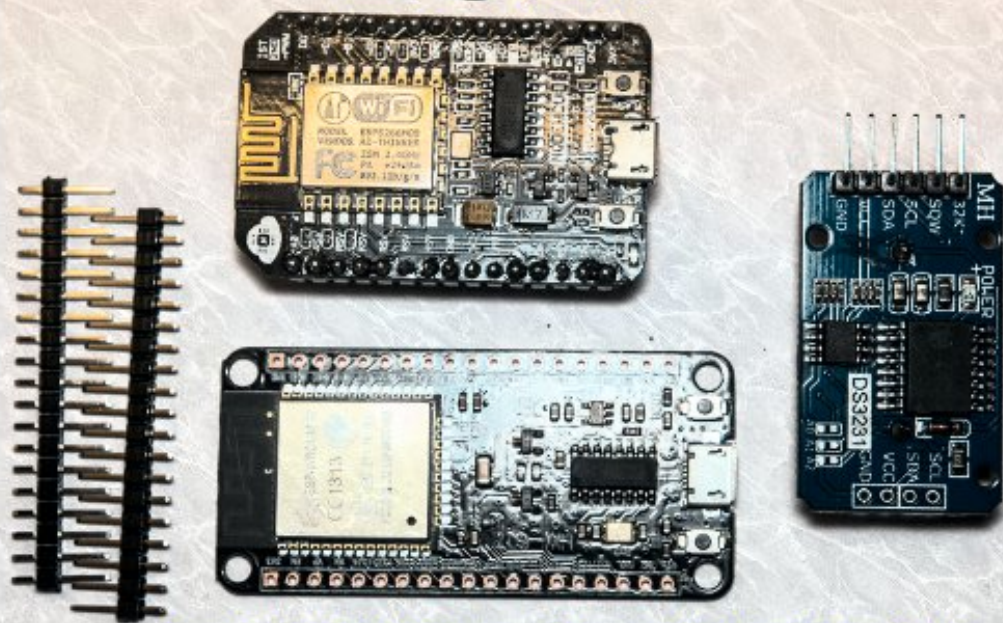


CQ-DATV

dotMOBI



Issue 53 - November 2017



The NODEMCU just got bigger! Let's look at this development and the Real Time clock module

<http://cq-datv.mobi>

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Better, but we still need more.
Please consider contributing an article.

Welcome to CQ-DATV 53

Interesting to see the correspondence over the last two issues regarding the changes to the Region 1 ATV contest which has been debated by two of our readers. ATV contests are important and necessary to keep that portion of our hobby alive and as such the Region 1 contest is a valuable contribution. The problem is that the change did not meet with universal approval and was instigated by the RSGB who perhaps represent less than half of the UK licensed amateurs.

They have a structure that includes an ATV manager which maybe where the advice to move the contest came from, but this is an appointment not an elected position. Not quite sure how the IARU is represented in Slovenia where Rudi lives and what is the structure of any organisation providing support or representation to the IARU, but there is no doubt that Rudi is an ATV enthusiast and that he for one was unhappy with the changes and makes a good case against the new date and how it fits into the contest calendar along with the longer operating slot.



The counter argument we received supporting the longer slot was that other amateurs participate in the event from portable locations on all bands and have no problem with the extended contest duration, which provides less daylight time for rig and de-rig.

If you turn up with a land rover and pump up mast to a portable location accessible by road, it's not fair to compare the rig de-rig task with someone who may have transported a scaffold pole supported aerial farm to a less accessible location. All Amateurs do not use the same equipment and some locations maybe more ATV contest friendly than others.

No system of representation is perfect and perhaps we should all keep that in mind, particularly when we make changes that to some of us look like an improvement and to somebody, somewhere else, they might be seen as a detriment.

We hope in some small way CQ-DATV has played a part in at least highlighting the problem. The magazine was created to try and bring the ATV world under a single umbrella. To do this we had to go to an electronic only publication and then we could circulate if free to all ATV enthusiasts around the world and at the same time up our game to a monthly publication. Is it working ? well this is issue 53 and is being read by both letter writers and that in itself is a positive, but we need to grow, we need to pull ATV together not split it apart and to do that we need your support. Yes we can all go off and prod our national society, who in turn can prod the IARU, but how much better would it be to have a common platform for ATV worldwide, no membership fees open to all.

