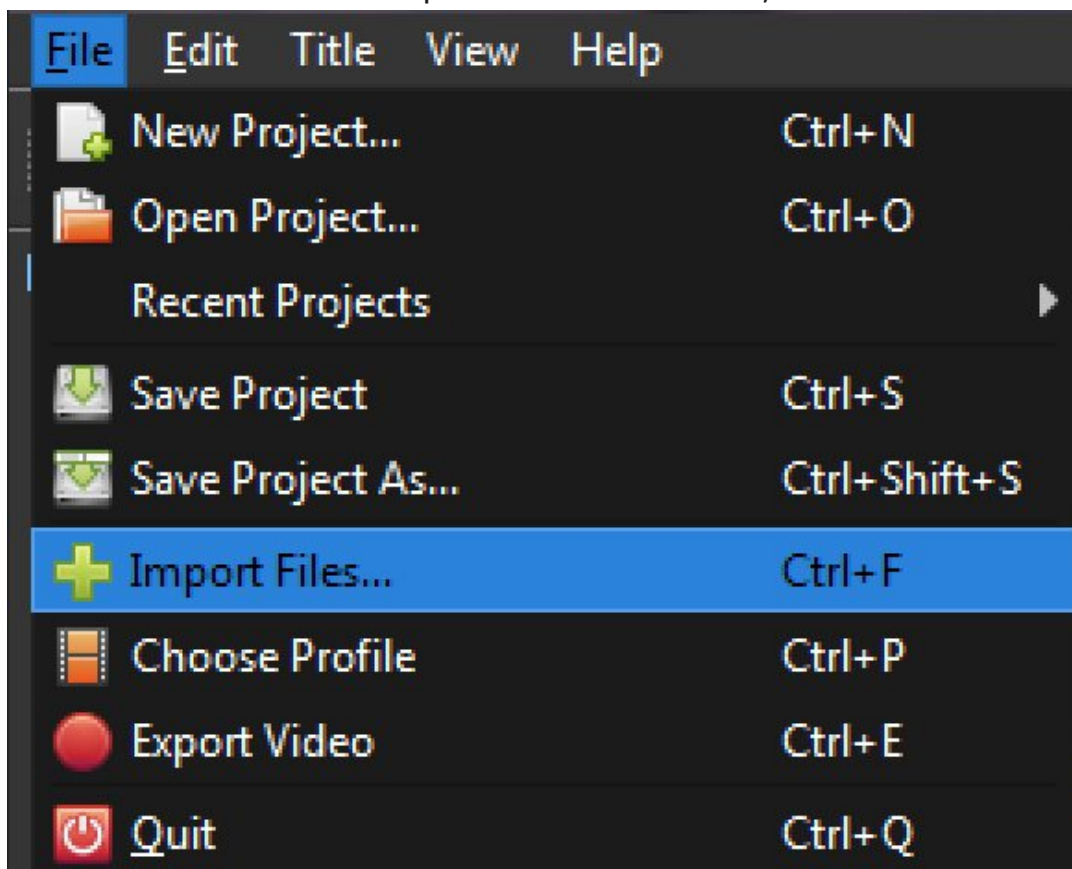
**The Project file window which also doubles as a transitions and effects window**



But a wise man would use Control+S (also available on the file drop down) to keep saving as your progress with your edit. You will be prompted as to the clip already exists and you can choose if you want to overwrite the current version it or not.

One of the things Open Shot does well is deal with a multitude of video formats and SWF was the only file on my disc it would not edit.

My present camera creates H265 files to reduce the data rate arriving at the SD card. It has HD resolution and if this data were not captured using an H265 codec, then the SD card would not be able to cope with the data rate, so until now all

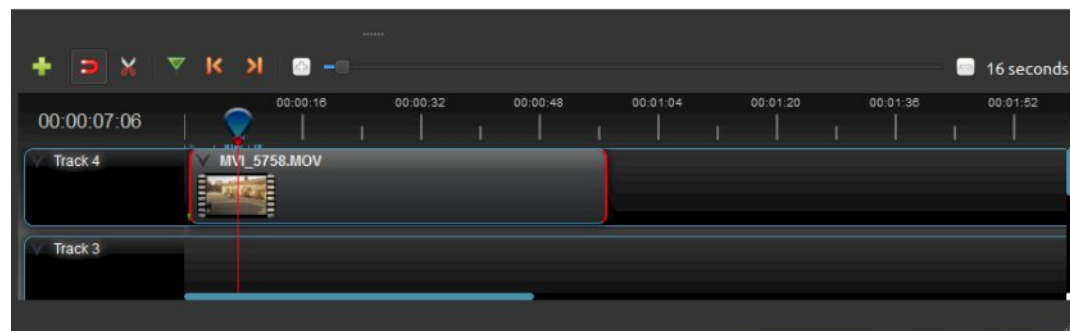


**The File Drop Down**

my H265 clips had to be converted using Pavtube software which is good, but not free and also added another step to the editing process that I could well do without.

Open Shot will allow H265 clips in the project file, you just browse them up like all the other clips and put them in the project file. So they can be seen as icons (far left of the picture under the project files tab)

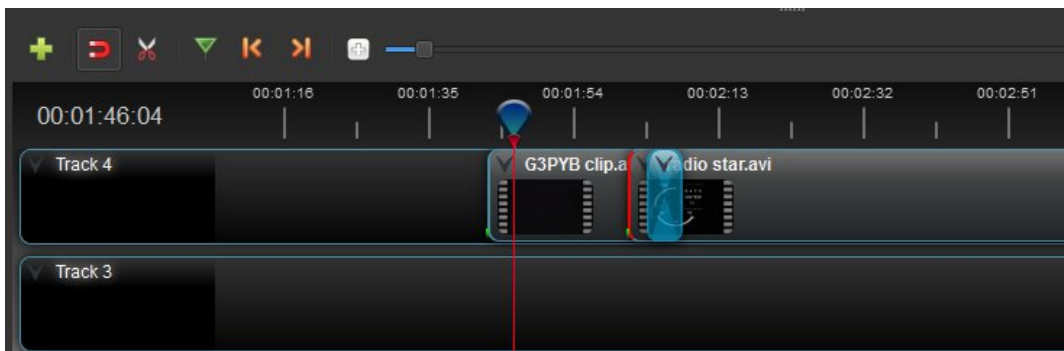
The downside is the software does not kick in at this point and say, I guess at some future point this file will be needed for editing and do any required conversion, while I have a coffee break, it waits until the clip is pulled or drag and dropped. To be more precise onto one of the multiple tracks that make up the time line and then, the penny drops and it holds you up while it converts. Keep your clips short and it does not hold you up for long.



**A clip or File placed on the time line**

Let's have a go. First import some clips or files that's on a drop-down from the file menu or Control+F, try to use the short-cut keys yes they are annoying to learn but in the long run they will speed up your editing. The files appear in the project file window

Drag and drop the files you require into the multi level time line, (just choose one track for all the clips) trim them by mousing on the leading or trailing edges (so as to remove any unwanted starts or ends that might have a stray car blocking your shot) and shuffle them together.



## Two Files Overlapped for a Dissolve

You can preview the clips with the scrubber or play in real time with the keys below the preview window. The software responds to some of the keys more familiar to those of you that have used Non Linear Editors like J, K, L and space. Space being stop and K being play.

If you want to dissolve or mix between clips just put them on the same time-line track and push them so you have an overlap rather than a but joint.

The audio is part of the video clip, but if you right click on the clip in the time line you can separate the audio onto a different time line or you have the option to adjust its volume in steps or both, which does include zero to remove it.

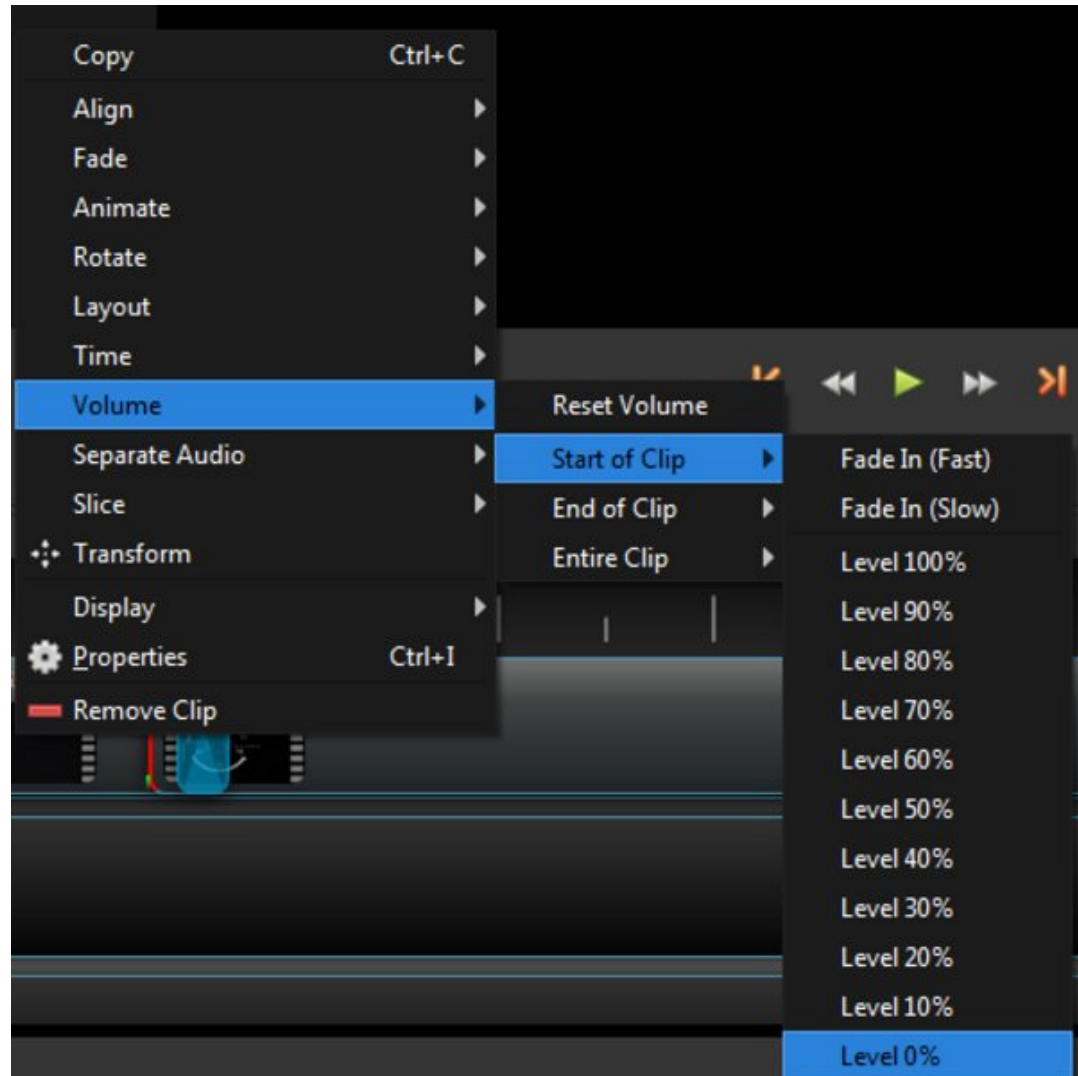
Adding a sound track again is just drag and drop from the file bin. The software will cope with MP3's, but I would always go for simple file formats like WAV take the load of the CPU.

