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# **Production Team**

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#### This area is getting decidely sparse.

Please consider contributing an article.

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# Editorial

Welcome to CQ-DATV 52.

Keeping a monthly magazine running is not easy. We have a readership of around 2000+, but unfortunately a much smaller contribution team. On the plus side, they work hard! If you feel there is something that would help cover the white space that the team start every month with, then please think about emailing it to *editor@cq-datv.mobi*.

Don't worry, our team is good at polishing up any copy and that includes removing typos, and working on the grammar. That's what our team do best, well some of them.

In this issue we have made a change to News. It has become **News and World Roundup**, so that we can include past events that you might have missed and perhaps want to put in your diary for next year.

Micro Corner is still running and this time it's Trevor who has been driving a small LCD display from the NODEMCU micro and finding out it's not quite as straight forward as he expected when the ESP BASIC command sends data to the wrong I2C address. Fortunately Mike G7GTN was on hand to rescue him and come up with a solution.

Richard VK4XRL has written another edition of digital world and this time he has been looking at FM TV and the microwave bands where the big boys used Klystron transmitters. However he managed to scale the kit down to something that can be home built and fit in an Eddystone box. Where would we be without Eddystone boxes?

Ken W6HCC has also produced his column, this time he has been looking at 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 1mW output. This low cost unit looks to have a big future in DATV.

We also have had a couple of comments on the letter we published in the previous issue by Rudi Pavlič S58RU, explaining how decisions are taken in the IARU and where the proposal to move the date and extend the operating window for the IARU Region 1 ATV contest came from.

The changes were requested by the RSGB, who were presumably acting on behalf of the BATC.

Trevor has also expanded on the Openshot video editing software that he introduced in the last issue and has produced an interesting short video that shows how the Star Trek Transporter works! This was a production exercise for students to attempt on a video course he ran.

We look forward to more of you beaming people out to perhaps contest sites or the like. This may be the answer to the IARU Contest in how to get people to and from the contest site in the reduced rig and de-rig window before and after the event.

Trevor has also covered how to rescue tape based recordings so they can be edited in Openshot. So let's hope this means that some of you can recover you personal archives.

So please, as we always say, sit back and enjoy CQ-DATV 52.

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

# News and World Round-up

Please note that we have changed the name of this section so that we can not only report what is coming up but also, what has happened and just might need to go in your diary for future years.

# Ken W6HHC reports on PLUTO, a new SDR education tool (Tx/Rx) from Analog Devices

I had a chance to compare 1.2GHz transmissions between the new PLUTO SDR modulator and DATV-Express modulator using the experimental PLUTO-Express v1.25p1 from G4GUO.



PLUTO-SDR transmitting on left DATV-Express transmitting on right DVB-S on 1.290 GHz with SR=2.2 MSymb/sec and FEC=1/2 both driven by PLUTO-Express software v1.25p1



PLUTO SDR on left DATV-Express on right both using DVB-S protocol with SR=2.2 MSymb/sec FEC=1/2 on 1.2 GHz



PLUTO-SDR signal on left DATV-Express signal on right DVB-S on 1.290 GHz with SR=2.2 MSymb/sec and FEC=1/2 both using v!.25p and MiniTiouner to receive/analyze

The two signals both look nicely formed and equal on the spectrum analyser. But the modulation constellation for the PLUTO looks tighter and the MER also is slightly better than for DATV-Express board (32dB vs 27dB) on the MiniTiouner analyser.

Not sure if I have done something wrong with DATV-Express board hook-up since I normally show MER=30dB? Maybe the slightly wider RF bandwidth of 3MHz at SR=2.2MSymb/s produced a change?

I also discovered that the unused PLUTO Rx antenna makes a perfect antenna for the MiniTiouner when sending the signals across the table in my software lab.

#### 73...de Ken W6HHC

# **OpenShot 2.4.0 Released - Improved Stability & More!**

The latest and greatest version of OpenShot Video Editor (version 2.4.0) has been officially released, and I'm proud to bring you all the details! This is a stability-focused release, and much of the effort was "behind-the-scenes" type work. Vastly improved stability, improved undo/redo history (now being saved inside each project file), new freeze and zoom menu, updated translations, and many bug fixes!

I have spent the past few months working along side a few other brave developers (huge thanks to Craig and Peter), determined to solve a very difficult stability issue, which is the leading cause of crashes in the OpenShot 2.x source code.

The challenge was to isolate the crash, and find a way to reliably reproduce the crash in our development environments. This proved very difficult, and often we could run hours and hours of test code before a crash would happen. And of course, debuggers and analysis tools would slow the code down, and reduce the likelihood of a crash even more, often preventing the crash completely.

For those who want more technical details on the crash, please keep reading. The crash was a race condition and memory corruption bug, caused by a few different things.

We process video and audio data in a thread pool, and sometimes things happen in a very unpredictable order. In a very rare condition, memory was being cleared while it was still being accessed.

Also, we switched from an older tr1::shared\_ptr to std::shared\_ptr, and changed the way we initialize our shared\_ptr instances, reducing the amount of memory being requested. Also, there were a few spots that needed to be protected between threads, and required locks.