We need to talk we are at an ATV crossroads with no common DATV standard and the kit we use and how we approach DATV, changes from Digilite to DATV express to Pluto, never before has there been so much pressure to get our act together.

Let's try and when we are there and only then, prod all the societies that in turn prod the IARU, but with a common voice, debated on a single accessible platform.

Enough of the politics, let's get down to reading what has been happening around the world and a look at some of the technology starting again with:

Rudi Pavlic S58RU has produced a story of an emergency deployable ATV repeater that has been constructed in Slovenia. That looks like a slick piece of construction. Let's not ask if it could be rigged and de-rigged in the few hours of daylight now left at the beginning and end of the IARU TV contest

Mike has written another column for Micro Corner and this month it's a real time clock with a revised BASIC download file that includes new custom commands that have been added to the original BASIC to drive this inexpensive unit.

Trevor has been investigating Magic Lantern's and to the best of our knowledge he has not produced a genie or been granted three wishes, but perhaps he lives in hope.

We have reproduced part of one of the learning packages offered free by the Cyber college and have chosen the subject of TV lenses. Our thanks to Ron Whittaker, Ph.D. from the Cyber College and we wish him every success with the venture, his interesting site is well worth a visit

Ken W6HCC has produced the September DATV express update and also explains that The Analogue Devices ADALM-PLUTO SDR Tx/Rx may become available again in first week of January at a price of US\$100 or US\$150. The Lime-Micro mini-Lime SDR Tx/Rx is rumoured to ship in mid-January at a price of US\$140. Digital ATV kit is on the move again.

Klaus has provided some translations from the latest issue of Der TV Amateur, the popular ATV magazine produced in the German language. It is always a pleasure to receive this magazine and work with the AGAF and it was a pleasant surprise to see that Trevor's article on 50 years of Colour TV in the UK has now been translated into German! Well done Klaus D4KCK.

Please sit back and enjoy issue 53 of the worlds widest read ATV magazine.

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.

In the future you may be able to print your own camera

By Adam Hamer



One day, will we need camera manufacturers at all?
Apertus.org.

Technology has always been an enabler. With more power to prototype and manufacture being placed into the hands of people who in years gone by could not even dream of such things, will open source cameras eventually replace our reliance on the big manufacturers?

With the advent of advanced printing technology, and the open sourced sharing and real-time, internet based development of complicated machining plans, the dawning of a new age of engineering is upon us.

Now, more than any time in history, advanced tools have proliferated into the hands of the masses allowing for high grade engineering from small individual enterprises. The era of tech empowered DIY engineering has arrived and impacted industries around the globe.

In this new period of development, a do it yourself, open-sourced camera system has emerged, powered by the internet and fueled by the hardware and manufacturing tools available to the tinkerers of today.

Fully circumventing the traditional marketplace for professional cameras, the intrepid developers of today's 3d printed camera technology seek to create custom devices which would satisfy all the desires of today's filmmaker or photographer, at a fraction of the cost of the current market leaders.

This trend, inevitably could disrupt the marketplace as did the RED One camera at the time of its launch, and as a result bring the costs of higher tech market leaders down. What is required is a viable prototype that can function at a necessary high technical and reliability level. Where the concept of 3d printing camera parts really excels is in the department of innovation.

An open sourced camera system allows for creators to add features they desire to already existing camera parts. This development makes it viable for individual to people print their own cameras in the near future from custom or pre-existing plans, but to simultaneously modulate them on their computers in real-time and, after printing out the parts, simply re-assembling them onto the already printed elements of the camera body.

This trend encourages the growth of fully modular camera systems.



The SLO 3D printed camera - Amos Dudley

The SLO camera

The SLO camera is a 3d printed still camera whose inventor, has detailed the plans for his design and released them on his website for all to see and tinker with.

This allows for the brave garage engineers to download the plans, and using a 3d printer available from a home improvement store, to print out a fully functional camera body.

On his website, the inventor features some sample images which can be evaluated. While the results are not high grade in resolution (a result of the difficulty 3d printing an optical lens element), there is a certain dreaminess to the images rendered by the custom printed lens and camera.