Titles can be created, again from the drop-down which has two options - Title, control+T which allows some very pleasant titles to be created from templates and animated captions, control+B which brings up the text box shown above right so I did not peruse this any further, perhaps something to explore for a future issue.

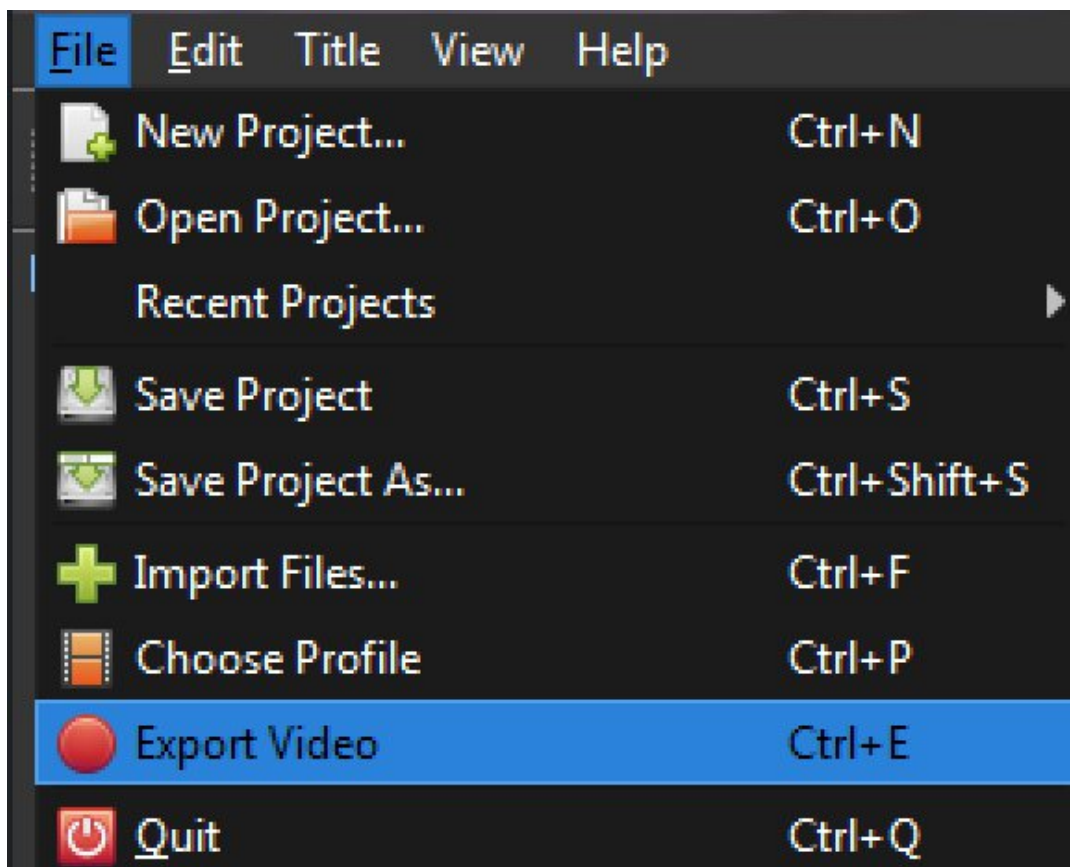
Blender, the free open source 3D content creation suite is required for this action (<http://www.blender.org>).

Please check the preferences in OpenShot and be sure the Blender executable is correct. This setting should be the path of the 'blender' executable on your computer. Also, please be sure that it is pointing to Blender version 2.78 or greater.

Blender Path:  
blender



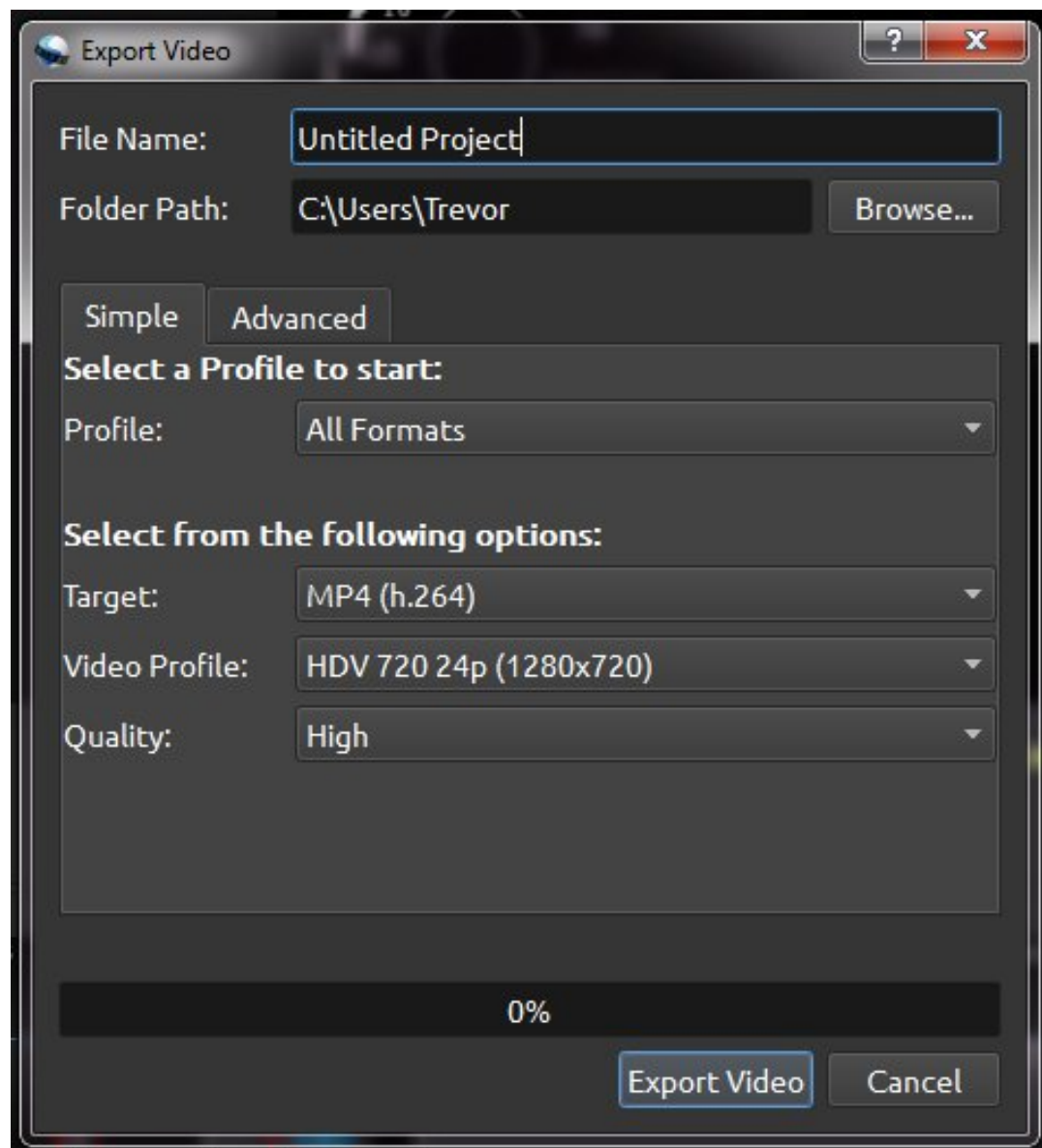
**Right click on clip in the time-line for this menu**



**File drop down for the Export menu**

When your file edit is complete then export video from the file drop-down or Control+E, will take you to the render format choice menu and allow you to select where you would like your end product stored.

So in conclusion, a very pleasant desk top video editor with a lot of features that are worth spending time to get to grips with. It copes well with almost all video formats including H265. The now almost standard JKL and Space key functions have been implemented. My hat is off to the programmer for this very clever piece of free software. The short cut keys are excellent and well worth learning, but the drop downs will get you everywhere the short cut keys will.



**The Export Menu - try the drop downs, you will be spoilt for choice**

See next page for a variety of links including where to download Openshot.



## Download Link

<http://www.openshot.org/download>

Please experiment with the functions and check youtube for help.

## Help link

[https://www.youtube.com/watch?v=0a\\_B4LxTy3Y](https://www.youtube.com/watch?v=0a_B4LxTy3Y)

## Example Links.....

<https://www.youtube.com/watch?v=jo4JOq6TvYg>

<https://www.youtube.com/watch?v=ma2MLS8DhyU>

## Manual (if you must)

<http://www.openshotusers.com/help/1.3/en/>

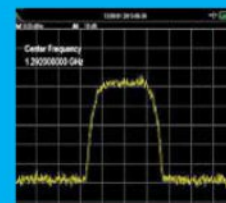
## PAVTUBE (but you won't need it)

[http://www.pavtube.com/video\\_converter/](http://www.pavtube.com/video_converter/)



## Digital Amateur TeleVision Exciter/Transmitter

Now available from



# DATV-Express

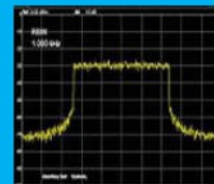


- A more affordable DATV exciter can now be ordered
- Fully assembled and tested PCBA
- DVB-S protocol and DVB-S2 protocol for DATV transmissions
- Can operate all ham bands from 70 MHz-to-2450 MHz
- RF output level up to 10 dBm (min) all bands (DVB-S)
- Software Defined Radio (SDR) architecture allows many variations of IQ modulations
- “Software-Defined” allows new features to be added over the next few years, without changing the hardware board
- Symbol Rates from 100K to 8000K Symb/sec allows RB-DATV
- Requires PC running Windows or Ubuntu Linux (see User Guide)
- Price is US\$300 + shipping – order using PayPal



For more details and ordering  
[www.DATV-Express.com](http://www.DATV-Express.com)

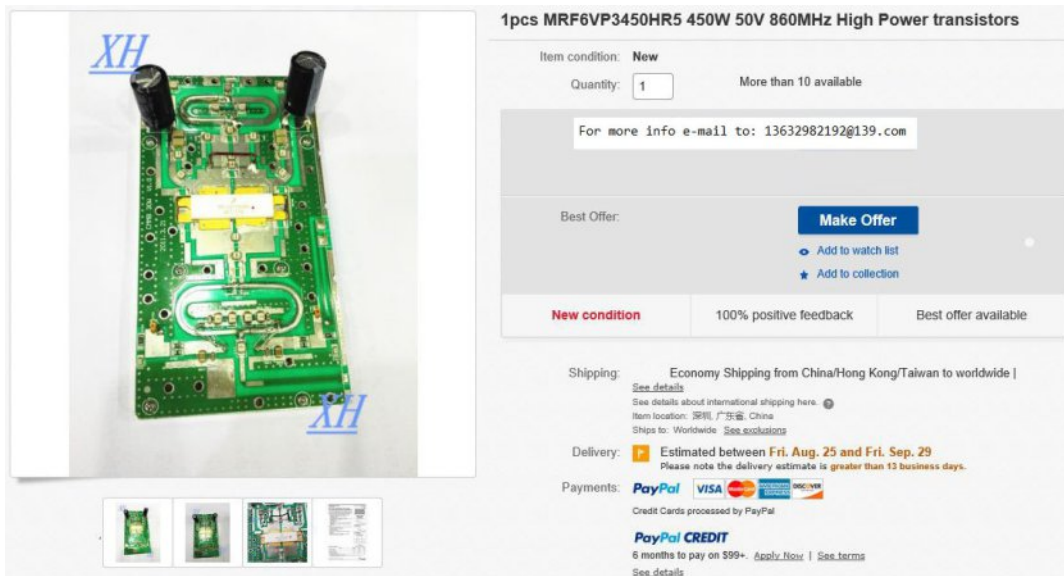
Register on the web site  
to be able to see  
the PURCHASE page



# Modification PA with MRF6VP3450H (470-860MHz) to 436MHz

by ON1BTE

On ebay.com Corn , ON7MOR found this power amplifier pallet.