So, in summary, a handful of small changes, and a few months of debugging, and we can no longer crash libopenshot during video processing or video encoding! I'm very excited about solving this one if you can't tell! Here is the full list of improvements:

#### openshot-qt (Video Editor)

- Improving undo/redo support. Now the last X number of undo/redo actions are stored in the project file. The number can be adjusted in the prefences, under the auto-save tab. This also vastly improves the usefulness of the auto-save system, since it saves your undo/redo history as well.
- Fixed Image Sequence exporting. Supports PNG, JPG, PPM, BMP and a few others. Also added 'Audio Only' and 'Video Only' export options.
- Adding new Freeze and Freeze & Zoom presets, to quickly insert freezes into clips.
- *Removing 'show waveform' from separate audio menu, to increase speed of separating audio.*
- Protect file menu from invalid file\_id.
- Protect timeline dropEvent from empty item\_id.
- Cloaking timeline body until Angular loads fully (so we don't see the occasional pop-in debug layout).
- Updating translations and supporters.

Bumping version to 2.4.0 (minimum libopenshot version 0.1.8).

### libopenshot (Video Library)

- Prevent crashes related to too many threads (on 24+ thread systems).
- Migrating tr1 to std, adding C++11 support to build scripts, fixing crash in FFmpegReader (caused by shared\_ptr, buffer, and last\_video\_frame corruption). Much improved stability with this change. Thanks to Craig and Peter for the help!
- Fixing crash on Ubuntu build server.
- Fixed a strange bug related to exporting image sequences.

The filename property was not being set on the AVFormatContext. Also fixed a bug when exporting to JPEG image sequences related to max\_b\_frames and certain codecs.

- Fixing issue with incorrect image size caches, which results in blurry/smudgy scaling on certain things.
- Fix issue with loading time curves that are never processed (i.e. have no values)
- Adding additional locks when adding/changing audio data. Reducing FrameMapper to a single frame at a time.
- Fixing crash on Time keyframes where it would sometimes calculate an invalid frame number.
- Fixing audio pops when stacking multiple clips with different offsets (pretty big issue for some people, just depending on your source framerates and position/start of clips).
- Removing nested OMP processing from FrameMapper. Adding lock inside time mapping (to prevent crashes when speeding up/slowing down clips). Adding omp critial lock to Frame GetAudioChannelsCount() and GetAudioSamplesCount() methods.
- Bumping version to 0.1.8 (SO version 13).

If you have had stability issues in the past with OpenShot 2.x, please give this latest version a try.

Also, a big thanks to all the users, contributors, translators, and supporters that give life to this project! I could not do it on my own, and I am humbled that so many people find OpenShot useful.

If you want to get involved with our project, please shoot me an email: *jonathan@openshot.org*. I am always happy to onboard new contributors and help them find something to help out with. Or if you would rather show your appreciation with a small donation, that would also be great! Linux (64-bit AppImage) AppImage requires no installation. Just download, make executable, and run.

(For more information on OpenShot, see Trevor's article in issue 51 and later in this issue - ED)

## JARL 2017 the Tokyo Hamfair



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At this point there is an opening for a CQ-DATV correspondent in Japan to report on events. So sorry we do not know what ATV activity there was, if any, at JARL and only have web pictures for you. But JARL is definitely on our radar for future events. Our thanks to Rudi S58RU for drawing our attention to this.



**JARL 2017** 

## **Annual ATV QSO party**



Another event which seems to have developed stealth technology and successfully made it under the CQ-DATV radar was the Annual ATV QSO party although Richard VK4XRL did send in a screen shot.

And the comment that it all went well, perhaps if we had published some information in advance it would have done even better, must bring it up at the editorial team annual performance review.

# **CAT 17**

Cat 17 also seemed to have been well attended and the lecture programme was streamed so that those of us not there in person could benefit from the lectures, if not the tea and coffee.





Dave Crump G8GKQ in full flow at CAT 17 (pay attention he may ask questions later)

#### **AMSAT-UK Colloquium**



#### Kents Hill Park Conference Centre Milton Keynes

One that did not escape is the AMSAT-UK Colloquium which will be October 14-15, this year it will be incorporated into the RSGB Convention at the Kents Hill Park Conference Centre, Timbold Drive, Milton Keynes, MK7 6BZ.

In previous years the lecture programme was streamed live, but in later years this seems to have fallen by the wayside, personally I blame the Romulans and their cloaking device for the loss of what along with the Microwave round table lectures, was without doubt the best TV streamed on the internet.

How to find us: http://kentshillpark.com/how-to-find-us

## **BATC CAT17 presentaion videos are online**

Last weekend the BATC CAT17 ATV Convention was held. The good people at BATC have now posted videos from most of the technical sessions on YouTube.

The sessions currently available are:

- Portsdown Project update
- DigiTwist satellite tracker
- 10 GHz DATV
- ADALM-PLUTO for DATV
- G4GUO PLUTO Q+A session
- DATV filters and amplifiers
- 5 7 GHz PLUTO amplifiers
- E'Shailsat update
- Optical Communications

These sessions can be watched on YouTube at *https://www.youtube.com/channel/UCUWLnUZllytlcCFd93tnB zw* 



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

## LimeSDR Mini

An open, full-duplex, USB stick radio for femtocells and more.



The LimeSDR Mini development board is a hardware platform for developing and prototyping high-performance and logicintensive digital and RF designs that use Altera's MAX 10 FPGA and Lime Microsystems' LMS7002M RF transceiver.