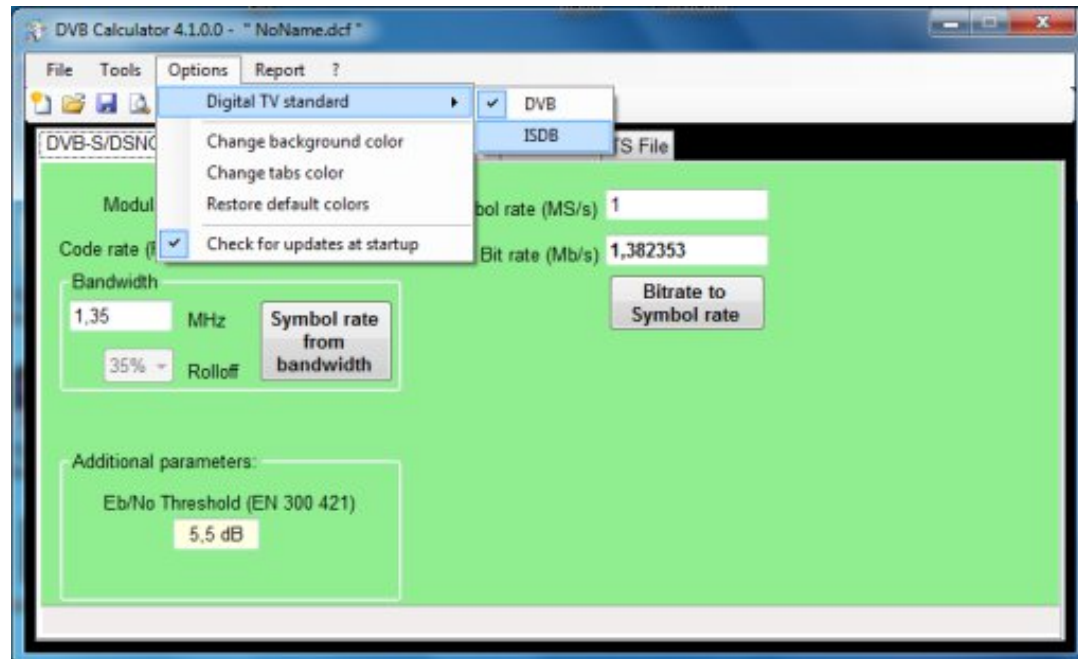
This demonstrates that readily available, modern technology can be manipulated to create all manner of objects and complex interlocking machine parts.

The shutter system of the camera is highly advanced and features the same functional design as that of a working, larger bodied camera system.

Digital TV standards bitrate calculations tool

DVB calculator is a set of comprehensive "easy usable tools" to facilitate bitrate's calculations of digital TV broadcasting systems including DVB and ISDB standards.

<http://dvbcalculator.altervista.org/Home.html>



The digital TV broadcasting standard can be selected via OPTIONS -> DIGITAL TV STANDARD menu.

Additional features

Calculations report creation to show all systems data.

RF power converter tool and many more.

Check out the website for a full list of features.



HAM RADIO Friedrichshafen 2017

Besides the usual DATV link from OE (remote controlled TX in Uwe DJ8DW's hotel room Schoenblick near Pfaender mountain) a live stream under AGAF club station call DA0TV with video from the AGAF stand was sent via HAMNET server DB0OBS in Berlin from his laptop by Joerg DF3EI.

At times he used the same computer for administration purposes like data collection or correction from AGAF members.

Klaus DL4KCK showed from his laptop via the beamer brought by Jens DH6BB stored videos of HamTV transmissions from ISS during ARISS school contacts or internet live streams from several ATV repeater outputs.



The improved free WLAN access in hall A1 now worked ok most of the time.

Some youngsters came by as part of the "DARC HAM rallye" around hall A1 and tried to answer fourteen questions regarding ATV which were prepared and printed on paper by Uwe DJ8DW.

Most answers could be found on several posters attached behind the AGAF stand. With at least five correct answers each youngster got an AGAF signing on her/his collecting block.

End of the day one young woman happily reported about her new handheld transceiver drawn at the DARC stage.