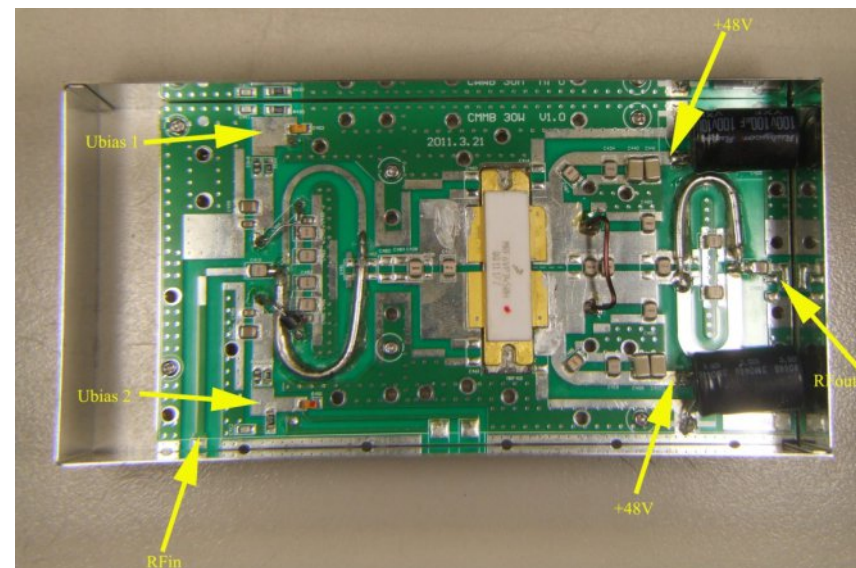


ON5AAS (Geert), ON7MOR (Corn ) and ON1BTE (Patrick) ordered such a pallet.

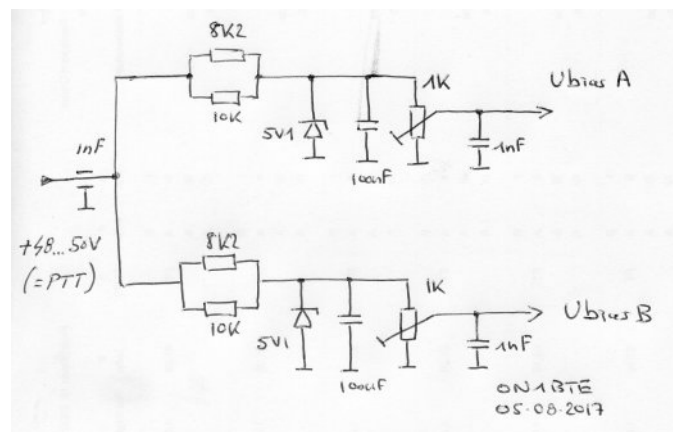
After a few weeks the package was correctly delivered.

The PA has no bias circuit on board so we had to develop one.

Geert discovered that the module fitted into a solderable housing with dimensions 74x148x30.

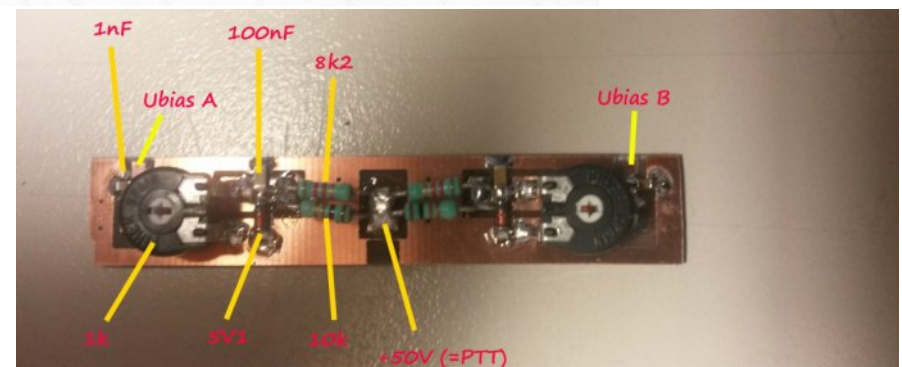


We just had a little space for our bias circuit. I drew the schematic and Geert drew the PCB.

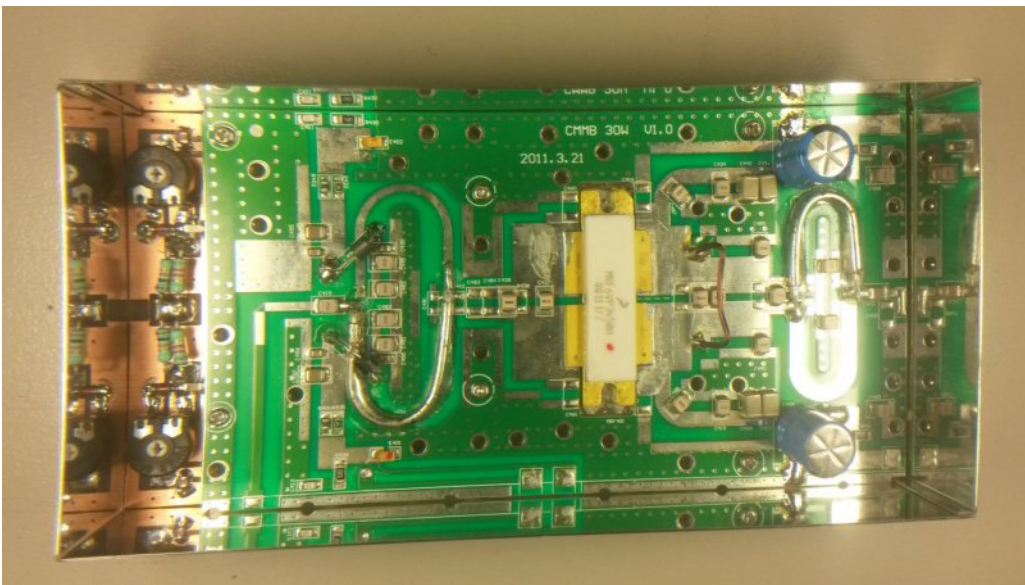


**Zener diodes:**  
5.1V 0.5W

**SMT Resistors:**  
0.5W





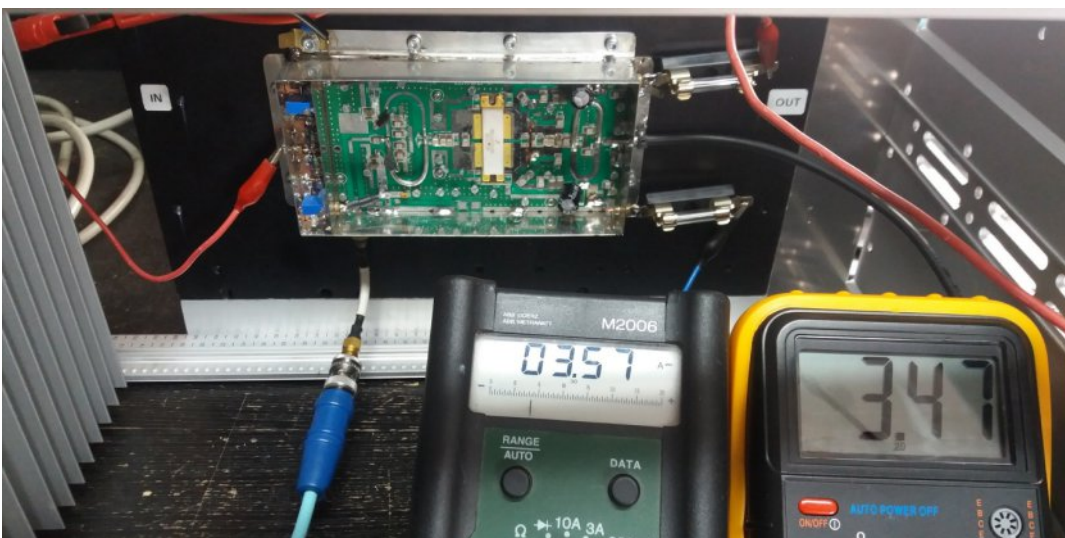


Pallet and Bias circuit together into the housing.

Geert started to build, measure and modify.

The only modification was placing a 24pF cap at the input on position C484 and removing the wire under the copper heatspreader.