- RF transceiver: Lime Microsystems LMS7002M
- FPGA: Altera MAX 10 (10M16SAU169C8G)
- 169-pin FBGA package
- 169-pin FBGA package
- 16 K Les
- 549 KB M9K memory
- 2,368 KB user flash memory
- 4 x fractional phase locked loops (PLLs)
- 45 x 18x18-bit multipliers
- 130 x general purpose input/output (GPIO)
- Single supply voltage
- Flash feature
- FPGA configuration via JTAG
- EEPROM memory: 2 x 128 KB for RF transciever MCU firmware and data
- Flash memory: 1 x 4 MB flash memory for data

- General user inputs/outputs:
- 2 x dual color (red + green) LED
- 8 x FPGA GPIO pinheader (3.3 V)
- Connectivity:
- USB 3.0 Type-A (FTDI FT601 controller)
- Coaxial RF (SMA) connectors
- FPGA GPIO headers
- FPGA JTAG connector
- Clock system:
- 30.72 MHz onboard VCTCXO
- Possibility to tune VCTCXO with onboard DAC
- Board dimensions: 69 mm x 31.4 mm



#### **Block Diagram**

**Source** *https://www.crowdsupply.com/lime-micro/limesdr-mini* 

## **The 39th National Balloon Fox Hunt**

This year marks the 39th Dutch Balloon Fox Hunt, The scheduled launch was September the 10th and as is customary it is the second Sunday in September.

The balloon itself is stratospheric balloon which usually reaches a height of 30+ kilometres and has an estimated flight time of between 1 1/2 to 2 1/2 hours. The launch site is closely guarded secret, but it's a good guess it was somewhere in Holland.

There is a prize ceremony at the landing site for those that can find it and the event was streamed live on the internet.

Last Year the Balloon was equipped with 13cms ATV, this year it was changed to 23cms (1252)

#### Randy Ten Have, PH4X

Something else that needs to go into the CQ-DATV diary for 2018.





The 'command centre' in Hilversum (Photo PE1PTP)

# Jamboree on the Air (JOTA) and Jamboree on the Internet (JOTI)



The JOTA and JOTI are real jamborees during which Scouting experiences are exchanged and ideas shared. They happen over the third weekend in October each year and are worldwide events.

# 60th Jamboree on the Air (JOTA), 20 - 22 October 2017.

The Jamboree on the Air is an annual event in which half a million Scouts and Guides all over the world make contact with each other by means of amateur radio. Short-wave radio signals carry their voices to virtually any corner of the world.

The use of amateur radio means that many Scouts get the opportunity to discover the skills of wireless radio techniques and electronics. JOTA is also the only event that offers each individual Scout the opportunity to speak to other Scouts across the world.

You can register to take part or find out more information by emailing *jota@scouts.org.uk* 

# 21st Jamboree on the Internet (JOTI), 20 -22 October 2017

Jamboree on the Internet connects Scouts across the world in a similar way to JOTA, but using the internet. Volunteer organisations like Scoutlink and Scoutnet provide the necessary technical support and server capacity.

For more information about JOTA-JOTI please visit the WOSM Event page.

Please follow the UK JOTA-JOTI Facebook page for information about the event in the UK or email *joti@scouts.org.uk*.

Participate in JOTA-JOTI with Scout Adventures To find out about opportunities to participate in JOTA-JOTI with Scout Adventure Centres, go to *jotajoti.scouts.org.uk* 

# <complex-block>

Friday, October 20th, 2017 @ 7:00 PM Room opens 6 PM for Registration and Inspection

> Held at... American Red Cross 600 Parkcenter Drive, Santa Ana, CA Second Floor Rm #208

#### **Auction Rules**

The room will open at 6:00 PM to allow registration, set-up and viewing. All buyers and sellers are welcome. The following rules for the 2017 OCARC auction will be in effect:

- 1. Only Ham radio or electronic equipment / items will be allowed,
- 2. You must register prior to or at the auction site the day of the auction when doors open. Registration is Free\*.
- 3. Sellers should number each item in their lot. A tag should indicate the minimum bid they expect.
- 4. Only 3 items from a Sellers lot will be auctioned during each turn adn then the auctioneer will move on to the next lot. Once the other lots lot have been offered the auctioneer will start the second round of auctioning with the next 3 items in Lot #1.
- 5. Auction bidding will take place as follows:
- (a) \$0.00-to-\$5.00 bidding will take place in \$0.50 increments.
- (b) Over-\$5.00-to-\$50.00 bidding will take place in \$1.00 increments.
- (c) Over-\$50.00-to-\$100.00 bidding will take place in \$5.00 increments.
- (d) Over-\$100.00 bidding will be in \$10.00 increments.
- 6. Rules 4 and 5 may be changed at the auctioneer's discretion to expedite the auction.
- Payments for purchased items are due at the end of the auction and shall be by cash or check with the appropriate ID. No twoparty checks or credit cards are allowed. Disbursements to the Sellers will be by OCARC check, only.
- \*Sellers will be charged 10% of the selling price for items sold by OCARC. A special table will be set up for items donated to the OCARC. Proceeds from the sale of donated items will go into OCARC operational funds.