On Friday at the international DATV forum session in room "Oesterreich" Joerg's computer together with his HDMI-IP-converter TBS2603 was needed.



For the first time the lectures were streamed live via LAN to the BATC server under <https://beta.batc.tv/live/datv-forum> to be viewed world wide.

On side tables several DATV devices were demonstrated: F5OEO's rpidatv, HB9DUG's Universal-TRX for DATV und DC5QC's GMSK/QPSK-TRX.

After the address of welcome to around 30 guests by Pierre-Andre HB9AZN the session started with a double live stream: Noel G8GTZ (BATC chair) showed his power point lecture on the planned geostationary DATV transponder at TV satellite Es'hail-2 (commissioned by Qatar) from his home in England.

In parallel the video projection in room "Oesterreich" as well as questions from listeners were streamed live by HB9AZN's videocamera (in front of the big beamer screen) and his laptop to the internet via batc.tv.

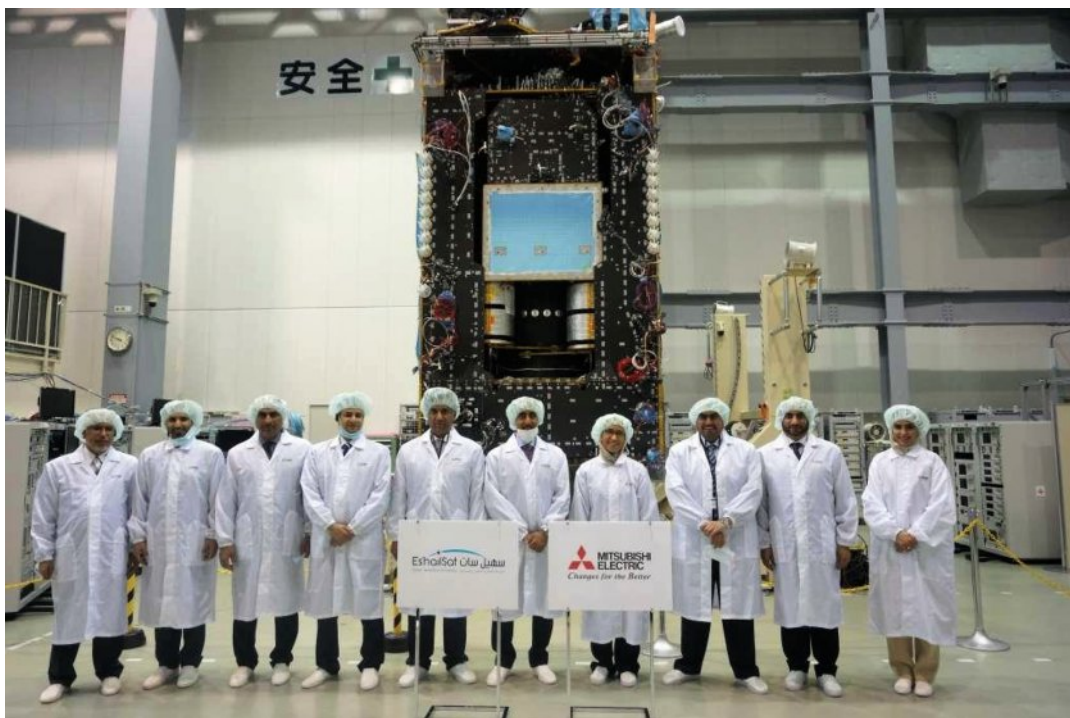
The planned usage of a 10 MHz wide broadband transponder for digital amateur radio experiments will need a strict coordination of the many DATV variations.

Noel suggested a british real time monitoring station at Goonhilly earth station in Cornwall.

There the received 10 MHz wide spectrum and a chat window for requests shall be streamed to the internet.