Test Setup: Hides HV200-E + Mitsubishi RA60H4047M1 + MRF6VP3450H:



First results by ON5AAS:

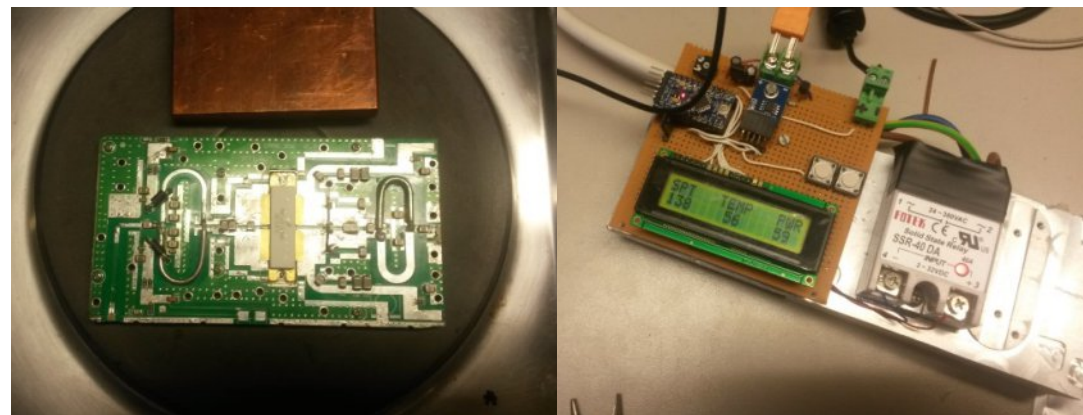
HV200-E setting	P-out RA60H4047	V Bias A	V Bias B	V supply	Rustroom	I drain A	I drain B	P OUT MRF6VP3450H	Shoulders CF +/- 1,5MHz	Gain
-12 dB	19,7 dBm	2,76	2,92	50V		1,47	1,71	40 dBm	54 dbc	20 dB
-12 dB	23 dBm	2,76	2,88	50V		1,92	2,17	43 dBm	53 dbc	20dB
-12 dB	25 dBm	2,75	2,92	50V		2,36	2,39	45 dBm	51 dbc	20 dB
									Shoulders CF +/- 1,2MHz	
-12 dB	21,2dBm	2,76	2,91	50V		1,62	1,84	41 dBm	53 dbc	20 dB
-12 dB	22,6 dBm	2,75	2,92	50V		1,86	2,03	43 dBm	49,5 dbc	20 dB
	26,68 dBm	2,68	2,91	50V		2,85	2,8	47 dBm	45,85 dbc	20 dB
	28,08 dBm	2,66	2,9	50V		3,05	3,13	48 dBm	44,35 dbc	20 dB
	29,24 dBm	2,6	2,9	50V		3,3	3,39	49 dBm	39,17 dbc	20 dB
	30,24 dBm	2,45	2,9	50V		3,48	3,52	50 dBm	36 dbc	20 dB

During his experiments Geert, ON5AAS did something wrong and the LDMOS died.

So Geert, ON5AAS ordered a new module, made the setup again but discovered that the test results from the 2nd module were far behind the results from the first module.

HV200-E setting	P RA60H4047	V Bias A	V Bias B	V supply	Rustroom	I drain A	I drain B	P OUT MRF6VP3450H	Shoulders CF +/- 1,2MHz	Gain
-13 dBm	18,40 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	1,02 A	1,02 A	40 dBm	-36,17dBc	21,70 dB
-13 dBm	19,15 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	1,10 A	1,10 A	41 dBm	-35,70 dBc	21,85 dB
-13 dBm	20,00 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	1,19 A	1,20 A	42 dBm	-36,00 dBc	22,00 dB
-13 dBm	20,90 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	1,30 A	1,30 A	43 dBm	-35,84 dBc	22,10 dB
-13 dBm	21,75 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	1,43 A	1,43 A	44 dBm	-36,10 dBc	22,25 dB
-13 dBm	22,75 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	1,60 A	1,61 A	45 dBm	-35,97 dBc	22,25 dB
-13 dBm	23,70 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	1,78 A	1,80 A	46 dBm	-34,26 dBc	22,30 dB
-13 dBm	24,62 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	1,99 A	2,01 A	47 dBm	-31,63 dBc	22,38 dB
-13 dBm	25,72 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	2,27 A	2,29 A	48 dBm	-28,18 dBc	22,28 dB
-13 dBm	26,40 dBm	2,57 V	2,76 V	50 V	2 x 0,61 A	2,46 A	2,47 A	48,61 dBm	-25,99 dBc	22,21 dB

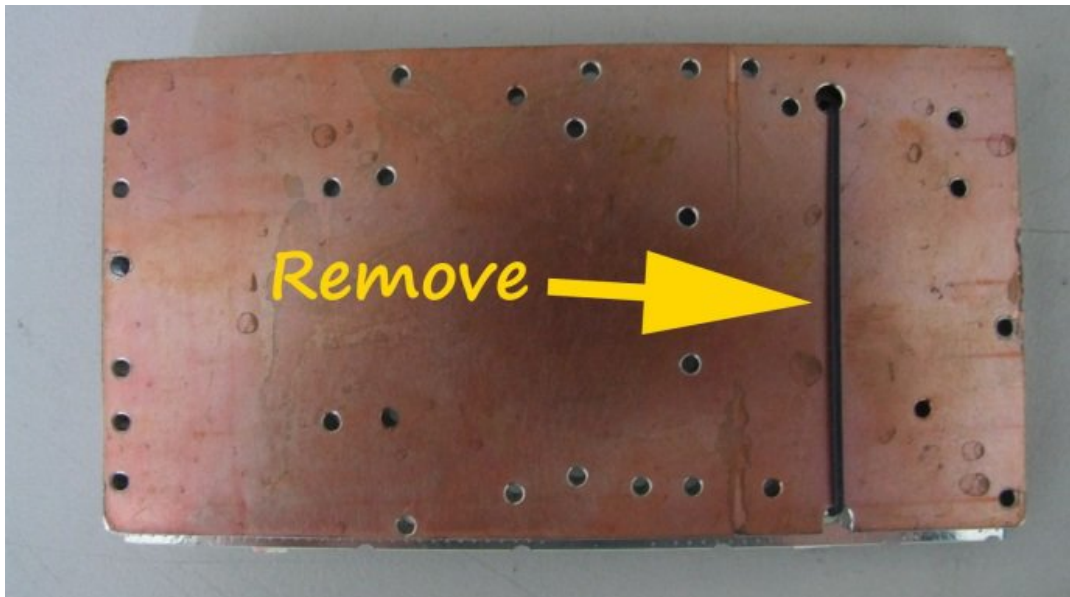
In the meantime Geert, ON5AAS ordered a new LDMOS at AliExpress and I soldered the LDMOS on the first module with low temperature (138°C) solder paste. Temperature controlled by Arduino and K-type thermocouple. However, this was no success. The LDMOS died at 100W output ... fake ... ?





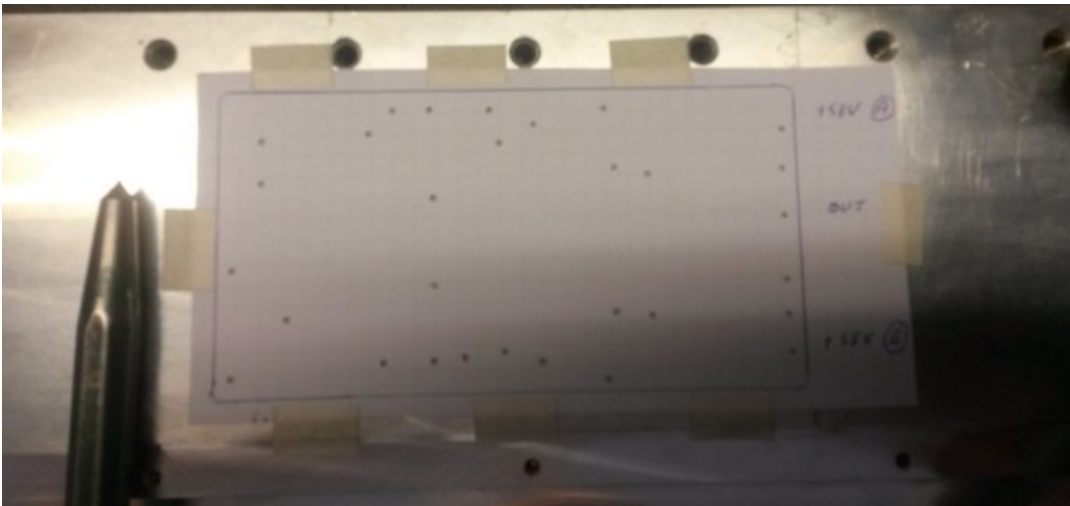
I also took some pictures from the in- and output circuit.

Finally I found the time to start building my PA.  
I removed this wire.



I changed the 100uF/100V capacitor on the 50V lines by capacitors (100uF/63V) with smaller dimensions. This is not strictly necessary.

To get the holes at the right position I made a drill mask.



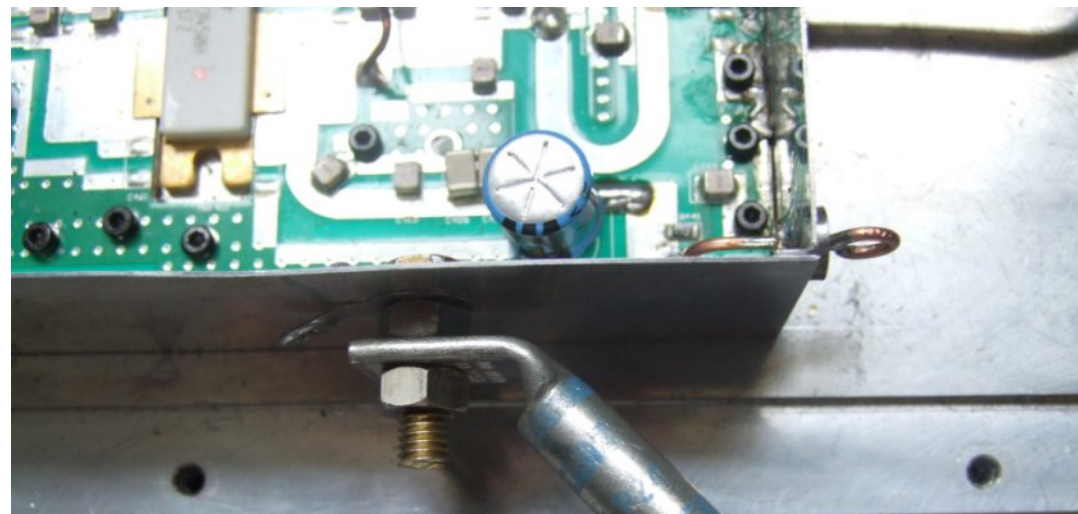
My module is mounted with 30 times M2 Black Alloy Steel Allen Hex Socket Cap Head Self Tapping Screws 12mm long. I drilled 30 holes with a 1.6mm drill bit. After drilling with 1.6mm I drilled ~2mm deep with a 3mm drill bit. I used a little WD-40 oil to drill the 1.6mm holes.



I used special feed through caps 10-25A (2nF) for the 48 ... 50V power supply.



Grounding is done by a brass bolt M4. Between the copper heatspreader and the heavy heatsink is a bit of thermal silicone compound.