For more information go to www.w6ze.org

# Correction

**Unfortunately, an error crept into the article** Modified PA with MRF6VP3450H (470-860MHz) to 436MHz, by Patrick Tilborghs ON1BTE **in the pdf version of issue 51.** 

The spectrum analyser passband picture on page 30 is not the correct one! The correct one is shown below:-



Date: 5.AUG.2017 09:13:35

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



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## Micro Corner

#### **By Trevor Brown**

In this issue I would like to look at the small LCD displays based on the Hitachi HD44780 chipsets and how to drive one via the I2C bus, using the ESP8266 module which has been flashed with BASIC and put into Station Mode as per the previous micro corner article in CQ-DATV 43. This is available in the CQ-DATV library *http://cq-datv.mobi/ebooks.php* 



**LCD Display** 

The displays are shipped without the I2C sub board, but it is an easy solder connection and sits on the rear of the LCD display.



#### Rear of LCD Display with the I2C board mounted

Once in place its only requires 4 connections to the micro +5V and GND and the I2C bus SDA and SCL to D3 and D4 of the Node MCU.

**PIN DEFINITION** 



D0(GPI016) can only be used as gpio read/write, no interrupt supported, no pwm/i2c/ow supported.

**ESP 8266 Pin Connections** 

The display unit requires +5V and ground connections, I stole my +5V from the vin bottom right, but check you have +5Von this pin first (I did). It is, after all, an input and the ground pin is adjacent.

The SDA is shown as D3 and the SCL is shown as D4. These two connections are referred to as the I2C bus and in an ideal world require pull up resistors to the +5V supply. Luckily these are already included on our small daughter board.

On power up it should light up blue (if not try the brightness pot on the rear).

My ESP 8266 came up on my browser as 192.168.0.24. So I can control it from the PC keyboard in Station Mode - again see CQ-DATV 43 for details of how to do this.

The first problem was the I2C address, which can be changed by grounding the A0 A1 A2. But with these pins open circuit I ran the I2C address scanner programme.

### **ESP BASIC I2C Scanner Programme**

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

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

## PCF8574 and PCF8574A I<sup>2</sup>C-Bus Slave Address Map

| 1  | NPUTS | ;  | PCF8574 I <sup>2</sup> C-Bus      | PCF8574A I <sup>2</sup> C-Bus |  |  |
|----|-------|----|-----------------------------------|-------------------------------|--|--|
| A2 | A1    | A0 | Slave Address                     | Slave Address                 |  |  |
| L  | L     | L  | 20 (hexadecimal) 38 (hexadecimal) |                               |  |  |
| L  | L     | Н  | 21 (hexadecimal)                  | 39 (hexadecimal)              |  |  |
| L  | Н     | L  | 22 (hexadecimal) 3A (hexadecimal) |                               |  |  |
| L  | Н     | Н  | 23 (hexadecimal) 3B (hexadecimal) |                               |  |  |
| Н  | L     | L  | 24 (hexadecimal) 3C (hexadecimal) |                               |  |  |
| Н  | L     | Н  | 25 (hexadecimal) 3D (hexadecimal  |                               |  |  |
| Н  | Н     | L  | 26 (hexadecimal) 3E (hexadecimal) |                               |  |  |
| Н  | Н     | Н  | 27 (hexadecimal) 3F (hexadecimal) |                               |  |  |

#### Address Allocation for I2C LCD Display

and it came up with 3F hex or 63 decimal, but it proved I had the I2C connected and working. It also revealed another problem that was later on to bite me.

63 is 3F in hex - just BASIC is written in decimal. The problem is the EPS BASIC command for Print to LCD has an address hard coded into the command. This is not good practice! Everything in BASIC is usually declared or equated and the Print to LCD command expects 27 hex i.e. 39 decimal.

That would be delivered and work if the I2C module used the PCF 8574 chip. Mine has a PCF 8574A so it sits at 63 or 3F. There is no way to send the Print LCD commands to the display in ESP BASIC other than to 27 hex or 39 in decimal as the chart shows, so you may have guessed it, I could not write to the LCD display.

This was a difficult to diagnose problem as the I2C commands are just like snail mail - only going to the wrong house and there is no way to know where the BASIC commands are sending the data and no report back.

That's why the scanner programme is so useful. Sometimes you long to be back in assembler, but then again we have to learn to move on and use higher level languages and well the B in BASIC stands for beginners, (Beginners All-purpose Symbolic Instruction Code) (Beginners Awfully Slow Idiot Code - ED).

Yes, it dates back to the 70's and the Spectrum, BBC and many other home computers. Even the early PC's had a resident BASIC. It fell into disrepute because every home computer had a different dialect and the programmes were not platform independent. Also magazines were all paper based so there was no cut and paste the text into your computer. It was nights of copy typing software from computer magazines of which there were many.

There are more complex languages out there and we need to start getting to grips with them, but this is not a bad place to learn and the instruction manual is on Google documents.

I was rescued by Mike G7GTN who took the BASIC apart (a task well above my pay grade) and confirmed my suspicion, that my mail was going to the wrong house. Mike changed the BASIC command and emailed a new BASIC to me along with the Flash software (both are on the CQ-DATV download site) and everything started to work. My mail had successfully been redirected.

The programme used could not be more simple and is:-

Icdcls 'clear screen Lcdprint "CQ-DATV 52",1,0 'print to top row Lcdprint "I2C LCD screens",1,1 'Print to bottom row end

NB text after the ' eg clear screen is not required it is just a comment to help you navigate the programme.

You need the inverted commas (quote marks) which was another stumbling block (they are not shown in the BASIC instruction set).

