

# CQ-DATV

dotMOBI



## Issue 73 - July 2019



<https://cq-datv.mobi>

ISSN 2059-2191

### In this issue

<b>Editorial.....</b>	<b>2</b>
<b>News &amp; World Roundup.....</b>	<b>4</b>
<b>RF Interference Potential of Digital TV.....</b>	<b>7</b>
<b>Annex WiFi Rapid Development System.....</b>	<b>8</b>
<b>The occasional bit of nonsense.....</b>	<b>10</b>
<b>Grass Valley Mixer Conversions - Part 6.....</b>	<b>11</b>
<b>Boulder, Colorado TV Repeater History.....</b>	<b>15</b>
<b>DARU - The realisation of a new Association....</b>	<b>21</b>
<b>Contest News.....</b>	<b>22</b>
<b>One from the Vault.....</b>	<b>23</b>
<b>Information.....</b>	<b>24</b>
<b>Coming up.....</b>	<b>25</b>

### Production Team

**Ian Pawson G8IQU**

**Trevor Brown G8CJS**

**Terry Mowles VK5TM**

**Jim Andrews KH6HTV**

### Contributing Authors

**Jim Andrews KH6HTV Trevor Brown G8CJS**

**Peter de Graaf PJ4NX Mike Stevens G7GTN**

**The CQ-DATV editors gratefully  
acknowledge all those authors that have  
contributed articles for this free magazine.**

Welcome to CQ-DATV 73. A lot has been happening so let's start with the IARU ATV contest. We hope our timely reminder got some of you out there, sorry we don't have any results as yet, but they cannot be too far away. Pictures have been arriving on the editor's desk, it looks well attended and as always, lots of fun.

Computers and ATV are as always linked, never more so than now with DATV, but we seem to have moved away from writing our own code. I know Trevor and Mike have been pushing hard with BASIC (the programming language), it has to be said this is somewhat of a revival, but until recently we were never sure how much of a revival, but the secret is now out.

Professor John Kemeny, Maths professor Thomas Kurtz, and a group of undergraduate students at Dartmouth College created BASIC (Beginner's All-purpose Symbolic Instruction Code). (Beginners Awfully Slow Idiot Code - Ian).

The first program ran on 1 May 1964

[https://www.theregister.co.uk/2019/06/17/plaque\\_for\\_basic\\_birthplace\\_new\\_hampshire/](https://www.theregister.co.uk/2019/06/17/plaque_for_basic_birthplace_new_hampshire/).

That's 55 years ago and it still has a following, I suspect when this was being created nobody could have ever imagined it being run on kit like the ESP 8266.

It just keeps getting better, as Mike G7GTN explains, ESP Basic was good, but Annex is another generation.

The program is free and the ESP modules are everywhere for just a few pounds, so you have no excuses. If you missed out on BASIC in the 80's and don't have fond memories of Spectrum's, ZX81's, BBC model B's, well now is your chance to fill in the gaps in your education.

Trevor is so impressed with Annex he is rewriting all the Grass Valley code for Annex BASIC, but that has not stopped him producing the 6th article in the series for the Grass Valley mixer and here at the editorial office we are suspecting there are still more to articles come.

Tracking the GVG panels on eBay, 4 have changed hands since he started but nobody is owning up to being a proud owner! Let's hope that some of them have fallen into the hands of CQ-DATV readers.

Also in this edition Jim Andrews KH6THV is sharing with us the history of the Boulder County ATV repeater, which went on air in 1978. It had both its inputs and outputs in the 70 cms band. It lasted until 1981 when a new 10kW FM broadcast transmitter made it unworkable from the site, only to reappear in 1990. I will let Jim tell you the full story.

Jim has also written a very interesting article about DATV and interference. COFDM modulation appears as if it were white noise. When viewed on a spectrum analyser, it appears as if the "grass" from the noise baseline is raised upon a rectangular pedestal.

So the question remains, just how strong will the DTV signal actually be when received by an ordinary amateur 70 cm FM mobile, or hand-held radio, or FM repeater? Jim explains it all.

Some news also from the Netherlands. The DKARS (Dutch Kingdom Amateur Society) who have also been publishing a free electronic magazine, is no more.

This very successful magazine has only been possible with the support of all radio amateurs who have committed themselves to DKARS. A group of enthusiastic people that continues to grow. Also a group of people who are usually positively critical and regularly provide the board with ideas.

The next step is now the Dutch Amateur Radio Union (DARU). We now have a first founding board consisting of four people:

- PA3FXB chairman
- PAØMKO vice-chairman
- PE1CHQ secretary
- PA3KYH treasurer

CQ-DATV would like to wish you every success with this next important step.

So now as we always say sit back and enjoy CQ-DATV 73

### **CQ-DATV Production team**

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



# **DKARS MAGAZINE**

**DKARS-Dutch Kingdom Amateur Radio Society**



**Dit is het vijftigste en laatste DKARS Magazine!**

**En verder nog dit nummer onder andere:**

- . De Dutch Amateur Radio Union(DARU) gaat het stokje van DKARS overnemen
- . Aluminium schuifmast voor veldwerk
- . New IOTA on Ice DXpedition
- . Again the analog keyer
- . Dual band YAGI antenna with open sleeve element
- . En nog heel veel meer



**DKARS-Dutch Kingdom Amateur Radio Society**



Prijs / Price € 0,00 / \$ 0,00

**Juni 2019 editie 50**

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

### DATV-Express Project

Charles G4GUO reported that the last box of the MiniTiouner-Express inventory of DATV receivers were all shipped to customers in European Union during May. The PayPal function for ordering MiniTiouner-Express receiver/analyzer units on the [DATV-Express.com](http://DATV-Express.com) website has again been disabled. The Project Team agreed that the PayPal function for ordering will next be enabled when the next production run of units are in the hands of Charles.

Art WA8RMC reported that the 100 each blank PCB boards for the next production run of MiniTiouner-Express units were shipped to him on 2019-05-29. The Serit NIM tuners will be shipped to Art in the first week of June. Art expects that the next production batch of MiniTiouner-Express units will be available for ordering in early July.

Ken W6HHC reports that the latest version of MiniTioune software (V0.9beta8) was released by Jean-Pierre F6DZP on May 04. This new beta software has been successfully tested on the MiniTiouner-Express units and works VERY well. The software is available to download free from the VivaDATV website at

<http://www.vivadatv.org/viewtopic.php?f=60&t=625>

**Project speed set to moderate ...de Ken W6HHC**

---

### Rudi Pavlič S58RU reports

Years ago I decided not to send the IARU ATV contest LOGs.

It is like us in Slovenia we have no more ATV contests, if we want to do QSO ATV we must join the IARU and Ancona Contest contests.

This year, after the UKV contest in June, I started preparing for the IARU ATV contest.



The desire was not much. As the days went by I learned that IK3HHG Francesco will not participate this year. With IV3WSJ Mauro we had to let go of the idea of doing QSO in 24GHz ATV.

For the 5GHz and 10GHz I only prepared the antennas. Two for the 5GHz and two for the 10GHz.

For the 23cm and 13cm I already have everything ready for analogue and digital DVB-T.

The fateful Saturday arrives. The 144.750MHz frequency remains silent.

On Sunday, something is heard but not like the past few years.

It's 17:13 on Sunday. On the card the IARU ATV contest is not yet finished, but the radio on 144.750MHz is muted. "Suma sumarum" I did ½ QSO in 30 hours of IARU ATV contest.

73 s58ru

---

## DATV-Express Project - TX units

This is a just a quick mid-month update....

The Project Team (without public notice) decided to take the last 24 blank PCBs for the DATV-Express transmitter boards that were still laying around and have them assembled and tested.

Art WA8RMC did all the work of ordering components, kitting them for the PCBA assembly house and testing them after assembly. Art now reports that these boards are NOW ready to be sold via PayPal at [www.DATV-Express.com](http://www.DATV-Express.com) website

The price has been reduced to USD179 each + shipping (and any VAT that may be due)

All shipping will be from USA...so usually USD35 for most world-wide shipping including EU....\$7.00 for shipping within USA.

Also, Art shipped a box of 30 ea MiniTiouner-Express RX units to Charles G4GUO on June 15. It is expected that it will take about 2 weeks for these RX units to clear customs and be delivered to Charles.

When G4GUO has these RX units in possession, The PayPal function for MiniTiouner-Express RX units will be enabled.

Project speed set to moderate ...de Ken W6HHC

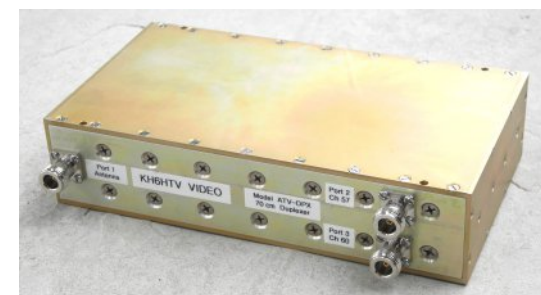
---

## NEW PRODUCT ANNOUNCEMENT



KH6HTV VIDEO is pleased to announce the availability of NEW filter products which will make it possible for radio/TV amateurs to easily build 70cm Television Repeaters.

They are the new model ATV-BPF-xxx, Band- Pass Filter and the model ATV-DPX, Duplexer.