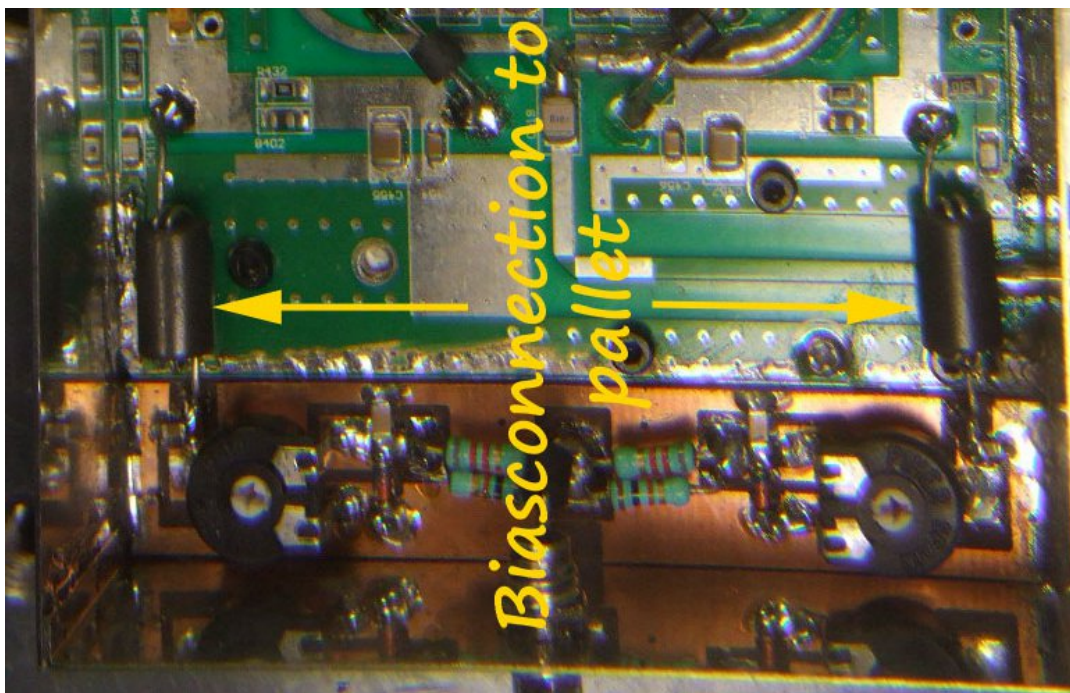


The module PCB is soldered to the housing with low temperature (138°C) solder paste Sn42Bi58.



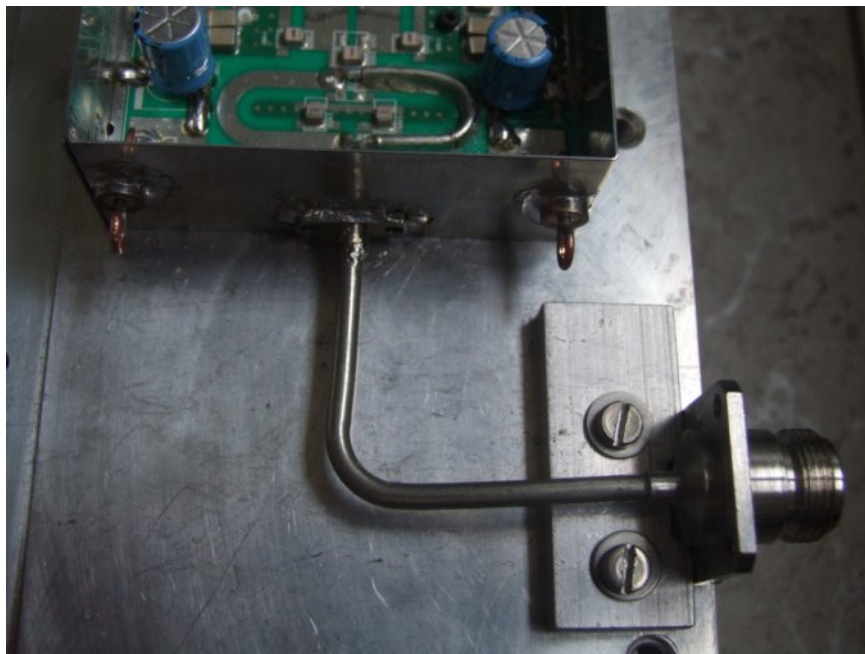
The bias circuit is soldered with normal solder.





Biasing connection to module.

Connecting the N chassis mount.

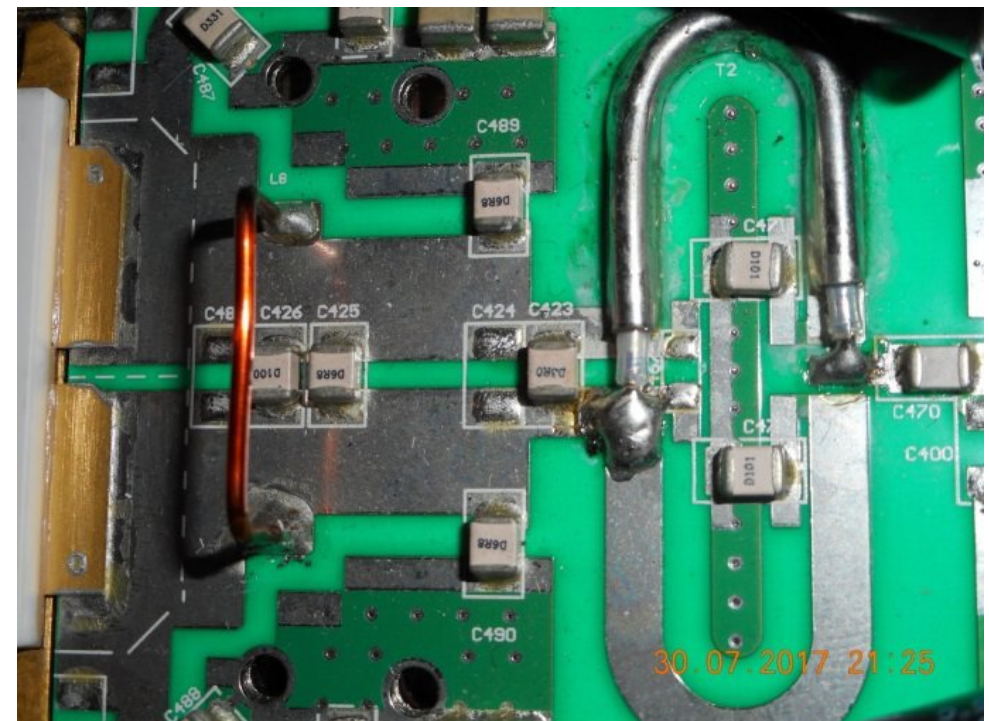


The power supply is a 1U Cherokee switched mode power supply adjustable from 45 to 50.2 Volts. It could deliver 1200W (+/- 24A). If you want to use the PA for D-ATV taken 25% efficiency into account this is more than enough.



First tests ... I found out that the test results where similar to Geert, ON5AAS his 2nd module. I started to compare the amplifiers we had bought. Corné, ON7MOR had ordered a few extra modules. He sent me some photos. We soon discovered that there where small differences.

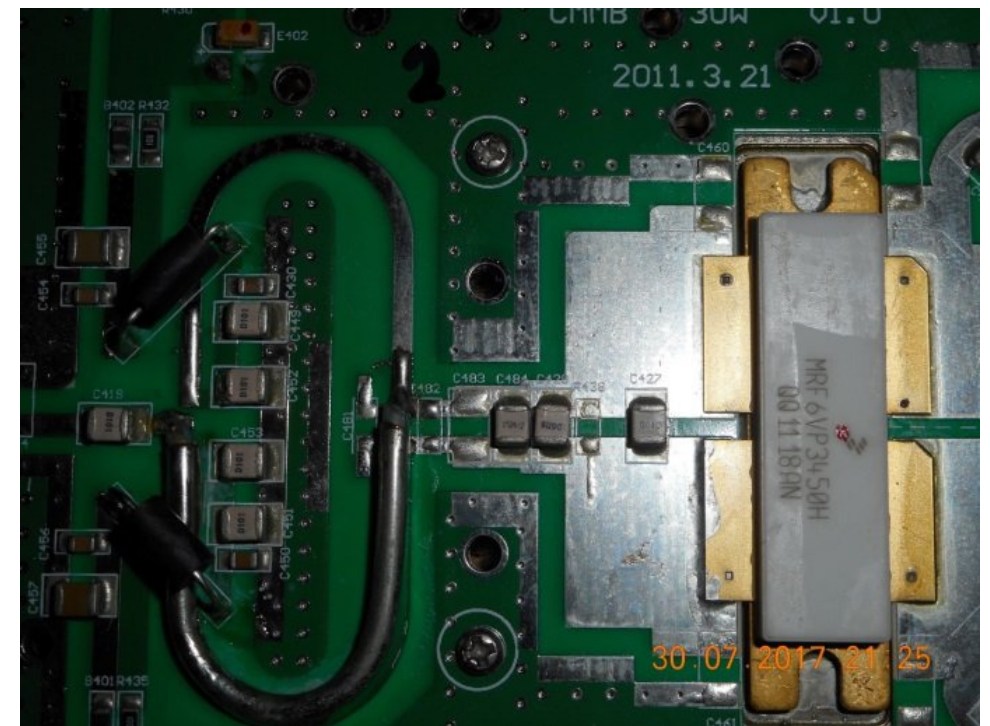
Output circuits:



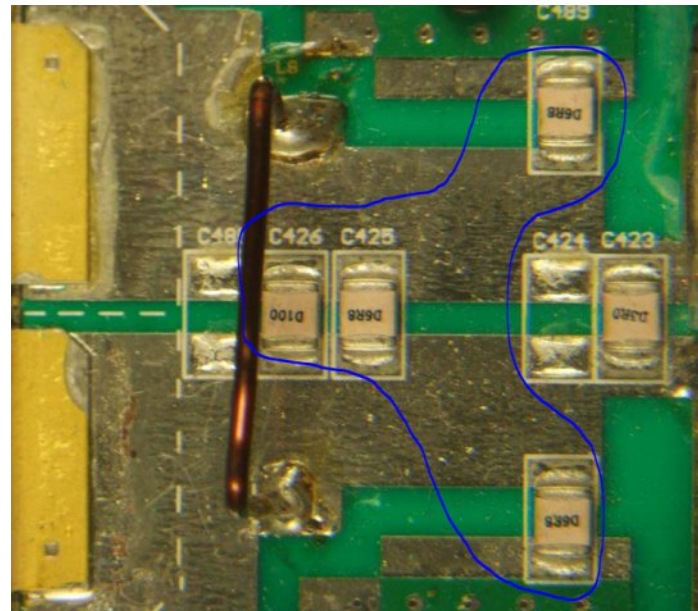
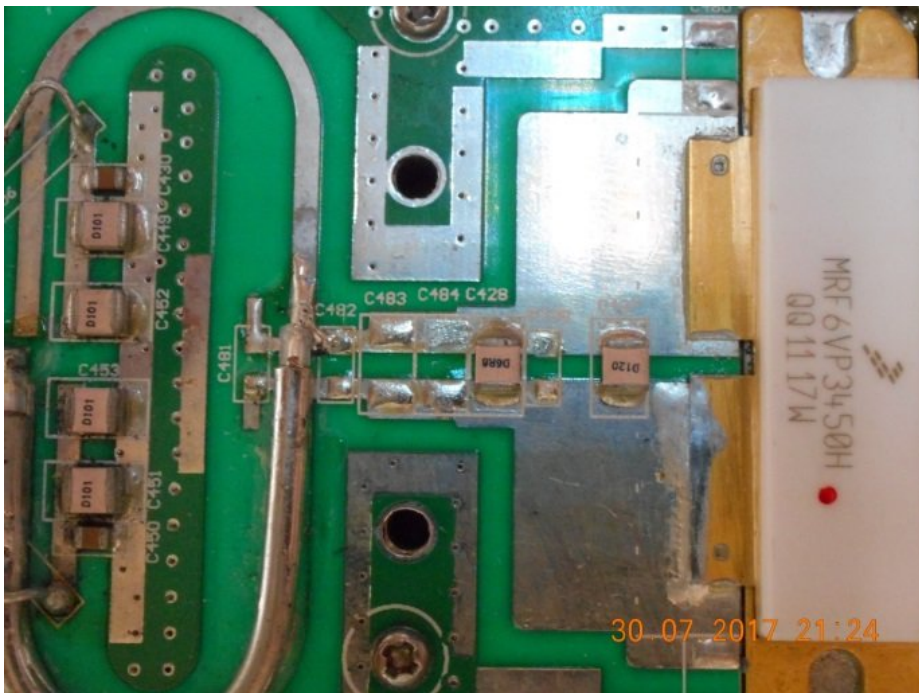