Followed by the Row number 0 and the column start address and you are in business. Here we are using a 16X2 display



16X2 LCD display

To re-flash the EPS 8266 load the flasher software from the CQ-DATV site. When you run the file it should look like

| R NODEMCU FIRMW | ARE PROGRAM | IMER       |                   | 000   |
|-----------------|-------------|------------|-------------------|-------|
| Operation       | Config      | Advanced   | About Log         |       |
| COM Port        | COM8        |            | Flash( <u>F</u> ) |       |
|                 | AP MA       | AC Waiting | MAC               |       |
|                 | STA MA      | C Waiting  | MAC               |       |
| NODEMCU TI      | AM          |            | L and             | Ready |
| The             | e EPS B     | ASIC Flash | ner config screen |       |

| R NODEMCU FIRMWARE PROGRAMMER                |    | 0       | 0    |
|--|----|---------|------|
| Operation Config Advanced About Lo           | bg |         |      |
| C:\Users\Trevor\Downloads\Desktop\CQ-DATV\CQ | Ö  | 0x00000 |      |
| Path of binary file                          | Ö  | Offset  |      |
| Path of binary file                          | Ó  | Offset  | -    |
| Path of binary file                          | 0  | Offset  |      |
| Path of binary file                          | Ő  | Offset  |      |
| Path of binary file                          | Ô  | Offset  |      |
| Path of binary file 👻                        | 0  | Offset  |      |
|  |    |         |      |
| NODEMCU TEAM                                 |    | R       | eady |

#### **Config screen**

select the config tab and use the cog wheel to navigate to the new BASIC (you might have stored it in a different location to me) once set, back to the opening screen and press the flash button. It will only take a few seconds and then you are ready to go.

Mike also added some extra LCD commands for the 16X2 display. Only one display can be connected at a time as they share the same I2C address (0x3F) Decimal 63

Icdaddr27 Will set LCD I2C PCF8574 Address to (0x27) hex. Icdaddr3f Will set LCD I2C PCF8574A Address to (0x3F) hex. (The value is saved to Eeprom and requires a power re-start.) Icdbltest Will test backlight control. Backlight will flash 5 times Icdblink 0 = Blinking cursor off Icdblink 1 = No Blinking cursor on Icdkill 0 = LCD / backlight off cdkill 1 = LCD / backlight on Icdtest Will shows characters from A-Z (Takes approximately 15 seconds to complete.) Icdtest20 As above but for a (20X4) display Icdversion Displays running basic version number

So I am happy bunny! I can continue my EPS BASIC learning curve. I am sure there are other problems to overcome, but I hope this article,together with CQ-DATV 43 article, puts you on the same learning curve using this very inexpensive hardware.

# **Useful Links**

#### **BASIC Manual**

https://docs.google.com/document/d/1EiYugfu12X2\_pmfmu2 019CcLX0ALgLM4r2YxKYyJon8/pub

#### **ESP BASIC Download**

http://www.esp8266basic.com/

#### **ESP BASIC Source**

https://github.com/esp8266/Basic/tree/NewWebSockets

There are lots of ads for the EPS 8266 module

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

But shop around and be prepared for delays from China.

The same for the display and LCD unit

https://www.amazon.com/SunFounder-Serial-Module-Display-Arduino/dp/B01E6N19YC/ref=sr\_1\_1?ie=UTF8&qid=1504910 423&sr=8-1-spons&keywords=lcd+display&psc=1

# Digital World - Looking at 10 GHz ATV

#### **By Richard Carden - VK4XRL**

In the beginning....

My interest in the higher frequencies started after I had finished my training and was placed in the OB links area.

The link equipment was Raytheon Klystron units which were low power but we had some 8 feet dishes which we used in those early days to provide link repeaters between Sydney and Melbourne and vice versa.

The first 10 GHz units that I experimented on were the old Gunnplexer units, these worked fine for FM.





Further reading can be found in the ARRL publications such as `UHF/MICROWAVE Experimenter's Manual as well as on the internet and such units can be found at ham boot sales etc.

#### http://www.hamtv.com/pdffiles/GunnplexATV.pdf

and

#### http://www.n5dux.com/ham/files/pdf/Gunnplexer%20Cookbo ok.pdf

The other most popular method is DRO's (Dielectric Resonator's.) Further information can be found here:

http://www.exxelia.com/uploads/PDF/59bacbb686c60.pdf



**Stump Camera 10GHz TX from Mitec** 

Higher power units giving around +26ddm output were also made and these could be converted to 10 GHz quite easily. (See photos below)





The only problem with these units was that no pre-emphasis was provided, however I added a small board as shown in the diagram which provided gain and pre-emphasis and was then feed into video DRO transmitter which of course was FM.







Later on to improve on the situation I opted for a x4 multiplier from Roberto (DGOVE) which had a 13cm signal FM feeding into it from an FM TX unit from Mini-Kits *http://www.minikits.com.au/* 



Now to receive the output at 10 GHz, I used an old Plessey Low Noise Converter which was used for the old B-Mac satellite system. This had a LO of 11300 MHz so I needed to change this and after some calculations I set it to 11.435 GHz which was no problem in resetting the LO DRO unit. The only other requirement was the internal filter, the photos show three approaches to this and either way works.





To set the LO frequency I used a splitter from the LNC feeding the SA and digital receiver, the IF was then set to 1165 MHz using the LO tuning screw.