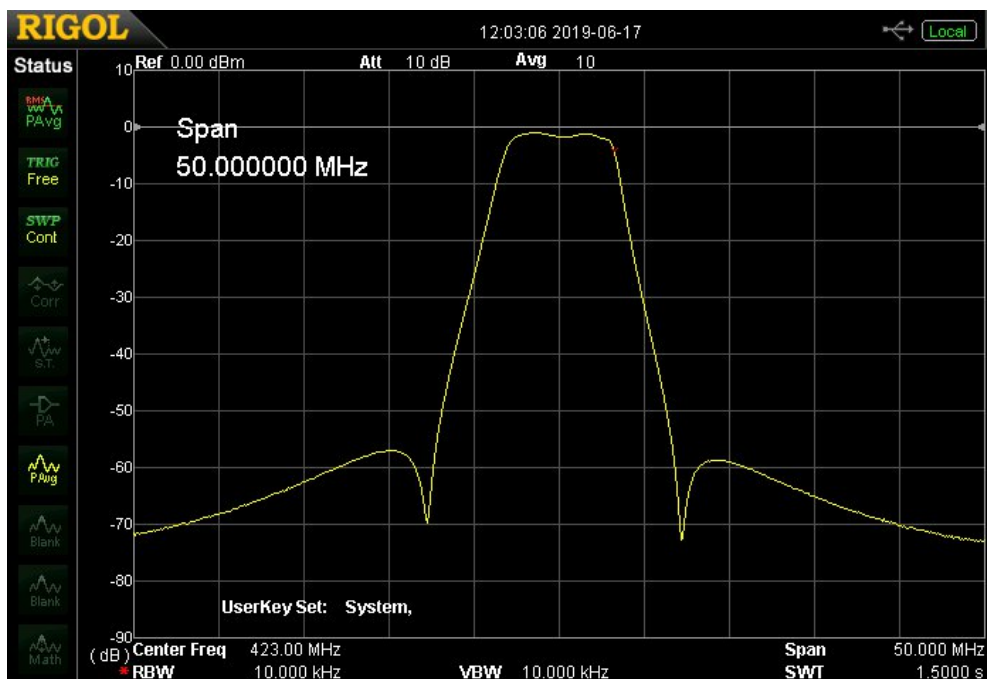


**Left: 70 cm, 6 MHz, Band-Pass Filter**  
**Right: 70cm, ATV / DTV Duplexer**

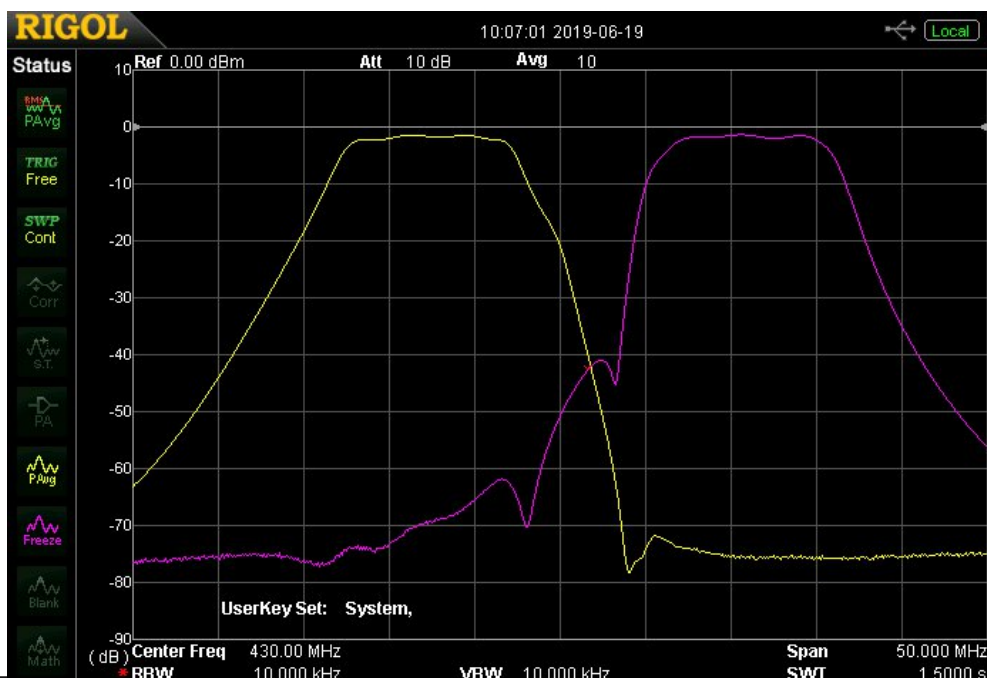
With the duplexer, it is now possible to construct a TV repeater using a single antenna. Detailed specification sheets are available on the web site: [www.kh6htv.com](http://www.kh6htv.com)

Also a new, revised, application note, AN-23b, entitled "DVB-T Television Repeater" is available on the web site.

**Continued next page...**




**Insertion Loss, swept frequency responses of the band-pass filter and the duplexer. 10 dB/div & 5 MHz/div**



## MiniTiouner-Express

### Digital Amateur Television DVB-S/S2 Receiver / Analyzer



Available at [DATV-Express.com](http://DATV-Express.com)

- Operates with Windows PC using free MiniTioune software from Jean-Pierre F6DZP
- Smaller than a stack of 2 decks of cards (picture above is full size)
- Two independent simultaneous RF inputs with internal preamps
- High sensitivity -100dBm @1288MHz – at 1/2 FEC
- Fully assembled/tested in aluminum enclosure
- Covers 144-2420MHz (ideal for Space Station DATV reception)
- Symbol rates from 75 KSymb/s to >20 MSymbols/sec
- Uses external 8-24VDC supply or +5V from USB-3 port (with small modification)
- Real time signal modulation constellation & dBm signal strength display
- Price: US \$75 + shipping – order with PayPal

For details & ordering go to [www.DATV-Express.com](http://www.DATV-Express.com)

(MiniTioune display above is the ATCO 1268MHz DVB-S repeater signal at WA8RMC QTH 15 miles away).

## RF Interference Potential of Digital TV

Written by Jim Andrews, KH6HTV

There has been concern expressed by some radio amateurs using FM voice radios to the possible interference to their 70 cm repeaters by radio amateurs transmitting digital Television signals. A 10 watt, DVB-T transmitter will be equivalent to transmitting a weak, 44 milli-Watt (+16dBm) signal on any single FM voice channel.

A digital TV (DTV) signal due to the random nature of the COFDM modulation appears as if it were white noise. When viewed on a spectrum analyzer, it appears as if the "grass" from the noise baseline is raised upon a rectangular pedestal. When one tunes in a DTV signal on a single sideband receiver, it just sounds like white noise, except that the receiver's S meter indicates the presence of additional RF power above the noise floor of the receiver.

So the question remains, just how strong will the DTV signal actually be when received by an ordinary amateur, 70 cm FM mobile, or hand-held radio, or FM repeater?

First what are the bandwidth requirements for an FM voice radio? Carson's Bandwidth Rule (CBR) for FM modulation is:  $CBR = 2 (\Delta f + f_m)$ , where  $\Delta f$  is the peak frequency deviation, and  $f_m$  is the highest frequency in the modulation signal. Thus for a typical band-limited voice signal maximum of 3 kHz and 5 kHz deviation, the required bandwidth is about 16 kHz. Per the FCC, for 5 kHz deviation, the channels are 25 kHz wide.

A typical amateur DTV transmitter puts out at most about 10 watts (rms) of RF power. In the USA, we use TV channels that are 6 MHz wide. For DVB-T modulation, there are actually guard bands of 145 kHz at the channel edges and the actual DTV signal occupies 5.71 MHz.

The DTV transmitter's power is uniformly spread over this whole signal bandwidth.

Thus the DTV transmitter's power density,  $P_d$ , in Watts / Hertz is:

$$P_d = 10 \text{ Watts} / 5.71 \text{ MHz} = 1.75 \times 10^{-6} \text{ W} / \text{Hz}$$

Thus the equivalent transmitter power in a single 25 kHz FM voice channel is:

$$P(\text{FM equiv}) = P_d \times \text{FM-BW} = 1.75 \times 10^{-6} \text{ W} / \text{Hz} \times 25 \text{ kHz} = 0.044 \text{ Watt} = 44 \text{ mW} = +16\text{dBm}$$

While this is not infinitesimally small, it is still much weaker than any typical 5 Watt hand-held radio or a 50 Watt mobile radio. Thus I argue that the RFI potential to FM voice repeaters is minimal.



**CQ-DATV MAGAZINE**

All back issues available  
All common eBook Formats  
We also have PDF

**Various Constructional Projects**  
**Looking Back At Older TV Technologies**  
**Digital & ATV Micro Processor Projects**  
**General ATV News UK & International**

The advertisement features a background with vertical stripes in yellow, cyan, green, magenta, red, and blue. On the left is a black video camera. In the center is a laptop displaying the text 'All back issues available', 'All common eBook Formats', and 'We also have PDF'. On the right is a diamond-shaped logo with a stylized antenna and the text 'CQ-DATV'. Below the camera is another similar logo. The bottom of the ad has a blue background with white text listing various projects and news.

### Quick Review by Mike Stevens G7GTN

Looking at available options for quick development and test type projects my attention was drawn to this modern version of Basic hosted on an ESP8266 module. We have seen a version before of a custom BASIC Language that ran on the same chip and allowed code development from a browser based editor. We can consider this to be the next generation on from the original concept of allowing us to enter code and run this from our standard web browsers. We have both a powerful implementation of the Basic language that many of us will already be familiar with coupled to some clever features to help whilst developing your code, of particular value is the built in help feature that is launched by pressing the F2 key.