Input circuits:



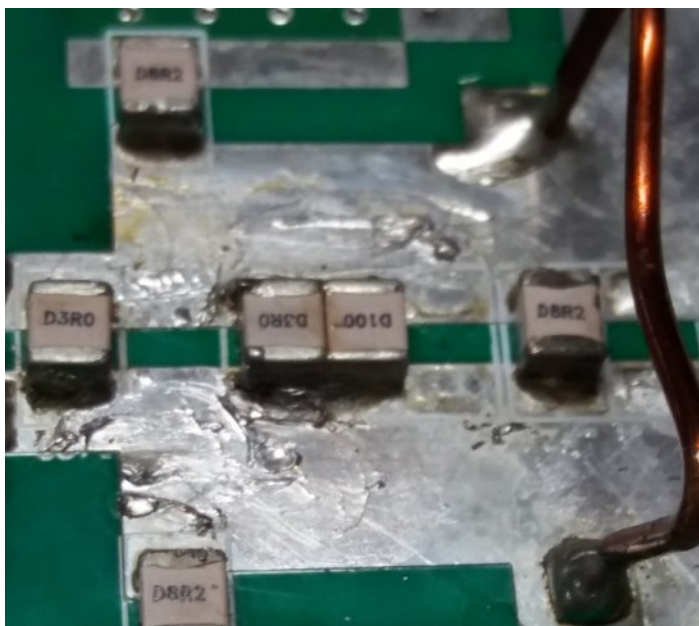
Finally I concluded that it has to be the value and position from the output caps.



Output view module ON1BTE (bad test results).

- C485: no cap
- C426: 10pF
- C425: 6p8
- C424: no cap
- C423: 3p0
- C490: 6p8
- C489: 6p8

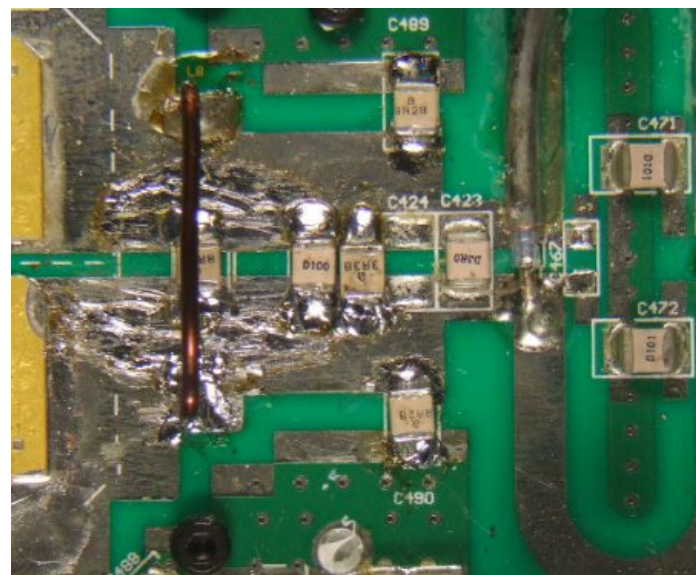




Output view module ON5AAS (good test results).

C485: no cap  
C426: 8p2  
C425: no cap  
C424: no cap  
C423: 3p0  
C490: 8p2  
C489: 8p2

Between C425 and C424: 10pF and 3p0

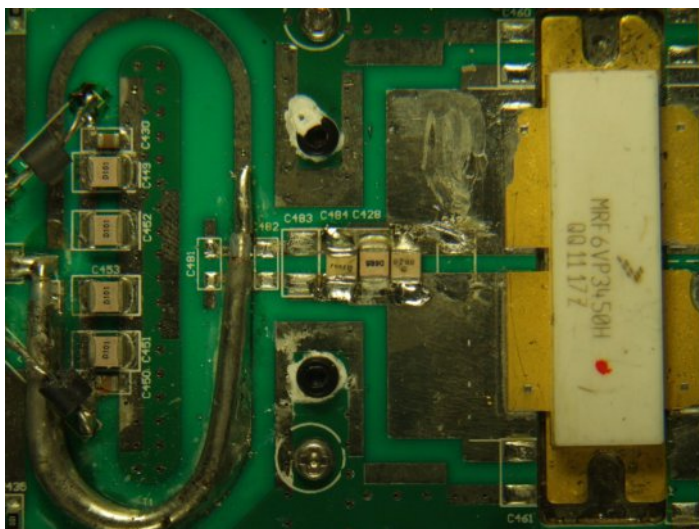


Output Circuit:

C485: no cap  
C426: 8p2  
C425: no cap  
C424: no cap  
C423: 3p0  
C490: 8p2  
C489: 8p2

Between C425 and C424: 10p and 3p3

With that info I started to modify my pallet.



Input Circuit:

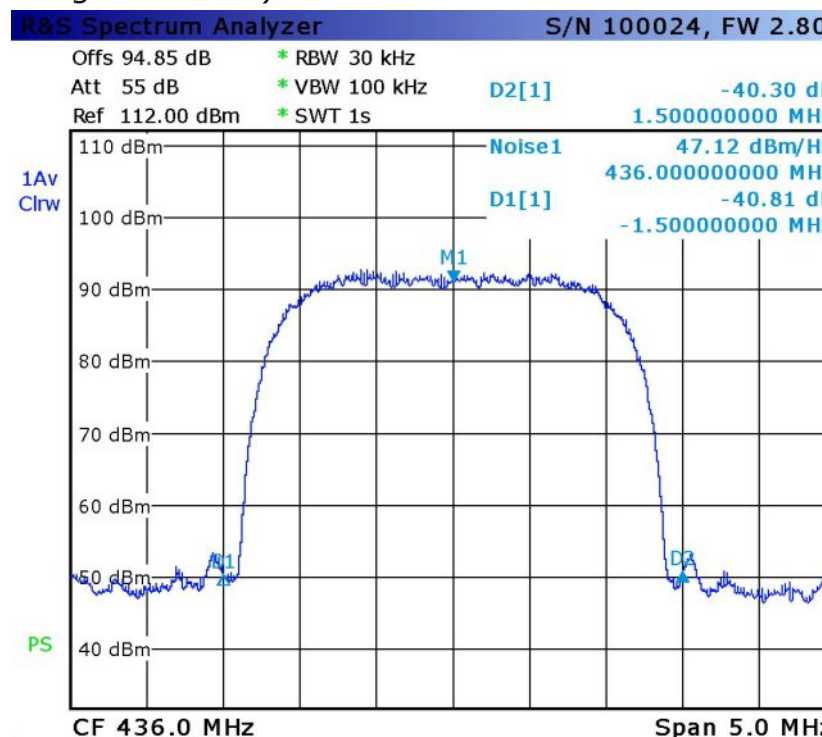
C484: 24p (added)  
C428: 6p8

On position R438:  
8p2 (added)

C427: removed (was 12p)

All caps are ATC100B caps.

Passband measured between 400-900MHz (bias A+B together 1.7A)



Ubias A:  
2.82V

Ubias B:  
2.65V

Vsupply: 50V

21.78dB =  
x150

Date: 5.AUG.2017 10:01:58

Test setup: Hides HV200-E / 13dB attn. / amplifier with 2x BLF546 / MRF6VP3450H

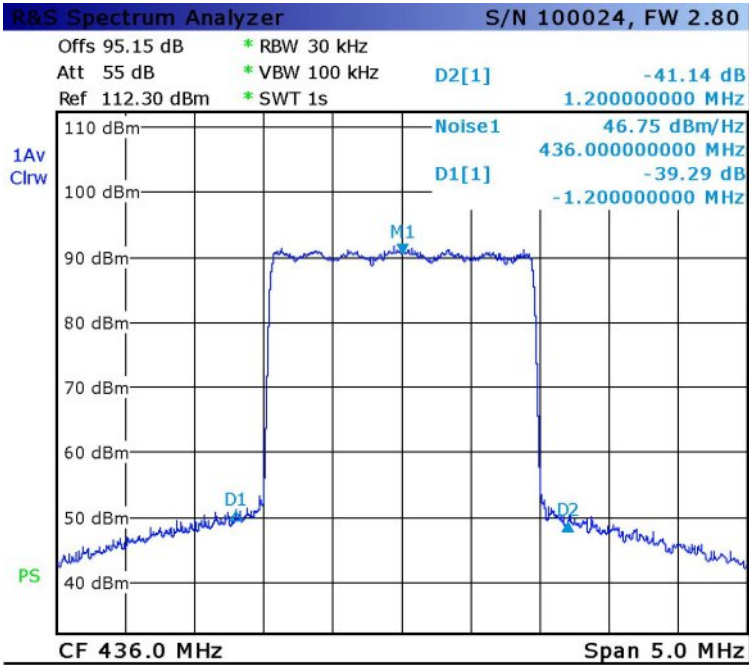
**Important note:** shoulders from the driver PA are @-42dB. That's the best I have for the moment. I think results will be better when driving with a Mitsubishi RA60H4047M1.

All DVB-T measurement are peak measurement. Average values will be +/- 1 - 1.5dB lower.  
For DVB-S average is the same as peak value.  
I bias A and B are optimized for the best spectral regrowth (shoulders).

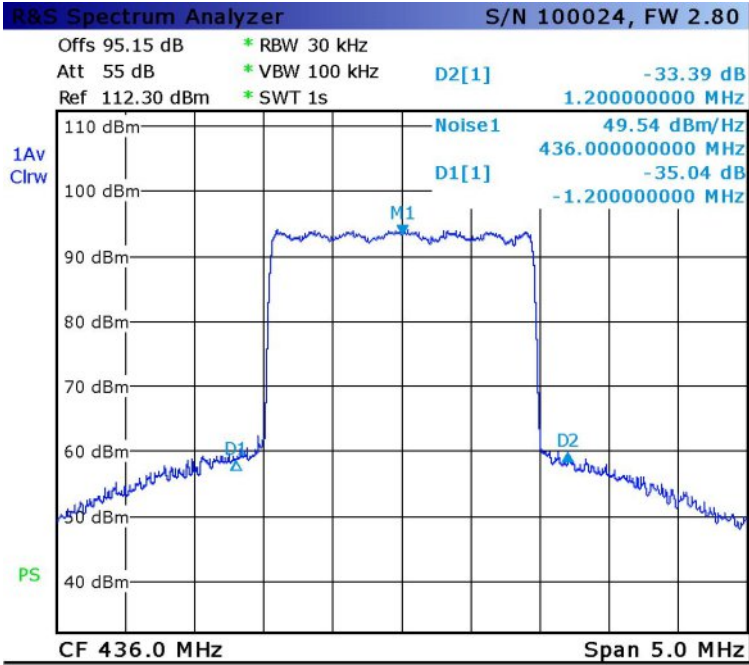
I did not use forced cooling for the MRF6VP3450H amplifier.