I am now looking at a Low Noise Converter from Roberto (DGOVE)



This photo was taken at the 2000 Olympic Games in Sydney showing a dual system from Mitec which I built during my employment there

So the next step was to try digital. I had a spare SR-System digital system which I used setting it to 1270 MHz, a SR of 4000 and FEC <sup>3</sup>/<sub>4</sub>. This again used from Roberto an up-converter with a LO of 9200 MHz which in turn supplied the output signal via a 500mw 10 GHz amplifier at an output frequency of 10.27 GHz.

When I saw the PortsDown TX unit I thought that would be a good idea as a digital input for 10 GHz. As I wasn't interested in the lower SR or 70cm frequencies I reprogrammed the touch screen to give me a range of frequencies and SR values that I needed.

Also this was never going to work as a unit into our local repeater because of certain features (these maybe updated in time), so the 10 GHz approach was a good move especially as I write this the audio has been added as has MPEG2, just now need MPEG4 with audio.

The 10 GHz Digital approach has been a good project and especially more so if the repeater has that receive facility. So what has been your approach?

Feel free to contact the editor with your story thereby helping others in pursuing the wonders off DATV.

| hz/23cm  | Digital S | Setup   |    |          |         |                        |          |     |
|----------|-----------|---------|----|----------|---------|------------------------|----------|-----|
|          | Transm    | itter   |    |          | Receive | r - LNB (              | 11435)   |     |
| O/P Freq | IF Freq   | LO Freq |    | l/P Freq | IF Freq | LO Freq                | Humax Rx |     |
| 10210    | 1210      | 9000    |    | 10210    | 1225    | 11435                  | 12660    |     |
| 10270    | 1270      | 9000    |    | 10270    | 1165    | 11435                  | 12600    |     |
| 10330    | 1330      | 9000    | 4/ | 10330    | 1105    | 11435                  | 12540    |     |
| 10430    | 1430      | 9000    |    | 10430    | 1005    | 11435                  | 12440    |     |
| 10350    | 1350      | 9000    |    | 10350    | 1085    | 11435                  | 12520    |     |
|          |           |         |    |          | Receive | r - INB ( <sup>e</sup> | 9200)    |     |
|          |           |         |    | l/P Freq | IF Freq | LO Freq                | Humax Rx |     |
|          |           |         |    | 10210    | 1010    | 9200                   | 10210    |     |
|          |           |         |    | 10270    | 1070    | 9200                   | 10270    |     |
|          |           |         |    | 10330    | 1130    | 9200                   | 10330    |     |
|          |           |         |    | 10430    | 1230    | 9200                   | 10430    |     |
|          |           |         |    | 10350    | 1150    | 9200                   | 10350    |     |
|          |           |         |    |          |         |                        |          |     |
|          |           |         |    |          | 23cm R  | eceiver -              | LNB (113 | 00) |
|          |           |         |    | l/P Freq | IF Freq | LO Freq                | Humax Rx |     |
|          |           |         |    | 1286     | 1286    | 11300                  | 12586    |     |
|          |           |         |    | 1287     | 1287    | 11300                  | 12587    |     |
|          |           |         |    | 1283     | 1283    | 11300                  | 12583    |     |
|          |           |         |    | 1250     | 1250    | 11300                  | 12550    |     |
|          |           |         |    |          |         | 11300                  |          |     |





# DATV-Express Project - August update report

#### By Ken W6HHC

Charles G4GUO has been working with a new SDR board called the ADALM-PLUTO from Analog Devices. This USB2based unit is full-duplex Tx/Rx and 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

G4GUO has released an experimental version of PLUTO-Express software, v1.25p1, that is based on the DATV-Express software. The software can be downloaded from

# https://www.dropbox.com/s/8oi6x1xpnt1dwwr/setup\_datvex press\_transmitter1.25p1.zip?dl=0

A nice feature that Charles has/will include is to add a Hardware-Abstraction-Layer to his software. This will allow the DATV-Express software on Windows to drive either:

- PLUTO board (Tx/Rx)
- LimeSDR board (Tx/Rx)
- classic DATV-Express modulator board (Tx only)

Ken W6HHC was able to purchase an "introductory" PLUTO unit from DigiKey-USA and has it running on Win10 with the experimental PLUTO-Express v1.25p1.



#### PLUTO Tx/Rx SDR unit from Analog Devices being run by G4GUO's PLUTO-Express software at 1.290 GHz DVB-S. (NOTE – the DATV-Express board is not powered up in photo.)

The only bad news is that DigiKey-USA and DigiKey-UK have currently run out of stock (as of 2017-08-31) on these ADALM-PLUTO SDR units.

Art WA8RMC reports there are only three DATV-Express boards left in inventory. Art WA8RMC also continues to "hack away" and electrically re-designing for a smaller/cheaper PCBA for the MiniTiouner V2 designed by Jean Pierre F6DZP. So far, Art has finished a finalized-draft schematic in AutoCAD and turned the design 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 around USD75-to-80+shipping (+VAT where applicable).

Ken W6HHC reports that he has released an updated version 12 of the USERS GUIDE for Windows with v1.25 software. The minor changes include some:

• Includes some new useful notes provided by Charles G4GUO on how the video formats selections work in Section 4.2.3 -VIDEO - Device Formats field

• A new Section 5.6 has been added to acknowledge that the DATV-Express board can be used as the modulator board with the BATC Portsdown Project software running on a Raspberry Pi -3.