The package includes a nice Windows based utility that amongst the features is a very good File Manager to help get your code on to and back off the module for storage. Also of use is a built in Serial Monitor that displays information whilst your code is running. You may also send text or data to this using the familiar PRINT command from your own code. So our web browser becomes our IDE interface, remembering this is local via WiFi and has nothing at all to do with the cloud so no internet connection is required unless your own project actually requires this (well not quite as the Help file actually comes from the web on pressing the F2 key) Downloading and installing the binary package on the ESP8266 Module

The full installation package can be freely downloaded from the site link, you can select the version you require. At the time of this writing we are at Version 1.39 which the author is describing as Beta 1:

<https://sites.google.com/site/annexwifi/home>

Using the Windows Toolkit Serial Flasher option you can install the package on the module. Possibly the most useful option is to install the package alongside the demo samples written and provided by the author. This provides a good indication of the type of projects you could attempt in BASIC. Entering 192.168.4.1 on a mobile device will now launch the default web configuration page, here you can enter the details of your WiFi router, this being the SSID and also Password. Once you have done this the fastest way to get the IP address is to launch the Serial Monitor and connect to the module. This will be the IP Address that you enter in to your web browser to get access to the IDE and control interface.

← → ↻ ⓘ Not secure | 192.168.0.4/config

Output Editor **Config** File Manager

Annex WiFi 1.37 Beta 1

**Station Mode (Connect to router)**

Name

Pass

**Ap mode (broadcast out its own ap)**

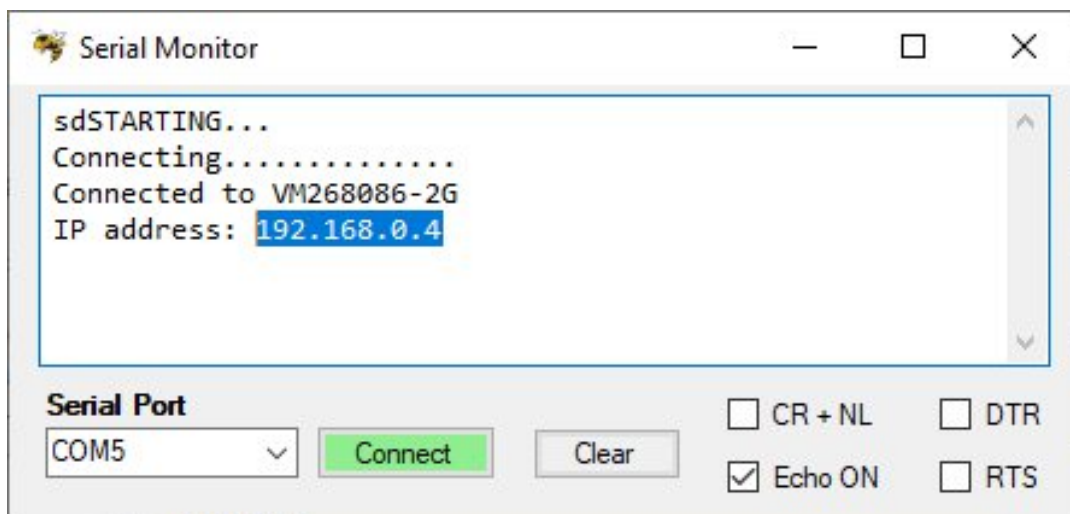
Name

Pass

Channel

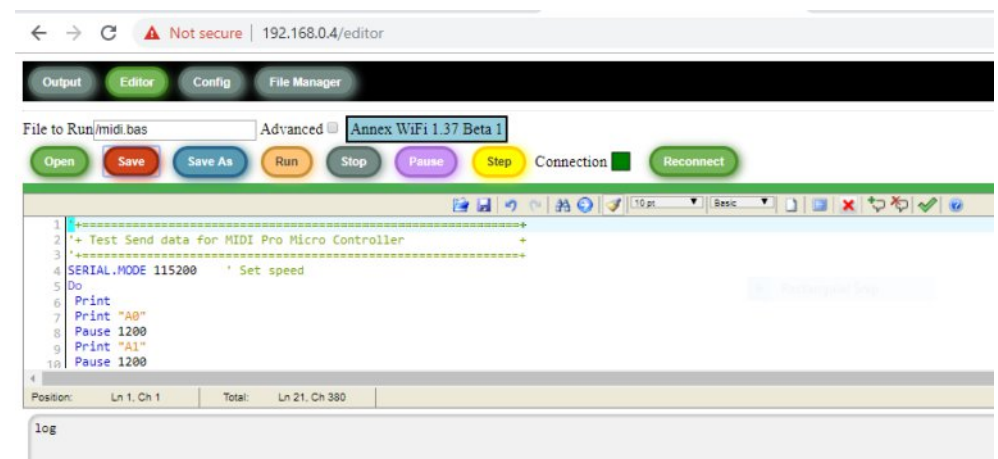
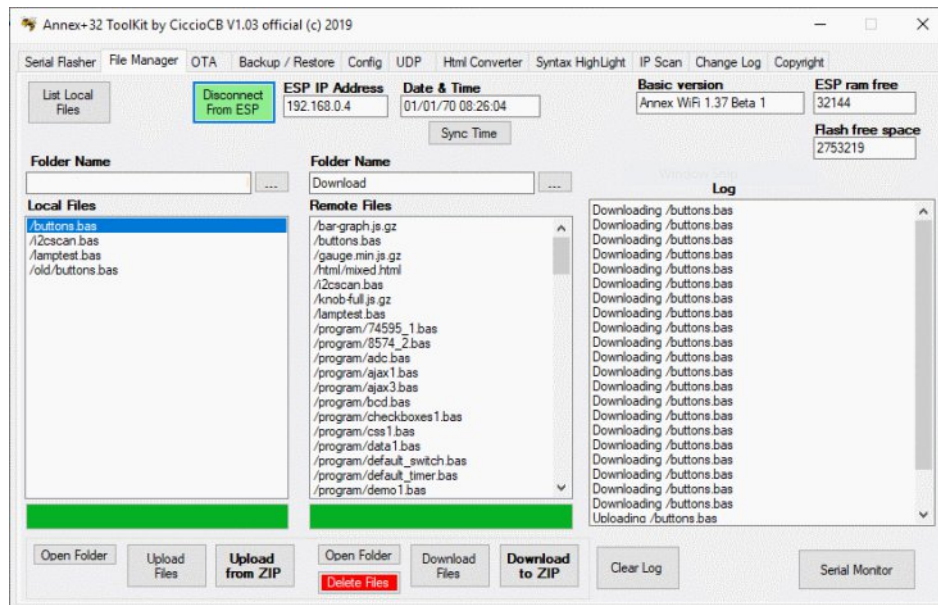
### The Web Based IDE

Once you have configured the connection details from your standard desktop web browser you can launch the IDE. This will be done using the IP address that the Serial Monitor has reported in the previous step. This on first look seems quite simple but provides some of the features we have come to expect from desktop IDE software.



### Web Configuration Page Serial Monitor showing IP address served from the Router

We can step through the code a line at a time and see the output in the LOG pane whilst we do so. Another helpful feature is the ability to enter a command in so called immediate mode to do some quick testing. The small graphical ribbon bar provides many more options that you will find useful during your own coding.

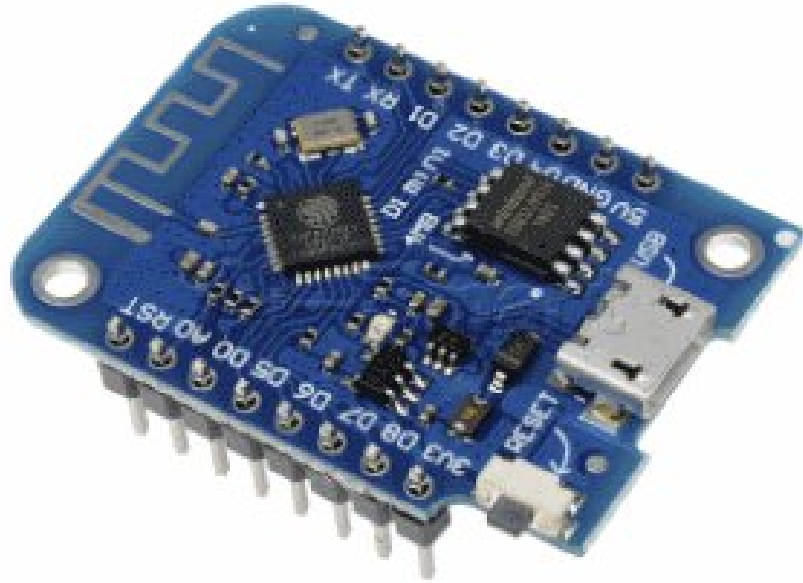


### Windows Toolkit Software Utility

Using the Windows Toolkit and having the module connected you gain access to some useful features, such as code uploading and downloading. From this window we can also access the Serial Monitor which is a handy way to debug your code using the PRINT command and observing the results. Alongside many of the commands additional options are available for formatting this displayed output. The extensive help file alongside the code samples provides all the information you will require as you develop code once again in the BASIC Language. We have more advanced features that I still need to fully investigate; moving forwards.