Output Power (W)	Current (A)	Power Supply (V)	Power consumption (W)	Efficiency (%)
50	5,23	50	261,5	19,1
80	6,36	50	318	25,2
100	7,27	50	363,5	27,5
200	10,48	50	524	38,2
300	13,7	50	685	43,8
350	15,25	50	762,5	45,9
400	17,25	50	862,5	46,4

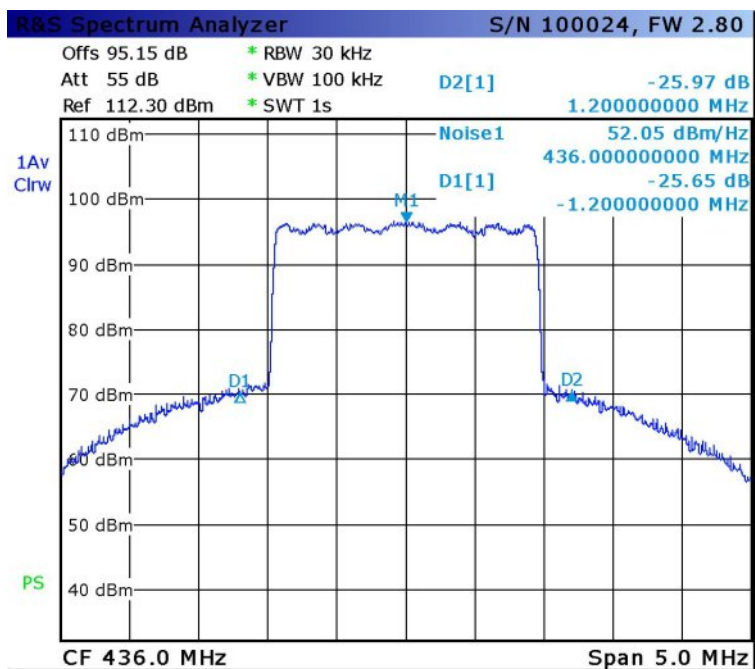


Test result with 2Mhz DVB-T @ 47dBm (50W) output



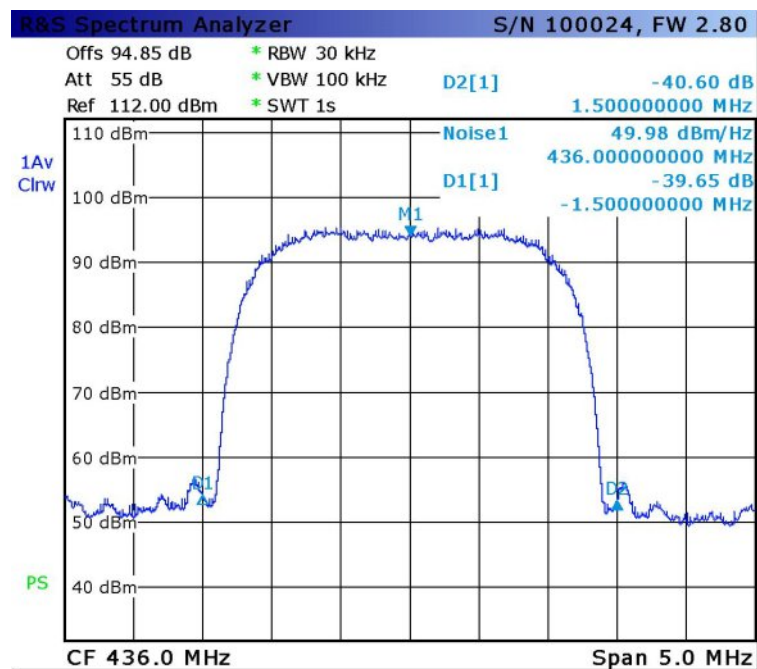
Test result with 2Mhz DVB-T @ 50dBm (100W) output





Test result with  
2MHz DVB-T @  
52dBm (160W)  
output

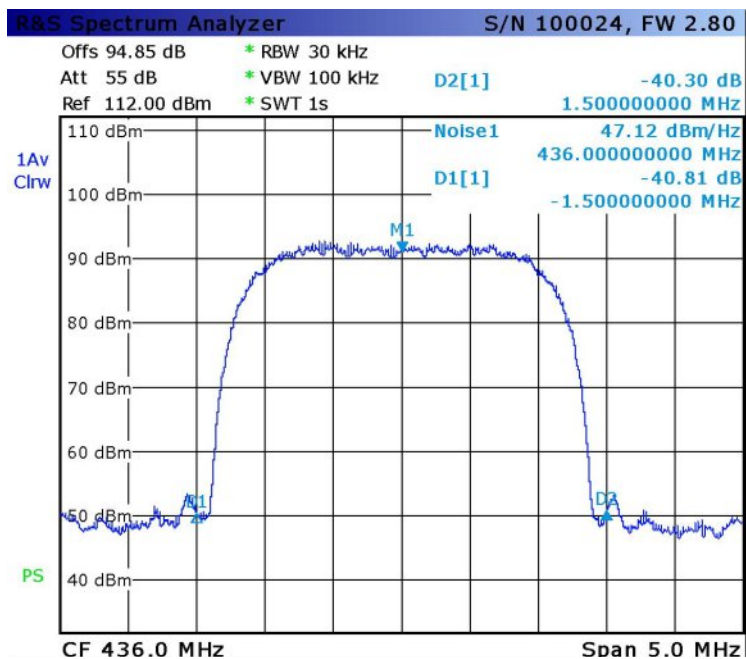
Date: 5.AUG.2017 10:09:27



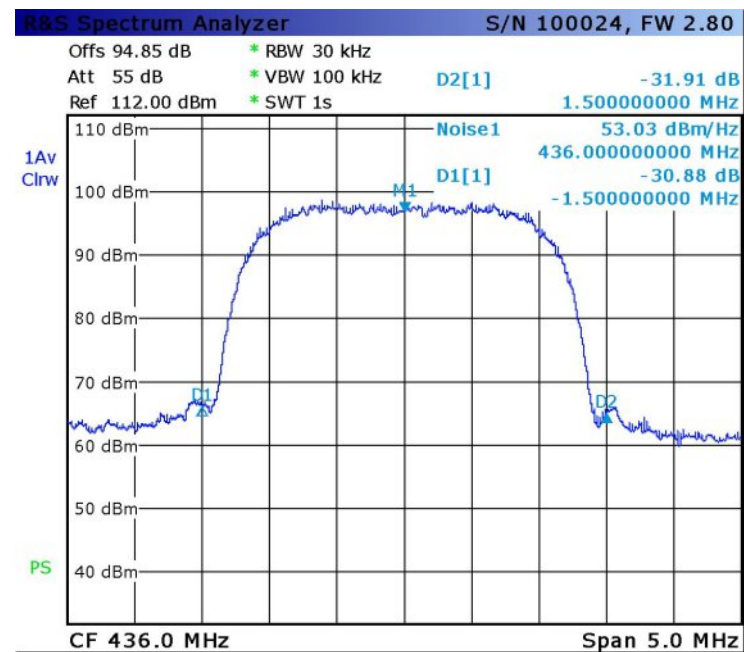
Test result with  
2Msym DVB-S @  
50dBm (100W)  
output

Date: 5.AUG.2017 10:00:26

Test setup: Tandberg SM5600 / Upconverter 436MHz /  
amplifier with 2x BLF546 / MRF6VP3450H



Test result with  
2Msym DVB-S @  
47dBm (50W)  
output



Test result with  
2Msym DVB-S @  
53dBm (200W)  
output



Test result with 2Msym DVB-S @ 54dBm (250W) output  
shoulders -26db

Test result with 2Msym DVB-S @ 55,9dBm (390W) output  
shoulders -17db

Modified 2nd module by Geert, ON5AAS.



Input Circuit:

C484: 27p  
C428: 5p1  
On position R438: 10p  
C427: removed

Geert has measured an  
input VSWR from 3.72

Output Circuit:

C485: no cap  
C426: 8p2  
C425: no cap  
C424: no cap  
C423: 3p0  
C490: 8p2  
C489: 8p2  
  
Between C425 and C424:  
10p and 3p0

Some DVB-T 2MHz test results ...

						MODIFIED	NEW	PALLET			
	I RA60 = 8,19A								Input VSWR = 3,72	Shoulders RA60 -47,09 dB	
HV200-E setting	P RA60H4047	V Bias A	V Bias B	V supply	Ruststroom	I drain A	I drain B		P OUT MRF6VP3450H	Shoulders CF +/- 1,2MHz	Gain
-13 dBm	17,5 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	1,78 A	1,43 A		41,53 dBm	-47,32 dB	24,03 dB
-13 dBm	17,88 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	1,75 A	1,51 A		42 dBm	-47,08 dB	24,12 dB
-13 dBm	18,84 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	1,89 A	1,61 A		43 dBm	-46,68 dB	24,16 dB
-13 dBm	19,83 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	2,01 A	1,84 A		44 dBm	-46,19 dB	24,17 dB
-13 dBm	20,87 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	2,23 A	1,85 A		45 dBm	-44,43 dB	24,13 dB
-13 dBm	21,90 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	2,47 A	2,04 A		46 dBm	-43,43 dB	24,10 dB
-13 dBm	22,86 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	2,73 A	2,26 A		47 dBm	-43,32 dB	24,14 dB
-13 dBm	23,82 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	3,02 A	2,51 A		48 dBm	-40,53 dB	24,18 dB
-13 dBm	24,86 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	3,37 A	2,80 A		49 dBm	-36,74 dB	24,14 dB
-13 dBm	26,00 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	3,76 A	3,15 A		50 dBm	-31,38 dB	24,00 dB
-13 dBm	27,15 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	4,23 A	3,56 A		51 dBm	-28,11 dB	23,85 dB
-13 dBm	27,69 dBm	2,78 V	2,75 V	50 V	0,98 A/0,88 A	4,44 A	3,75 A		51,5 dBm	-26,69 dB	23,81 dB

Datasheet MRF6VP3450H:

<http://www.nxp.com/docs/en/data-sheet/MRF6VP3450H.pdf>



NXP Semiconductor  
Technical Data

Document Number: MRF6VP3450H  
Rev. 4, 2010



## RF Power Field Effect Transistors

### N-Channel Enhancement-Mode Lateral MOSFETs

Designed for broadband commercial and industrial applications with frequencies from 470 to 860 MHz. The high gain and broadband performance of these devices make them ideal for large-signal, common-source amplifier applications in 50 volt analog or digital television transmitter equipment.