Good news – Hiroshi JA1SYK reported back to the Project Team that he confirmed the changes in v1.25 now allows the software to work better for selecting cameras with Windows OS for Japan. The latest DATV-Express Users Guide for Windows can be downloaded from the *www.DATV-Express.com* web site.

G4GUO reports that he is working on a CAT17 presentation about using the PLUTO SDR board. The presentation will be pre-recorded for the BATC conference that is scheduled for September 9 and 10. Hopefully the BATC will provide for the video to be watchable afterwards for viewers who can not physically make the journey to the conference.

"Project speed set to slow" .... de Ken W6HHC



#### Digital Amateur TeleVision Exciter/Transmitter



Now available from

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- A more affordable DATV exciter can now be ordered
- Fully assembled and tested PCBA
- DVB-S protocol and DVB-S2 protocol for DATV tramsmissions
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- 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

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

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# IARU again



JARU International Amateur Radio Union Working for the future of amateur radio

In reply to the article in the previous issue by Rudi Pavlič S58RU, we have received the following:-

Dear Rudi,

Thank you for your letter.

One major misunderstanding is the way decisions are taken within the IARU.

Your country is also member of the IARU so they could also bring in proposals to the meeting and they could also discuss the proposal in advance in the IARU wiki.

The Netherlands brought a proposal to make the rules more easy and transparent to Vienna. There it was rejected because of the RSGB, they wanted to have an other date and longer time period (for portable stations) and to have remote controlled stations included.

The alternatives for the date and duration was negotiated in the wiki and everything was adjusted to a new proposal that was brought to all IARU members (including your country) to be voted for in Varna.

The IARU members voted in favour of the new proposal. So it are the members that decide, not the IARU board or so. That is democracy. If you want to know what your country voted for this proposal in Varna, you could ask them. I do not know if you are a member of an IARU section. If you are, you could contact your VHF manager and make a proposal for changes. For the coming meeting it is not possible, the next meeting in Vienna will be in 2019. So the coming years it is not possible to have it changed. Not because I want it but because this is the way the IARU is organised by its members. So you could be disappointed about these rules but you could also accept it the way it is at this moment, or do not join and leave it this way. No hard feelings.

Since Varna the rules are in the VHF-managers handbook and it is communicated to all VHF-managers about this (and the log to be used, that contains also the email address) so if it is not communicated in your country it is a pity. Also in CQ-DATV and other magazines (and we corresponded about this before) are the rules and the logsheets communicated.

Last thing I have to say about this: I do not know if "a thorn in the flesh of the IARU organization" is good or bad. At least we show ATV is something to take into account! Many more stations and countries participated in a relaxed way.

#### Best regards, Chris PA3CRX

#### Dear Editor

I read Rudi S58RU's letter about contest timings with interest, and would welcome the opportunity to state my views as the BATC Contest Manager.

One of the roles of the British Amateur Television Club is to represent UK ATV operators at the IARU, and we do this through providing position papers and briefings to the UK representatives. We have a close relationship with our Dutch colleagues, and it was I who suggested to them that the contest timings be extended after the success of our National contests which run for the longer period. This was discussed at the IARU conference and well supported. I am not aware of what the Slovenian representative's position on the change was.

Given that the UK's highest-scoring entry for the past 2 years has been a single-operator portable station who scored points on all bands from 430 MHz to 24 GHz, I do not accept Rudi's point about the end time not leaving enough time to de-rig everything and pack the car whilst remaining competitive.

Additionally, since moving the contest from September to June, UK activity levels have risen from less than 5 stations to over 20 stations active during the contest.

So, in the UK, the timing and date changes have had an overwhelmingly positive effect, and I look forward to a further increase in participation for the June 2018 IARU contest which will be organised by the BATC.

Perhaps Rudi would like to discuss an alternative proposal with his national representative to the IARU.

**Dave G8GKQ** 

#### **BATC Contest Manager**



# 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...





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

# **Openshot Video Editor - Part 2**

#### **By Trevor Brown G8CJS**

In CQ-DATV 51, which is available from the CQ-DATV Library *http://cq-datv.mobi/ebooks.php*, I introduced the Openshot editing software (free download) and some very simple cut editing with the odd dissolve that could be rendered up into a single video. This free software should open the door for anyone with a creative idea..

A while back I shot a clip for a course on video editing to be delivered to an audience of scuba divers, not to dazzle, but as a classroom exercise that they could film on a simple camera and edit up as a practical exercise. I wanted something that could not be produced without editing, but also something that could be filmed and edited with a few simple shots and that required relatively simple video editing.

I will let you be the judge if my idea worked or not. It caused endless amusement and probably proved the old adage that we learn from our mistakes and not from our successes. My thanks goes to all the scuba divers that took part in the original filming.

https://www.youtube.com/watch?v=PxPXmfqZLik&feature=y outu.be

The camera was an old inexpensive Canon S95 that records video onto an SD card, so it was a relatively simple process to drag and drop the files onto the Openshot time line. The sound effect probably makes it work and it again is a free download

http://www.mediacollege.com/downloads/sound-effects/startrek/tos/

I am sure there is lot of fun to be had replicating this shoot and customising the idea to something that probably better suits your own ends. I also promised in the last issue to show you how it is possible to edit earlier video tape formats. These fall into two camps, analogue and digital.

Let's look at digital first. The most common was miniDV, that recorded onto small tapes.