### Conclusion

This could provide the perfect development platform for some simple projects – whilst is certainly capable of far more complex ideas I can see making good use of this for quick development tasks. You can escape the sometimes long compile upload cycles of conventional C ++ and the complexities of additional libraries. We have now from within Basic some very good support for additional hardware and common modules we might wish to use in our projects. This would be an excellent fit for the wemos D1 ESP8266 module and large range of associated shields.



I would fully recommend downloading and giving this web browser based version of BASIC a test for yourself. In the three weeks I have been using this have found it to be stable.

You will find a good support system from the supplied help file to a community forum that provides assistance from many knowledgeable users.

Re-publication of CQ-DATV magazine material is encouraged as long as source credit is properly given.

**Exception:** "Reprinted by permission" material must have the original publisher's/authors permission.

**In case you were wondering.....**

## **A SENIORS PERSPECTIVE OF FACEBOOK.**

For those of my generation who do not, and cannot, comprehend why Facebook exists:

I am trying to make friends outside of Facebook while applying the same principles.

Therefore, every day I walk down the street and tell passersby what I have eaten, how I feel at the moment, what I have done the night before, what I will do later and with whom.

I give them pictures of my family, my dog, and of me gardening, taking things apart in the garage, watering the lawn, standing in front of landmarks, driving around town, having lunch, and doing what anybody and everybody does every day.

I also listen to their conversations, give them the "thumbs up" and tell them I like them.

And it works just like Facebook.

I already have four people following me:-

Two police officers, a private investigator and a psychiatrist.

**A Noni Moose**

## Grass Valley Mixer Conversions - Part 6

Written By Trevor Brown G8CJS



I did expect this project to span more than one magazine, but never as many as it has. I explained in issue 68 that this was a live project and that each month I would progress it and report back. This time I have back tracked a little and made changes, but they are all

improvements and effect the programming language. To be more accurate, the syntax and some minor changes to the hardware which just keeps getting better and better.

Let's start with the hardware. I showed in one of the earlier issues a PCB designed and produced by Mike G7GTN, well the slow boat to china has delivered some PCB's and thanks to Mike I have two of them. I have now populated up one of them and yes, it works! Works is probably not the correct word; it works brilliantly and has more facilities than I ever asked for.

It has two additional eight-bit ports provided by two extra PCF 8574 chips and the I2C bus has been brought through to an external connector so that a 20 by 2 LCD screen can be added. I have added the screen and it works brilliantly. The user address lines for the PCF 8574 chips have also been connected to dip switches so they can be user positioned in the memory map.

As Mike also has a GVG panel and PCB we are working together to test software and hardware. I have changed the 8574 chips, the original ones were PCF8574AP to PCF 8574A. Let me explain. The Chips have a specific I2C address and only one device can be located at any one address.

This is achieved by connecting the A0 to A2 connections to either Vcc or ground hence the three DIP switches (my original dongle in CQ-DATV 68 shows them hard wired). This is not the full address bus, but the rest of it is connected inside the chip and is not user adjustable.

The mathematicians will realise that we can only have eight of these chips on the I2C bus. Enter the PCF 8574AP chips which have the internal part of the address bus connected differently so the eight possible addresses are different to the A version so that the I2C bus can address eight of the A chips and eight of the AP chips. Yes that's 16 in all! You can use whichever chips you can get your hands on but remember to correct the statements at the head of the code. I have now included the options in comment statements. If you use an LCD screen remember it is not adjustable, it is locked to 0x3f in hex or 63 in decimal. If you have any doubts run the I2C address scanner software and it will report back all the addresses that have a device present.

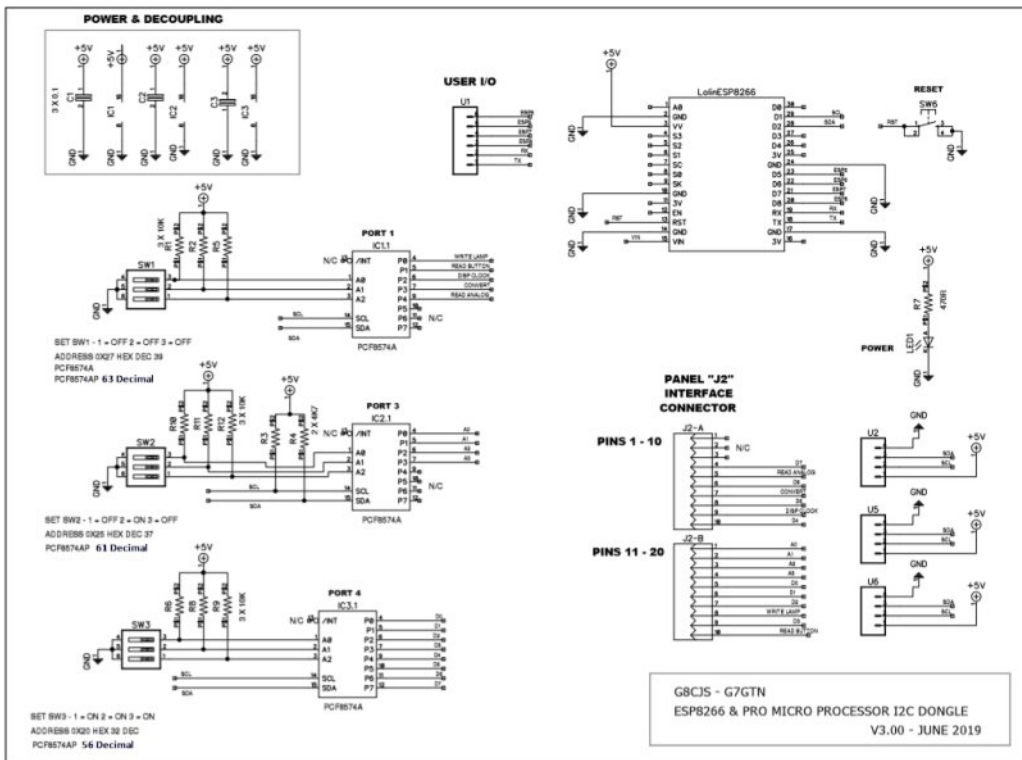
```
'+=====
'+ GVG100 Panel Button Decode

'+ Annex ESP8266 Basic

'+ https://sites.google.com/site/annexwifi/home

'+ Original ESP8266 Basic Code from CQ-DATV Magazine 72
'+=====

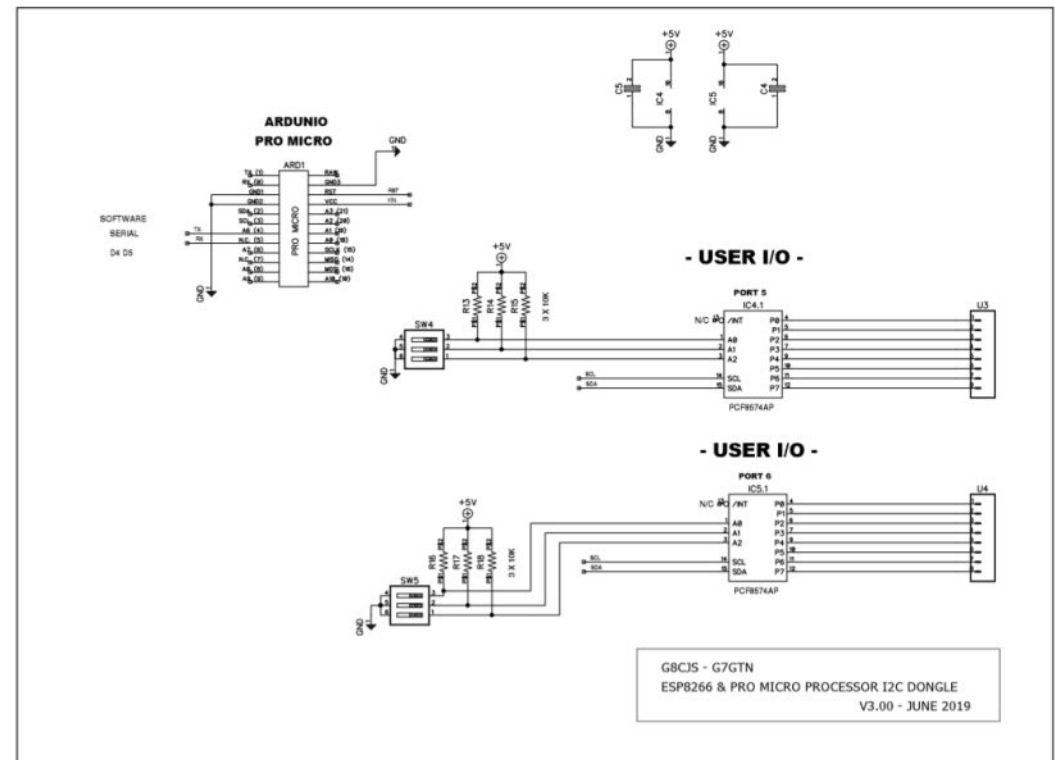
' PCF8574 Device Addresses
let PRT1=39           ' Port 1 Control      address 63 for /P
device
let PRT3=37           ' Port 3 Address Bus  address 61 for
/P device
let PRT4=32           ' Port 4 Data Bus    address 56 for
/P device
```



**The revised dongle circuit diagram**

I have also made some changes to the software. The ESP BASIC might have got this project off the ground, But it did have one or two problems, the micro's used to lose Wi-Fi connection to the PC usually at the most inopportune time such as when I was hoping to cut and paste the code from the proof versions of the magazine and verify everything before we publish, so one or two things escaped checking. One of them was carriage returns.