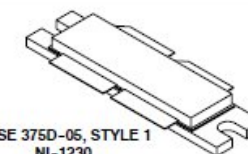
- Typical DVB-T OFDM Performance:  $V_{DD} = 50$  Volts,  $I_{DD} = 1400$  mA,  $P_{out} = 90$  Watts Avg.,  $f = 860$  MHz, 8K Mode, 64 QAM  
Power Gain — 22.5 dB  
Drain Efficiency — 28%  
ACPR @ 4 MHz Offset — -62 dBc @ 4 kHz Bandwidth
- Typical Broadband Two-Tone Performance:  $V_{DD} = 50$  Volts,  $I_{DD} = 1400$  mA,  $P_{out} = 450$  Watts FEP,  $f = 470$ -860 MHz  
Power Gain — 22 dB  
Drain Efficiency — 44%  
IM3 — -29 dBc
- Capable of Handling 10:1 VSWR, All Phase Angles, @ 50 Vdc, 860 MHz:  
450 Watts CW  
90 Watts Avg. (DVB-T OFDM Signal, 10 dB PAR, 7.61 MHz Channel Bandwidth)

#### Features

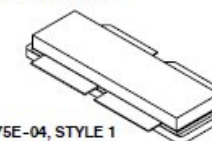
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Internally Input Matched for Ease of Use
- Qualified Up to a Maximum of 50 V<sub>DD</sub> Operation
- Integrated ESD Protection
- Designed for Push-Pull Operation
- Greater Negative Gate-Source Voltage Range for Improved Class C Operation
- RoHS Compliant
- In Tape and Reel. R6 Suffix = 150 Units per 56 mm, 13 inch Reel.  
R5 Suffix = 50 Units per 56 mm, 13 inch Reel.

**MRF6VP3450HR6**  
**MRF6VP3450HR5**  
**MRF6VP3450HSR6**  
**MRF6VP3450HSR5**

860 MHz, 450 W, 50 V  
LATERAL N-CHANNEL  
BROADBAND  
RF POWER MOSFETs



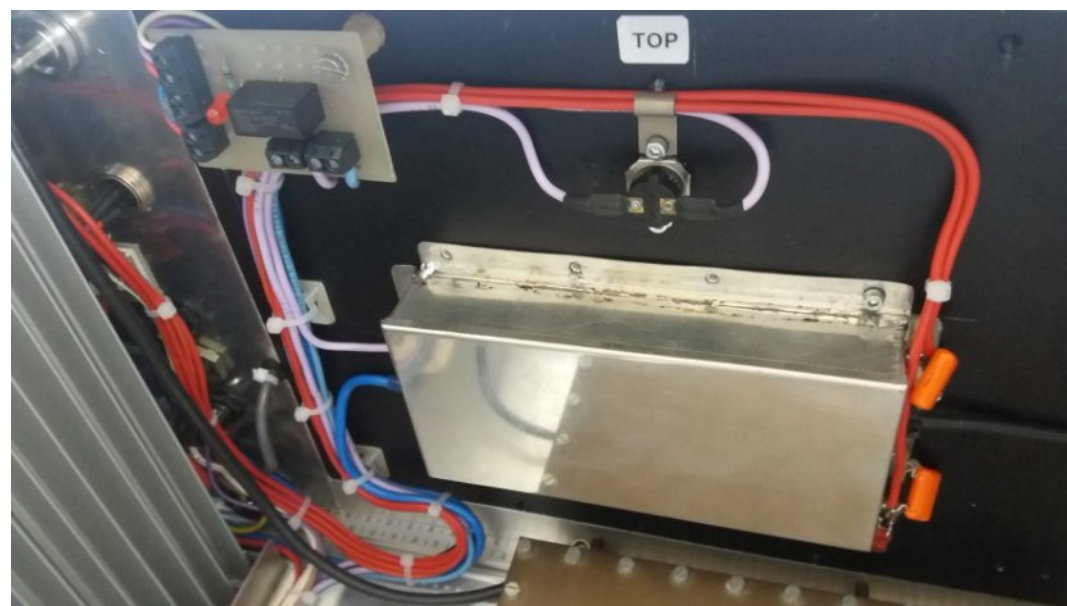
CASE 375D-05, STYLE 1  
NI-1230  
MRF6VP3450HR6(HR5)



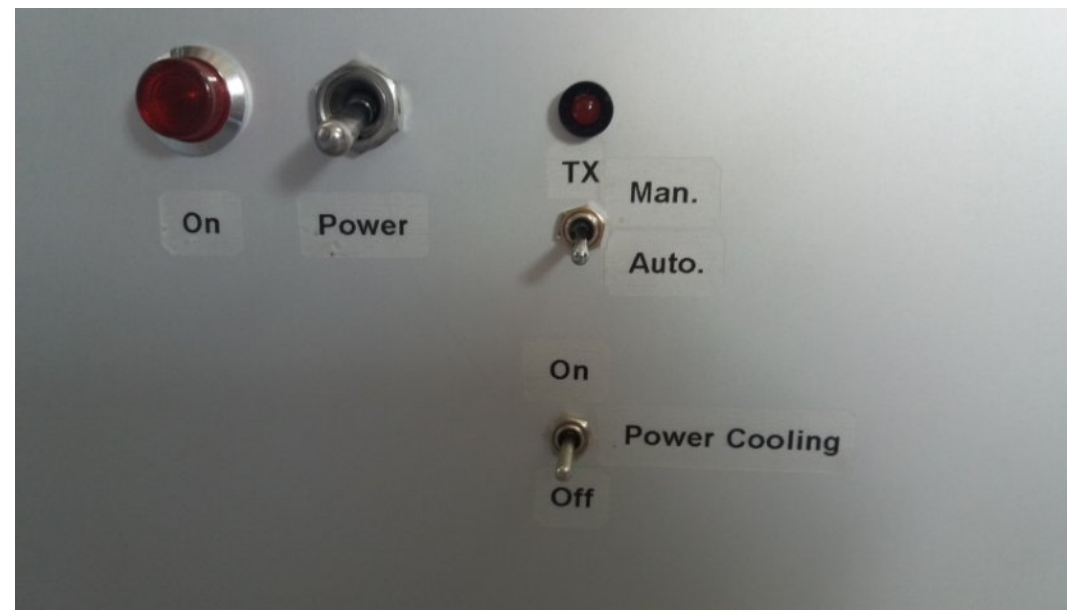
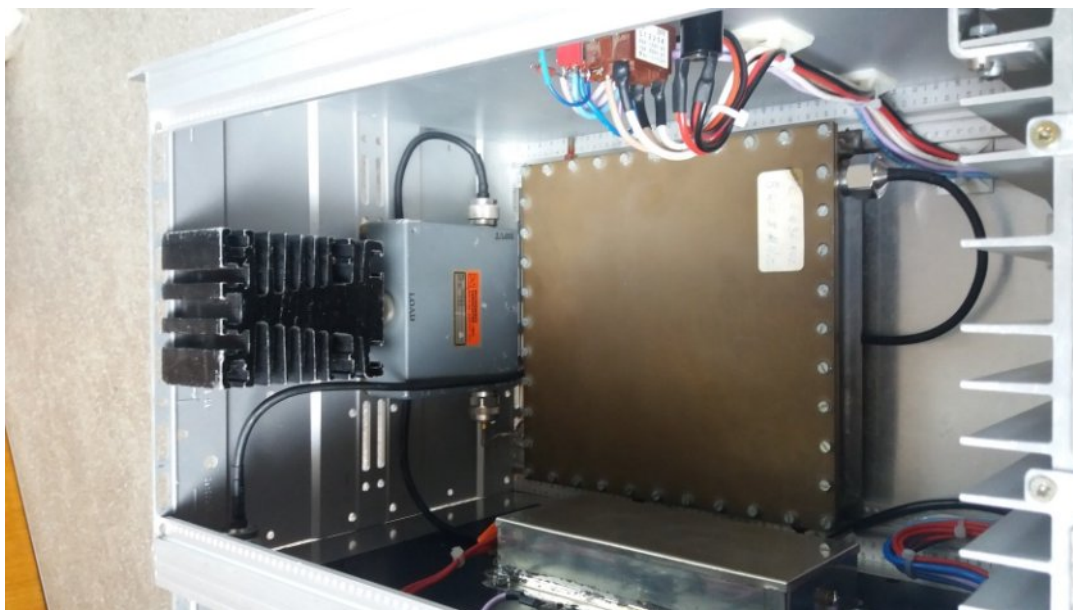
CASE 375E-04, STYLE 1  
NI-1230S  
MRF6VP3450HSR6(HSR5)

PARTS ARE PUSH-PULL

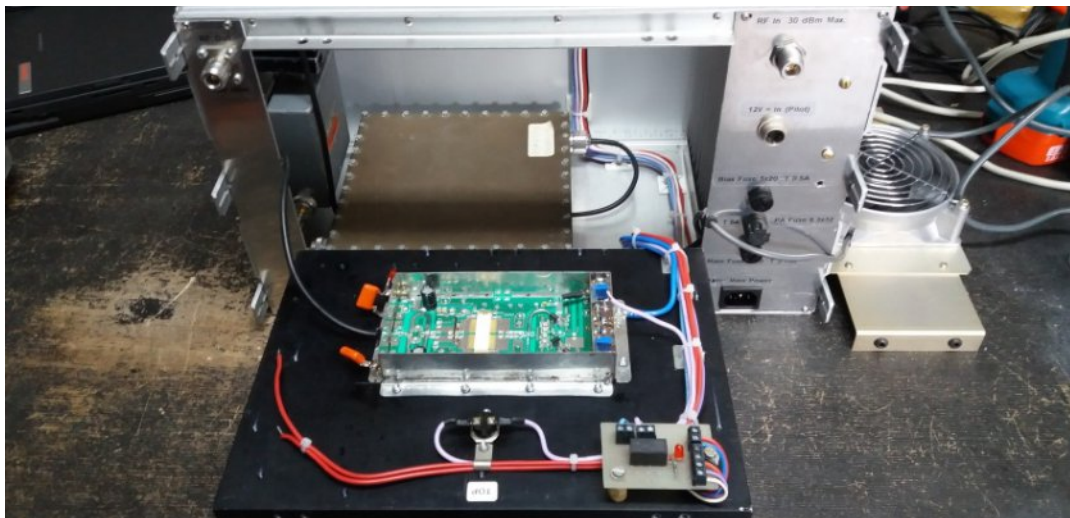
Some pictures from Geert, ON5AAS his PA.



With circulator and BPF at the output.







**Note:** The PA is working great only the input VSWR is not so good. This is not really an issue. This can be considered as a working point. If you want to protect your driver PA you can always use an isolator.

Improvement proposals are always welcome.

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