Computer NLE (**N**on Linear Editing) editing was starting to appear at the time this format was emerging and to enable simple video capture, the camcorders had a Firewire or IEEE 1394 connection. This enabled the digital data on the tape to be transferred to a PC.

At the time there was support available including via windows, time moves on but still the tapes turn up. I have to confess to having a draw full, most of them are early AMSAT lectures, that were more of a rescue than a creative edit.

These files can be edited in Openshot, but you need to get the material from tape to hard drive in a world where most of the required capture software has moved on.

There is still however software around if you know where to look and one such programme called Scenalyzer Live V4 is still on the net. The software seems to have long ago been abandoned and there is an explanation about it not being suitable for HD and not worth the effort to upgrade...just follow *http://scenalyzer.com*. It comes with a full manual in PDF format so I won't go into detail here. It's friendly intuitive software that just requires you to select the camcorder from the drop down, select where you want to save the video.

I use a second V drive in my computer reserved just for storing video files. But I have a lot of video files and at one time I was editing for a living and saving clients rushes for up to 12 months. So I used removable hard drives as my archive system. I had 10 on the shelf at one time.



Scenalyzer Opening screen

The software is old and probably pre-dates Windows 10 or Windows 8. I have windows 7 and it worked a treat with no dropped frames. You will see from the picture it displays the first frame of each clip.

So with just an old mini DV camcorder a Firewire lead, these tapes are recoverable. You will need a PC with a Firewire input or a Firewire card, the cards are still plentiful on eBay and cost less than £10 or GB pounds.

Slightly more complex is capturing the analogue formats VHS and even Betamax. You obviously need the machine and they are getting rare. I have a mini DV standalone recorder for DV tapes and the larger more professional tapes (DVcam). It has those dreaded yellow white and red phono plugs for an input and also scart.

If I need to capture an old tape I just plug the VHS machine output into its input and play the video through the machine and onto the PC...yes I have a VHS deck, but the Betamax and Video 8 decks are long gone, so please don't ask. There are video capture cards around if you do not have the luxury of a DV recorder in the shack. It was serious money not too long ago but I have recovered this several times over and these machines still turn up on eBay at more affordable prices.

One last word on Openshot. Since the last issue Openshot have released version 2.4.0 of this software, not to add any features but to fix one or two outstanding bugs, so they recommend that you replace any earlier versions with this revised version at *http://www.openshot.org/*. It is still a free download although you can donate to its development if your conscience is bothering you. There is a full list of the benefits of 2.4.0 elsewhere in this issue.

I hope these articles provide some solution to video editing problems. I have tried wherever possible to use free software and low cost hardware.

NLE has advantages and disadvantages over their predecessors, Linear Editors which are essentially a bunch of VT tape decks under keyboard control.

Transferring video material from source decks to a master recording, as you push keys the decks start moving and particularly if they are reel to reel decks, provide that satisfying feel that something is happening, but at a cost.

Three VT machines, vision mixer, digital effects generators, sound mixers and caption generators, can send you looking for an understanding bank manager.

NLE editors can remove this cost, but also take time to carry out instructions, but often lack indicators as to what they are doing and how long this will take, this generates frustration. With this in mind I would like to retract one conclusion from the last issue CQ-DATV 51, yes Openshot will edit H265, but it is slow. This is the first NLE editor I have come across with the ability to handle these files, so my hat is off to the software writer, but either the compiled code is slow or my quad CPU PC is just not up to it! I suspect in truth that the code is slow and my hardware is lacking the CPU power needed for manipulation of these files and the required hardware is still at the design stage.

So for H265 files I have back tracked and used Pavtube video conversion software *http://www.pavtube.com* to convert the files to something that would move through the editor a little faster.

At this point we need to consider the end application. If it is for streaming, web work or even to end up as a flash FLV (No please, please don't - ED) file it is silly to knock yourself out preserving HD quality.

Reserve this struggle for when you need to create an HD master. Pavtube is full of options and worth experimenting with to find the file format that will not slow down the editor but produce the desired quality. One will always be a trade off against the other.

Do not be undeterred, there are faster NLE editors out there and faster hardware, solid state discs for a start, but they all come at a price, so please be tolerant. I hope I have opened a door that allows some creative video work at almost zero cost, but your feedback is always welcome.

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.





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

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

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

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

# What adverts really mean..

*EXCLUSIVE* - Imported product.

UNMATCHED - Almost as good as the competition.

FOOLPROOF OPERATION - No provision for adjustments.

ADVANCED DESIGN - The advertising agency doesn't understand it.

IT'S HERE AT LAST - Rush job. Nobody knew it was coming.

FIELD TESTED - Manufacturer lacks test equipment.

HIGH ACCURACY - Unit on which all parts fit.

FUTURISTIC - No other reason why it looks the way it does.

REDESIGNED - Previous flaws fixed - we hope.

*DIRECT SALES ONLY* - Factory had a big argument with distributor.

YEARS OF DEVELOPMENT - We finally got one to work.

BREAKTHROUGH - We finally figured out a use for it.

MAINTENANCE FREE - Impossible to fix.

*MEETS ALL STANDARDS* - Ours, not yours.

SOLID-STATE - Heavy as hell.

HIGH RELIABILITY - We made it work long enough to ship it.

From **WATTS** 02-2007 The monthly newsletter of the Pretoria Amateur Radio Club

# 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.