The BASIC listings always appeared as double spaced in word and reducing this by using control carriage return can remove the carriage returns when you cut and paste the BASIC code so to avoid this we have posted the code as a .BAS file on the CQ-DATV website. These files can be opened in notepad (for the curious).



**The extra ports for future additions**

The posted files have been re-written into Annex BASIC. The curse of BASIC was always syntax or dialects. In Annex BASIC print becomes Wlog, Delay becomes Pause, the brackets in the I2C routine needed to be removed and the subroutine calls and labels are a little different, just to mention a few.

Annex BASIC is such an improvement on ESP BASIC as Mike has already explained earlier. It's worth making these changes and using Annex so from now on as our BASIC for the NODE. MCU or its later incarnation LOL1n (both modules are pin compatible) will be in Annex BASIC.

What can I say about the BASIC that Mike has not already covered? The instant help key (F2), the ability to single step

the code, the ability to see it full screen and above all the reliability and the ease of getting a IP address that can be pulled up on the PC. I will convert the lamp test routine and get that onto the CQ-DATV site as Annex BASIC in the next few days .

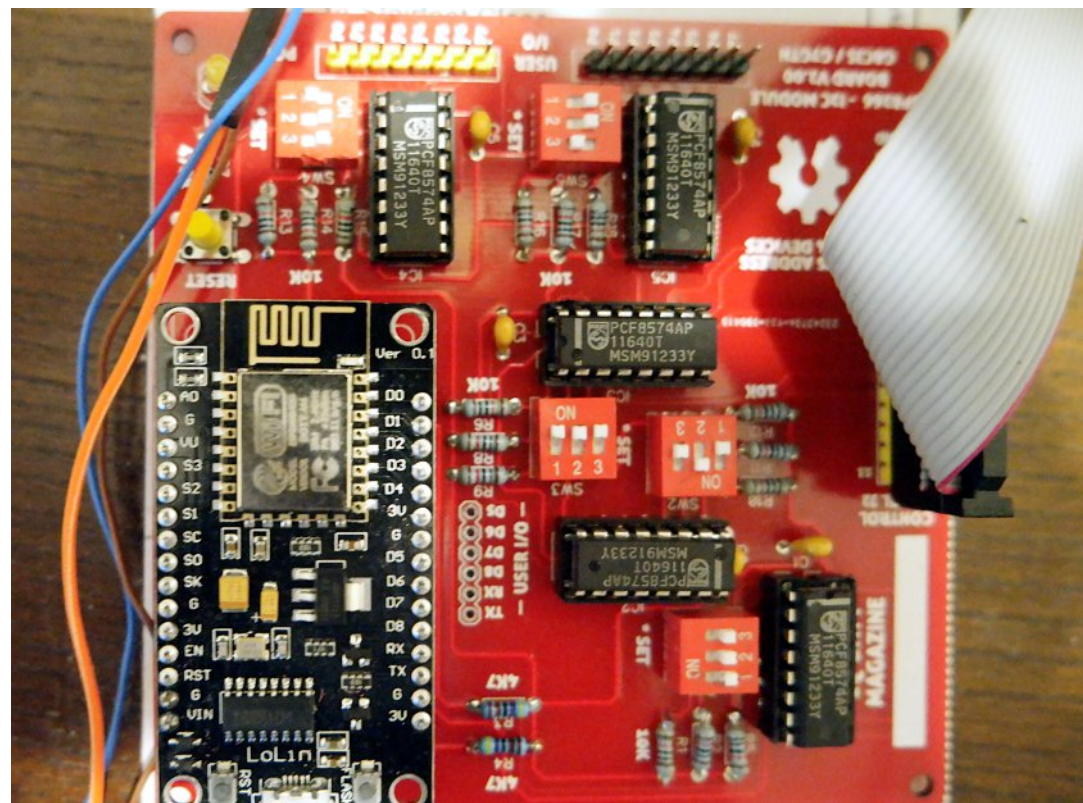
The Button\_test programme will print the selected button on the PC. It does not need to run in De-Bug mode and can easily be adapted to print on the LCD display E.G. If you look at the PST subroutine PST:

```
'if B = 3 and e = 254 then wlog "PST 0 "  
if B = 3 and e = 254 then LCD.CLS: LCD.PRINT 1,1,"PST 0"  
if B = 3 and e = 253 then wlog "PST 1 "  
if B = 3 and e = 251 then wlog "PST 2 "  
if B = 3 and e = 247 then wlog "PST 3 "
```

You can see I have commented out the PST0 wlog and put a new line below it to drive the LCD. What I can say the advantage of BASIC is it is its own source code so you can see the code and customise the code. This was the advantage and the weakness.

The secret squirrels, who like compiled languages are all into keeping the source code and selling you the executable files they produce in the knowledge that you cannot see or edit their work. CQ-DATV is squirrel free and I hope we are presenting the code in this series of articles so that anyone can adapt, change and extend our work.

Next time I will make the button press light the lamps I promise...sorry for the changes and the new BASIC syntax, but it really is worth the changes.



**The PCB for the new improved dongle**

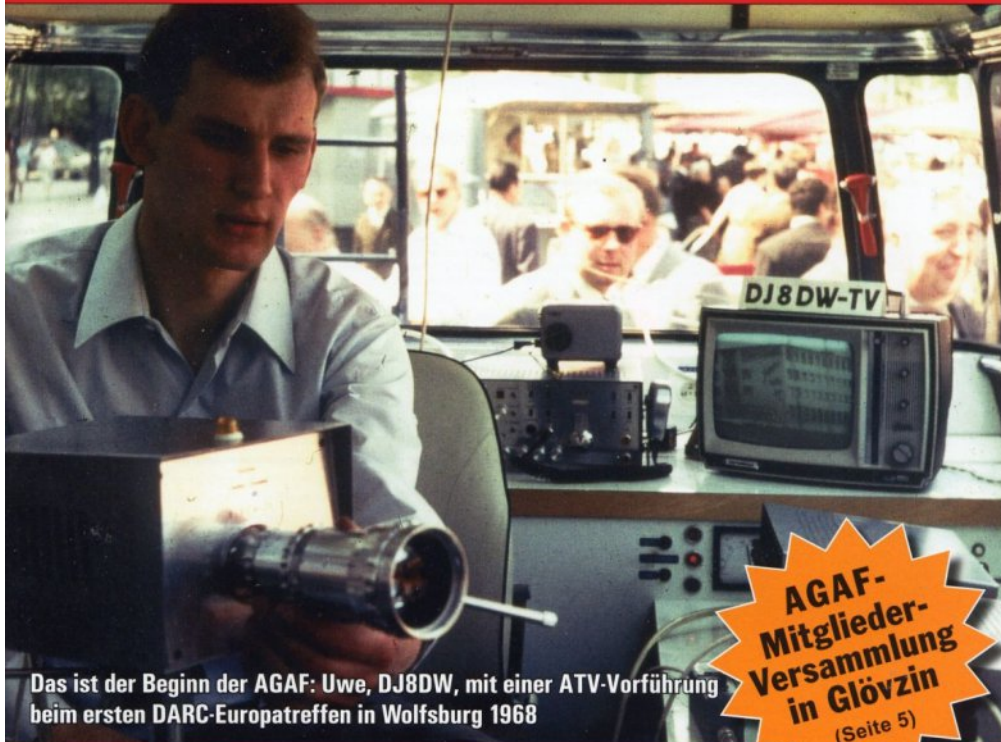


agaf-ev.org · www.agaf.de

# TV-AMATEUR

Nr. 192  
51. Jahrgang  
1. Quartal 2019  
EUR 6,- SFR 6.50 US\$ 6,-




Zeitschrift für Bild- und digitale Daten-Übertragung im Amateurfunk



Das ist der Beginn der AGAF: Uwe, DJ8DW, mit einer ATV-Vorführung beim ersten DARC-Europatreffen in Wolfsburg 1968

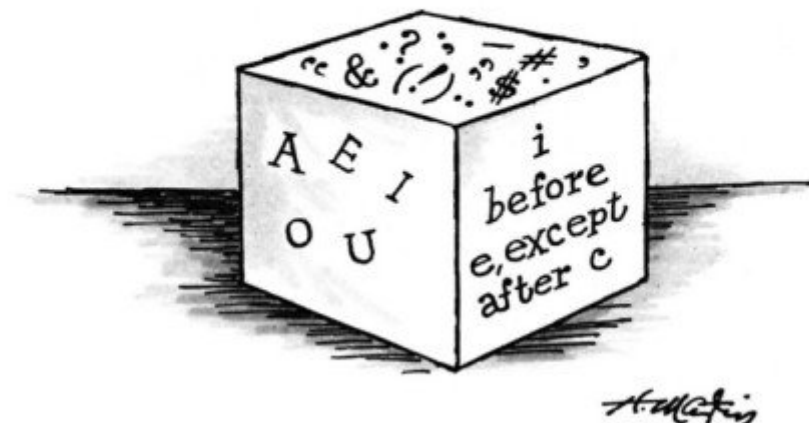

**AGAF-Mitglieder-Versammlung in Glövizin**  
(Seite 5)

Aus dem Inhalt: EDITORIAL: Die AGAF in Glövizin und Friedrichshafen • Der Fernsehponier Charles Wesley Rhodes • Der Aufbau und Betrieb des MiniTiouners • Umbau und Einsatz von PLL-LNBs • Einsatzmöglichkeiten des Eachine PRO DVR • Ein skalarer Netzwerkanalysator auch für UHF •

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



## WRITER'S BLOCK


# CQ-DATV

## Monthly Free Magazine

### eBook & PDF

[editor@cq-datv.mobi](mailto:editor@cq-datv.mobi)



## Boulder, Colorado TV Repeater History

Written by Jim Andrews, KH6HTV



Boulder, Colorado has had an amateur Television repeater since the late 70s. Boulder hams, including myself, became interested in amateur TV starting in 1974 when an inexpensive, small, partially solid-state, B&W TV camera became available from a bankrupt company in Austria that had come out with an early consumer grade video tape recorder.