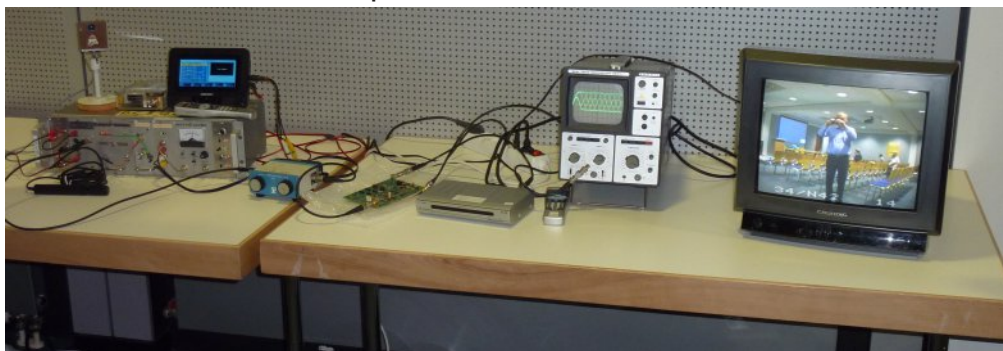
He recommended DVB-S2 modulation (2 dB less TX power needed) and max. 2 MHz wide TX channels for practical DATV contacts between amateur stations from South America over Europe to India.

For receiving tests on satellite position 26.5 degr. east TV satellites Es'hailSat-1 and BADR-4 up to BADR-7 (KU band, minimum 1 m dish) are available.



There is no fixed launching date for Es'hail-2, but during 2018 should be possible...

Then Michel HB9DUG, Co-organizer of this DATV forum session, presented his Universal TRX for DATV contacts that is PC based. An SDR-RX with the software leanDVB by F4DAV and the VLC player makes the receiving end based on Ubuntu Linux OS, while the TX comprises of the software "GNU Radio Companion graphic tool" and the hardware dongle LimeSDR connected via USB3.0 port.



DVB Calculator and TS Analyzer are helpful software tools to find the best signal parameters for each rf channel width.

Now Uwe DJ8DW described advantages of the DATV mode GMSK, at first demonstrated by him in 1995 at the Wuppertal University in Germany. A special benefit of GMSK is the low linearity requirement in rf power amplifiers and virtually no reflexion problems on the signal path.

DC5QC's GMSK/QPSK-TRX is proving that in every DATV QSO across the "Ruhrgebiet" region in western Germany. Willi also recorded all the lectures with his camcorder.



Pierre-Andre HB9AZN then suggested with tongue in cheek to give the "Amateur Radio Nobel Prize" to Evariste F5OEO while announcing his presentation of the "rpidatv" project, a very small RB-DATV QPSK TX on RaspberryPi base.

Besides that Evariste showed his Rasbpi 10 GHz DATV TX involving a cheap HB-100 doppler radar module. For easy Internet streaming purposes he pointed to Auvideo LKV373A HDMI-to-IP converter modules for only 30 USD.



Then Dirk Fischer DK2FD from technical college Muenster (Germany) gave an overview on linear power amplifiers for DATV.

In amateur as well as professional usage are LD-MOS transistors with 28 Volt supply voltage. While for AM ATV big tube amps were needed, for FM ATV a lower linearity requirement emerged.

Nowadays with most digital ATV modes it is advisable to prefer high linearity over energy efficiency. A professional 100 Watt PA for SSB will give only 10 Watt linear output in class A operation for DATV. A very rare technical solution is operating with high complexity in "feed-forward" mode to reduce spurious emissions, a similar technique is "Pre-Distortion". DK2FD is offering such experimental 13 cm PA devices upon request.

As last session part presented live Joerg DF3EI described activities in and around Berlin to merge HAMNET and ATV repeater sites via the DB0OBS node. Former DATV links were replaced by 5.6 GHz HAMNET IP links in order to reduce critical temperature problems. For video coding it was planned to use Raspi-3 modules, but it failed. Instead of Windows-PC with high energy costs and low long-term stability the small HDMI-IP converter modul TBS2603 was applied, it enables flexible parameter setting via the IP port.



At the end of this years DATV forum session the web presentation "ATV in the Netherlands" by Chris vandenBerg, PA3CRX, was shown on the beamer screen and streamed via batc.tv.

He started with analog RB-ATV on the 70 cm band and first DVB-T experiments. On the higher bands DVB-S is dominating, and the 6 cm band is very popular.

There are frequent ATV contacts to british ATV stations, but a special passion in the Netherlands are wheather ballons carrying video camera and ATV TX...