Most of the active TV hams then were also members of the Rocky Mtn. VHF Society. The RMVHFS had a 2 meter FM repeater (146.76MHz) then on Lee Hill, north-west of Boulder. Under the sponsorship of RMVHFS, I, Joe Woods AD0I, John Shafer, W0KWR, and Bob O'Connell, WA0BAF, designed and built our first TV repeater and installed it at the repeater site on Lee Hill.

It was a 70cm repeater with the input on 439.25MHz and the output on 421.25MHz. It used a single DB Products, DB-411, antenna with a circulator (25dB isolation) and separate 6 MHz, interdigital, band-pass filters on the receiver and transmitter.

I designed and built the 10 watt transmitter and controller. Joe built the receiver, John built the band-pass filters. Bob did the wiring of the controller.

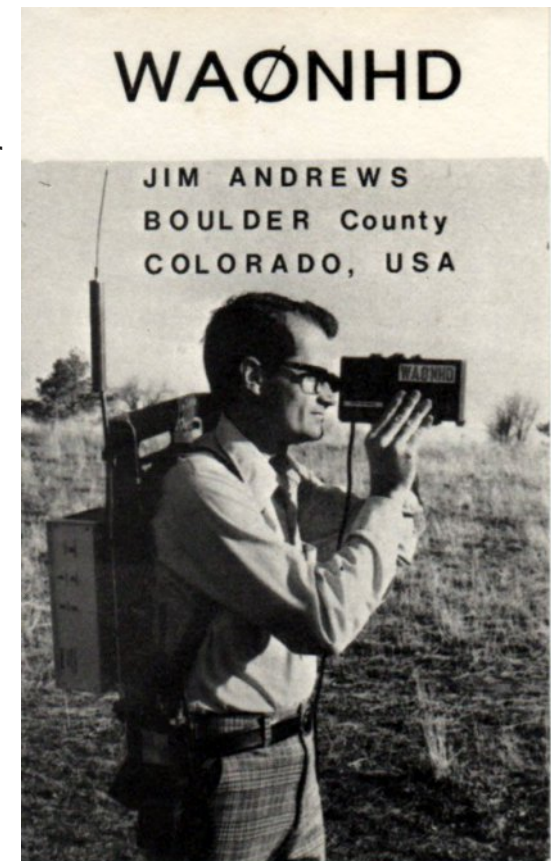
This repeater was operational from about 1978 till 1981. It operated under the RMVHFS club call sign, W0IA. During this era all ham TV was in black & white (B&W), as no one could afford a color TV camera. In 1981, a new, powerful (10kW), FM broadcast transmitter was installed at the Lee Hill site.

The resultant RFI was so strong that we were unable to keep it out of our repeaters circuits. Thus, we removed our TV repeater from Lee Hill.

In 1980, I started my business, Picosecond Pulse Labs, and began working on it full time in 1981.

For the next ten years, I was too occupied with PSPL to devote any time to ham radio or TV.

The TV repeater sat in storage in my basement for the next ten years. TV activity in Boulder died during this interval.





In the fall of 1989, Captains Bill McCaa, K0RZ, and Chuck Pringle, K0DGP, of the Boulder County Sheriff's Department approached BCARES (Boulder County Amateur Radio Emergency Services) and asked that BCARES provide TV services to the Boulder Sheriff's department for major emergencies. They promised to provide financial and other support for the project.

At this time, I was the chairman of BCARES. Also at this time, several camera companies, like Canon, Sony, etc. had come on the consumer market with the new idea of camcorders. These combined in one relatively inexpensive, small, hand-held package, both a color TV camera with a zoom lens, viewfinder and also an 8mm video cassette recorder.

Thus, with the new color camcorders and the support of the Boulder Sheriff, BCARES accepted the TV challenge. We pulled out of storage our old 1970s vintage TV repeater. The Sheriff arranged for us to install it in the City of Boulder's radio site in Chautauqua Park on the flank of the Flatirons mountains, 800 ft. above the city.

The Sheriff also purchased antennas, and hard line, coaxial cable and provided their radio technician to install the antennas using a city cherry-picker truck. We no longer had a circulator, so when the repeater was installed at Chautauqua Park, we now used a pair of DB-411 antennas, one for receive and the other for transmit. We had the repeater back on the air by the summer of 1990.

At this time, Bill McCaa, also encouraged us to get the TV repeater frequency coordinated with the [CCARC](#) to nail down the 421.25 MHz frequency for our exclusive use.

The CCARC was unwilling to give us frequency coordination for an in-band 70cm repeater. They gave us the 421.25 MHz output frequency, but insisted that we must be a cross-band repeater with our input on the 23cm band.



**The Boulder analog ATV repeater at the former Chautauqua Park site**

They assigned us 1277.25 MHz as our input frequency. This was a very unfortunate choice as the third harmonic of the 70cm transmitter's sound sub-carrier at 425.75 MHz was also exactly 1277.25 MHz !!!

I was thus faced with the difficult task of adding a 23cm receiver to the repeater and also suppressing dramatically the third harmonic from the transmitter. I accomplished it, but not without a lot of effort.

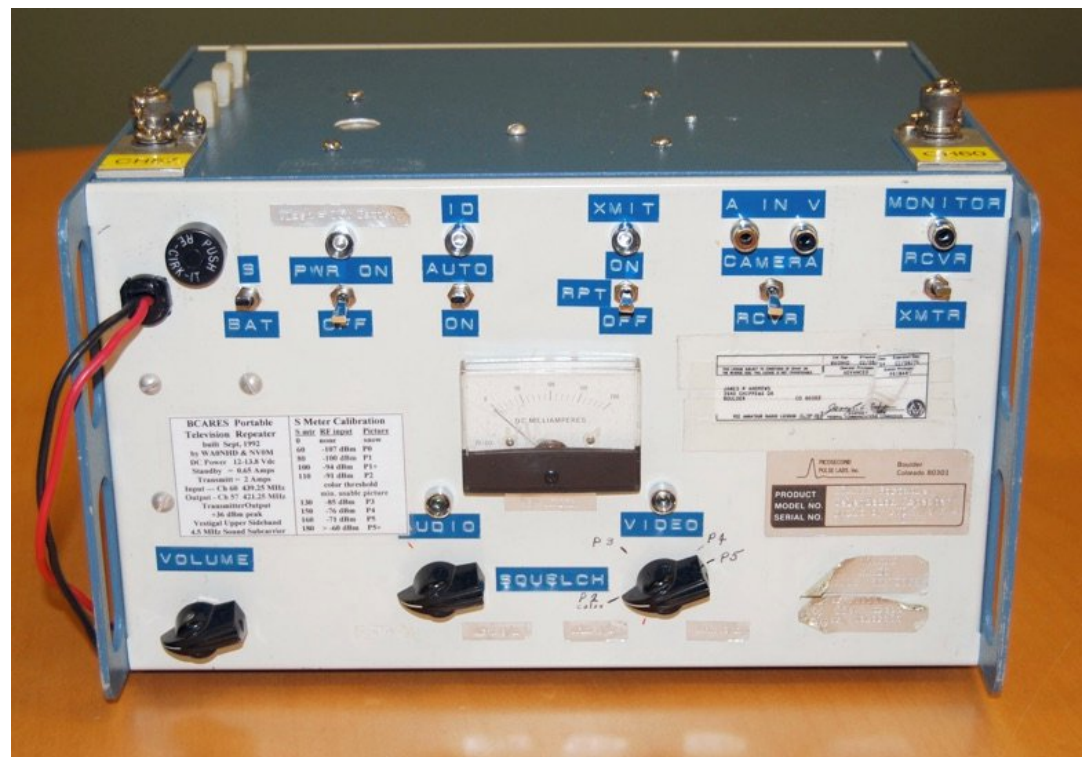
At this time, we also made the decision to still retain the 70cm input capability at 439.25 MHz to support 70cm ATV transmitters. Granted this was against the CCARC ruling, but we felt it was needed to adequately support the Sheriff's department.

Thus our 70cm input was un-coordinated with the state frequency coordinator. For remote control of the TV repeater, we used a simplex 2 meter channel with DTMF (touch-tones).

In the normal stand-by mode, the repeater was configured to receive on 23cm to comply with the CCARC frequency coordination. Only for special BCARES operations, was it switched over to receive on 70 cm. Most all of BCARES's ATV equipment was for the 70 cm band. This is still the case in 2019.

In 1991, we also saw the need to have a portable TV repeater to be able to adequately cover forest fires in the mountains of Boulder County. The Chautauqua Park TV repeater gave good coverage of the city of Boulder and the eastern plains portion of Boulder County.

It didn't give any coverage of the western mountains in the county, except for the first ridge of foothills to the north. I thus, started a project to design and build a portable, 70 cm in/out, 10 watt TV repeater.



I enlisted Rip Van Winkle, NV0M, (now SK), to assist me with the packaging of the repeater. We managed to cram all of the necessary electronics into a small (12" w x 8" h x 12" d) enclosure. This portable ATV repeater has performed flawlessly and is still in service with BCARES to this day.

The 1970s vintage repeater and transmitters used were my own design using a Motorola, 70cm brick amplifier. In the 1990s, all of the BCARES TV transmitters, including the repeater transmitter, were made by [PC Electronics](#).

We had both 1 watt and 10 watt transmitters.

By the late 90s, we had added to the repeater, the capability to receive 23cm FM-TV in addition to VUSB-TV. Over the succeeding years, I continued to make improvements in the various components of the repeater, with several major rebuilds.

During most of this time, the repeater operated under my own personal call sign which then was WA0NHD. In Dec. 2006, I changed my call sign to KH6HTV. This was done because now in retirement I was living for half the year in Hawaii and half in Colorado.

BCARES felt that a KH6 call was not appropriate for the TV repeater. We thus applied for the vanity call sign, W0BCR, for BCARES, with myself as the trustee. From that time on, the TV repeater operated under the call, W0BCR.

In 2012, we encountered a major problem with RFI on the repeater's 23 cm input. It was from a new radar at the Denver airport operating on 1263 - 1267 MHz. I applied to the CCARC for permission to move our input frequency from 1277.25 MHz to the bottom end of the 23 cm band at 1240-1246 MHz. The request was approved.

With Don Nelson's, N0YE, help we were able to come up with a suitable band-pass / notch filter for the 23 cm receiver which rejected the extremely powerful radar pulses which were clobbering our receiver.

In 2014, I discovered DVB-T, digital TV and [Hi-Des](#) in Taiwan as a supplier of affordable gear. This made a major transformation in amateur TV in Boulder, Colorado.

BCARES soon adopted it for use in support of public safety. The University of Colorado Police department funded the purchase of four complete DVB-T, portable, transmitters with all necessary other equipment. This included a quad, high-definition, DVB-T receiver to receive all four transmissions simultaneously for display on a big screen monitor.

In the summer of 2016, I spent the whole summer designing and rebuilding the TV repeater to make it a 70 cm transmit, dual band (23 cm & 70 cm) receive, dual mode, analog & digital, TV repeater.



**New 23cm/70cm ATV/DTV Repeater**

It went back into service in the fall of 2016.

In the next summer of 2017, BCARES was given notice by the City of Boulder that the TV repeater had to be removed from the Chautauqua Park site. This was because the city wanted to expand their own radio system and needed the rack space in the radio shack and also the space on the tower for more of their own antennas.

Since then the repeater was in a couple of temporary locations. It was first at my QTH and then on Davidson Mesa at Roger & Naomi Salaman's QTH ( K0IHX & KD0PDZ ).

Neither site gave as good coverage as the Chautauqua site. A search was on for a better site.

A proposal was made to the Boulder Amateur Radio Club (BARC) to use their site and share their 70 cm antenna. The BARC 2m and 70cm FM voice repeaters were on a high mesa, south-west of the city of Boulder.

BARC agreed subject to approval from the CCARC for the move. Approval was obtained from the CCARC in Jan. 2018. The TV repeater was thus moved from Davidson Mesa to Table Mesa.

Because of lack of space for more antennas on the tower, we were forced to share the existing, 70 cm, 4 element, folded dipole, co-linear antenna with BARC.

This meant that Don, N0YE, and I had to design a custom combiner which allowed both the BARC FM repeater and our 70cm TV transmitter to share a common feed line and antenna.

For receive, we installed a Diamond X-6000 (2m/70cm/23cm) antenna on the roof, directly underneath the transmit antenna.



**Site of both the BARC 2m & 70cm FM voice repeaters and the TV repeater**

At the same time as the move to Table Mesa, BCARES informed us that they no longer wanted to be associated with the TV repeater.

Thus, henceforth, the repeater is now operating again under my own personal call sign, KH6HTV, with myself as the trustee, and Don Nelson, N0YE, as the assistant trustee. It thus no longer has any ARES affiliation.

From the TV repeater's new location, it now has even better coverage than it had at the Chautauqua Park site.

It covers a good portion of the Denver metro area, the eastern half of Boulder County, and extends out into Arapahoe, Weld and Larimer counties.

It reaches east 35 miles to the Denver International Airport and north 77 miles all the way to the Wyoming border, just south of Cheyenne.

Today (2019), almost all of the active ATV hams in Boulder are now on high-definition (1080P), digital, DVB-T, television.

There now is a very active group of about a dozen ATV hams participating in a weekly TV net which typically runs for about 1 1/2 hours every Thursday afternoon, starting at 3 pm.

The TV net uses the TV repeater and the BCARES, 2 meter FM repeater on 146.76 MHz for it's intercom frequency. Don, N0YE, is the TV net control.



## DARU - The realisation of a new Association

### Translation by Peter de Graaf, PJ4NX

The DKARS magazine published in August 2018: *"Your board has concluded that the past years have been exceptionally successful and realise that this has only been possible with the support of all radio amateurs who have committed themselves to DKARS. A group of enthusiastic people that continues to grow. Also a group of people who are usually positively critical and regularly provide the board with ideas. The foundation that has been built in recent years may be called healthy. Reason to think about the next step."*  
(img,, alt: daru\_logo src: ../Images/daru\_logo.png)

From that moment on a large group of enthusiastic fellow amateurs started to realize the next step: Establishing an Association that takes the place of the Foundation. The Foundation has successfully met a need for the past 5 years and offers the association a "flying start". That is why the Foundation was dissolved on 15 June 2019 and has stopped its activities. This gives the Association all the space it needs to realise its objectives. This is a fantastic and an important step for the future that we may be proud of.

Thanks to all employees, sponsors and all others who have contributed to DKARS!



Of course much still needs to be arranged. But we will take care of that!

The name of the new association will be:  
Dutch Amateur Radio Union (DARU)

The by-laws are almost ready.

The objectives are the same as those of the former DKARS foundation.

There is a first founding board consisting of four people:

- PA3FXB chairman
- PAØMKO vice-chairman
- PE1CHQ secretary
- PA3KYH treasurer

The BOAN (Netherlands Antenna Antenna Permit Support Service) that has functioned under the wings of DKARS for the past five years will also become part of the new association. On the website [www.iwab.nu](http://www.iwab.nu) there is a complete radio amateur course for both the N- and F license. Entirely free. Our treasurer PA3KYH has set this up over the years.

In short, DARU is completely ready to go.

It is now up to you to register as a member. That is possible via e-mail. The association can be reached via this temporary e-mail address: [2019daru@gmail.com](mailto:2019daru@gmail.com)

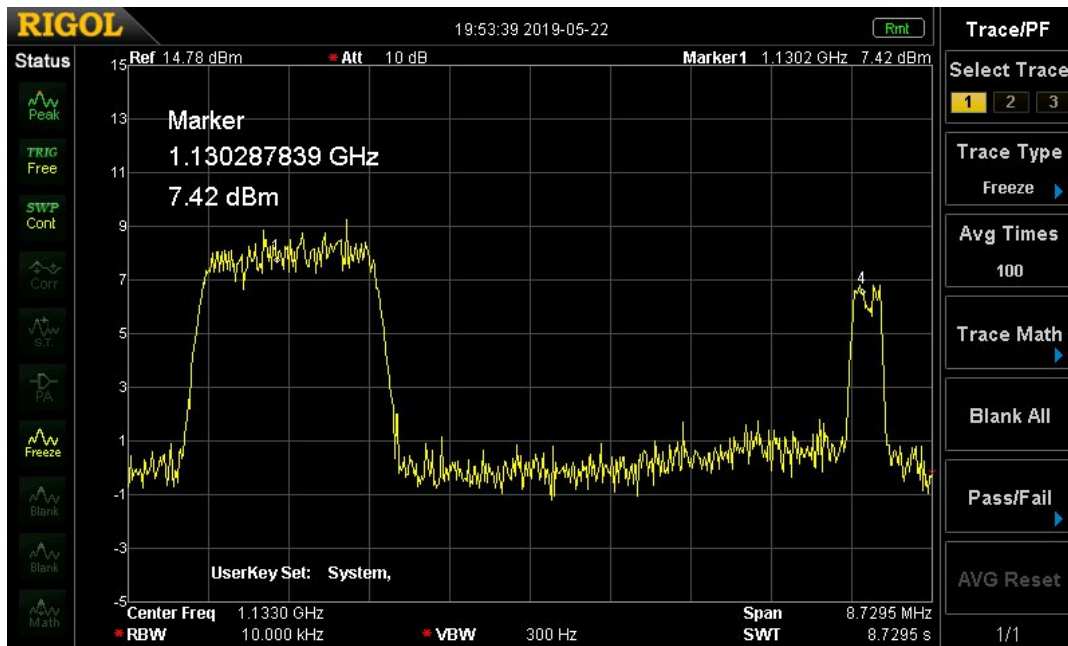
Donors from DKARS are NOT automatically members of DARU. This is not possible for privacy law/technical reasons. That is why existing donors of DKARS are also called upon to register as a member of the new DARU association. There is still much to organize, but one thing we already know, we will apply a low membership rate. You can become a member for 15 euros a year!

Naturally, within the Association there is room for enthusiastic and positive-minded fellow amateurs to work together towards our objectives. The most important of these is that we strive for one Dutch amateur radio association that actively defends the interests of the radio amateur.

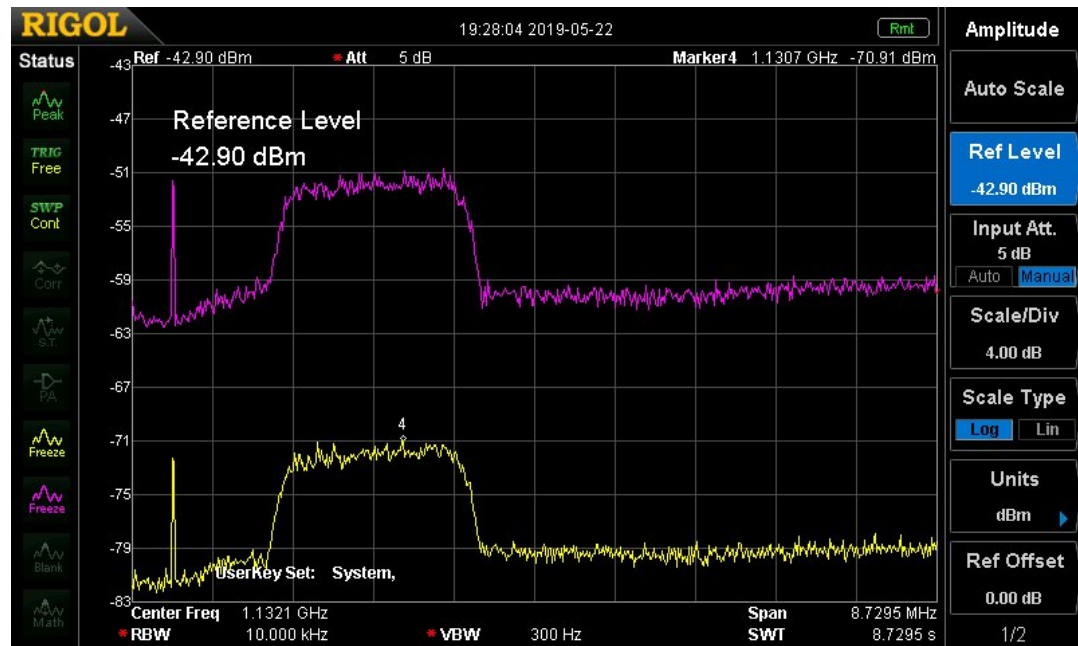
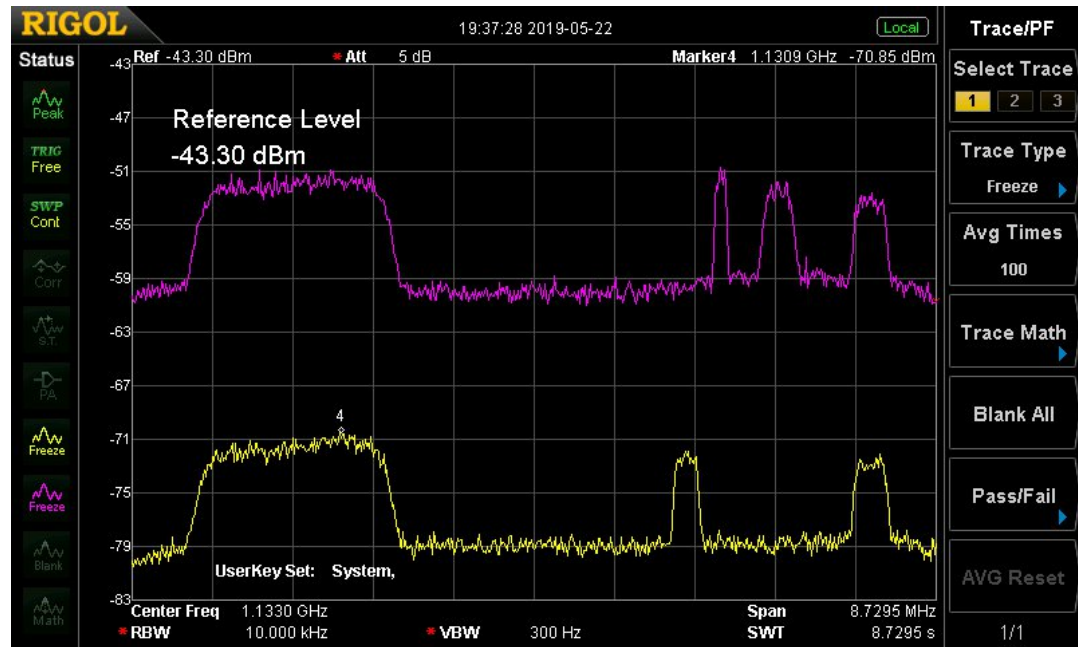
## Contest News



Our reporter did not believe he was only running 24W on a 2.2m antenna. The yellow trace (below) is without the use of LNA, it is purple with the used LNA.

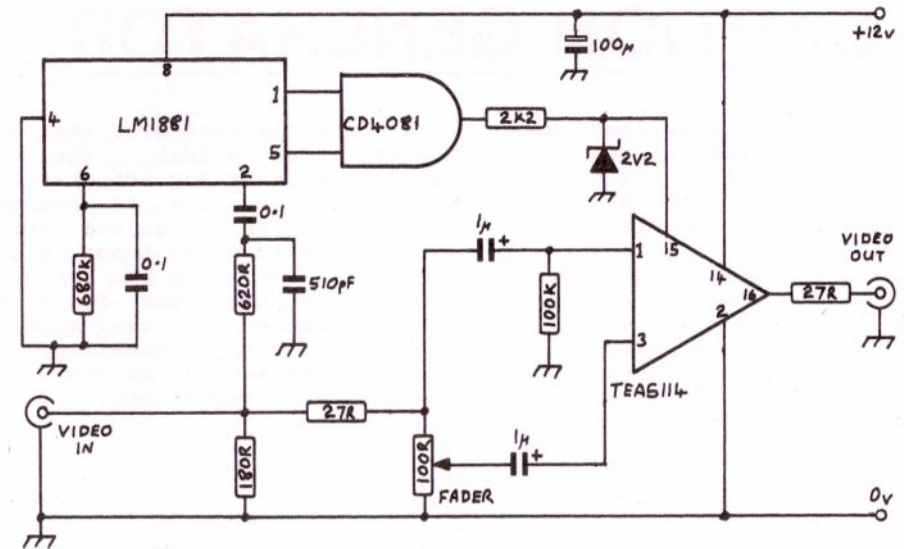


The complete VF level is raised by about 20 dB, and the signal / shaft ratio is improved only by about 1.5 dB. At reception, this is noticeable as 99% AGC level (about 66%), and on signals only on those at the border (+5 dB SNR).



**Written by Trevor Brown**

This helped isolate the required sections when copying between the two machines. Couple this with a the pause edit that always look terrible on VHS machines, but if you faded to black and then paused, cued up the player released the pause and faded up, well it looked passable.



Although I hope you never come home from work to a note and two VHS tapes that needed the above work at very little notice.

Page 23

### External links

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

But if you have a Kindle 3G then yes, but only to Amazon, and there is not a lot of ATV material on their site. Smart phone reading apps are ok providing that you have a 3G data connection.

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

### Legal Niceties *(the small print)*

E&OE. Whilst every care is taken in the production of this publication, dotMOBI accepts no legal responsibility for the advice, data and opinions expressed. dotMOBI neither endorses nor is it responsible for the content of advertisements or the activities of those advertisers. No guarantee of accuracy is implied or given for the material herein. dotMOBI expressly disclaims all liability to any person in respect of anything and in respect of the consequences of anything done or omitted to be done wholly or partly in reliance upon the whole or any part of this publication. As the regulations for the operation of radio frequency equipment vary in different countries, readers are advised to check that building or operating any piece of equipment described in dotMOBI will not contravene the rules that apply in their own country.

All copyrights and trademarks mentioned in this publication are acknowledged and no infringement of the intellectual copyright of others is intended.

### Copyright

The articles contained in this publication remain the copyright of their respective authors and NOT dotMOBI. Any reproduction of such articles must be approved by the author of that article.

### Notice to Contributors

Authors are alone responsible for the content of their articles, including factual and legal accuracy, and opinions expressed by them may not reflect the editorial stance of the publication. Material submitted to dotMOBI should not infringe the copyright of other writers or bodies. Contributions are accepted for publication on this basis alone. dotMOBI publications - <https://cq-datv.mobi>

### Author Guidelines

CQ-DATV welcomes contributions from our readers. It does not necessarily have to be on ATV, as long as it is of interest to our readers.

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

Images should be in PNG format if possible and the best quality available. Do not resize or compress images, we will do all the rework necessary to publish them.

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

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

## Coming up in CQ-DATV

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

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



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

Want to be notified when issues of CQ-DATV are published? Join our [mailing list](#).

# CQ-DATV

dotMOBI 

## Issue 74 - August 2019

<https://cq-datv.mobi>

ISSN 2059-2191