Web link: <https://prezi.com/udsmpokr4qbk/status-of-atv-in-the-netherlands-2017-by-pa3crx/>

At our AGAF stand many well known OM came by like Ernst DJ7DA from ATV repeater DB0QI in Munich (ATV Munich group had their stand in hall A1 as well), Helmut DG3KHS from DB0KO near Cologne, Klaus DL9KAS and Bernd DL9KAR from DB0KWE near Aix-la-Chapelle/Aachen.

Some visitors missed the usual guest book at the stand, but most members were pleased to get a printed magazine TV-AMATEUR again. For instance Darko Banko OE7DBH (inspirer of the small HiDes DVB-T modules for DATV) and Flexayagi owner Rainer Schloesser who wants to engage in 3D photography again in his retirement age.



Uwe DJ8DW and Joerg DF3EI gave a presentation of AGAF activities on the DARC stage in the foyer west and met some

DARC committee members afterwards for exchange of ideas. Later on Friedrichshafen fair officials informed that Ham Radio and Maker Faire Bodensee 2017 draw 17110 visitors. In 2018 the double feature will start earlier than ever, from June 1 to 3.

Klaus, DL4KCK



FPV devices used for ATV

Some time ago Juergen DF9OA, Ben DK6OT, my brother Detlef DN6DM und I, DL1CR, have achieved an ATV contact on the 6 cm band over a distance of 65 km.

My brother and I had a portable station on a look-out on Bocksberg mountain (Harz, Germany), DF9OA and DK6OT on the southern hill of the "Kronsberg" near the Hannover fair ground.

Our channel 21 equates to 5.733 GHz that is part of the 18 MHz wide ATV band on 6 cm. We were using FPV devices from far east, that are frequently in use by quadro-copter pilots.

Antenna: 19 dbi IT ELITE PAT50019,
TRX: TS832 + RC832
Monitor: BW 5 inches HD TFT-LCD
Camera: 3.1 Sony 700TVL PAL 3.6 mm
(available at Amazon for under 100 Euro)

A short video from our look-out site:

https://youtu.be/3f_Bj3Me_XY

The received video from Hannover:

<https://youtu.be/J0ggXqD8NNE>

Maybe there is someone who wants to get in contact with similar equipment, 73 Chris, DL1CR

Online reaction:

That is really adventurous - I am owner of a DVB-T/T2 TX & RX from HiDes including linear PA for some hundred milliwatt. For a range test I need a QSO partner, but here is no one... Achim DJ3UE, southern Germany (from forum.db3om.de)



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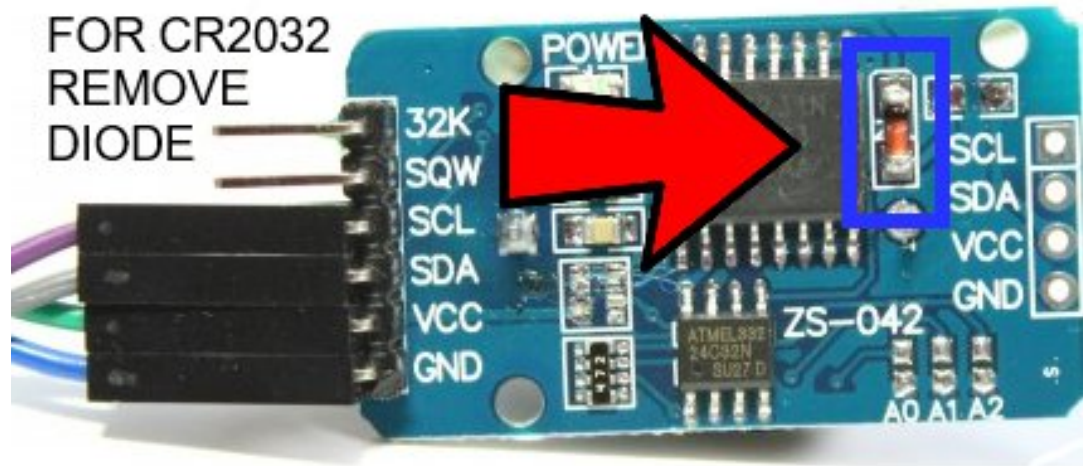
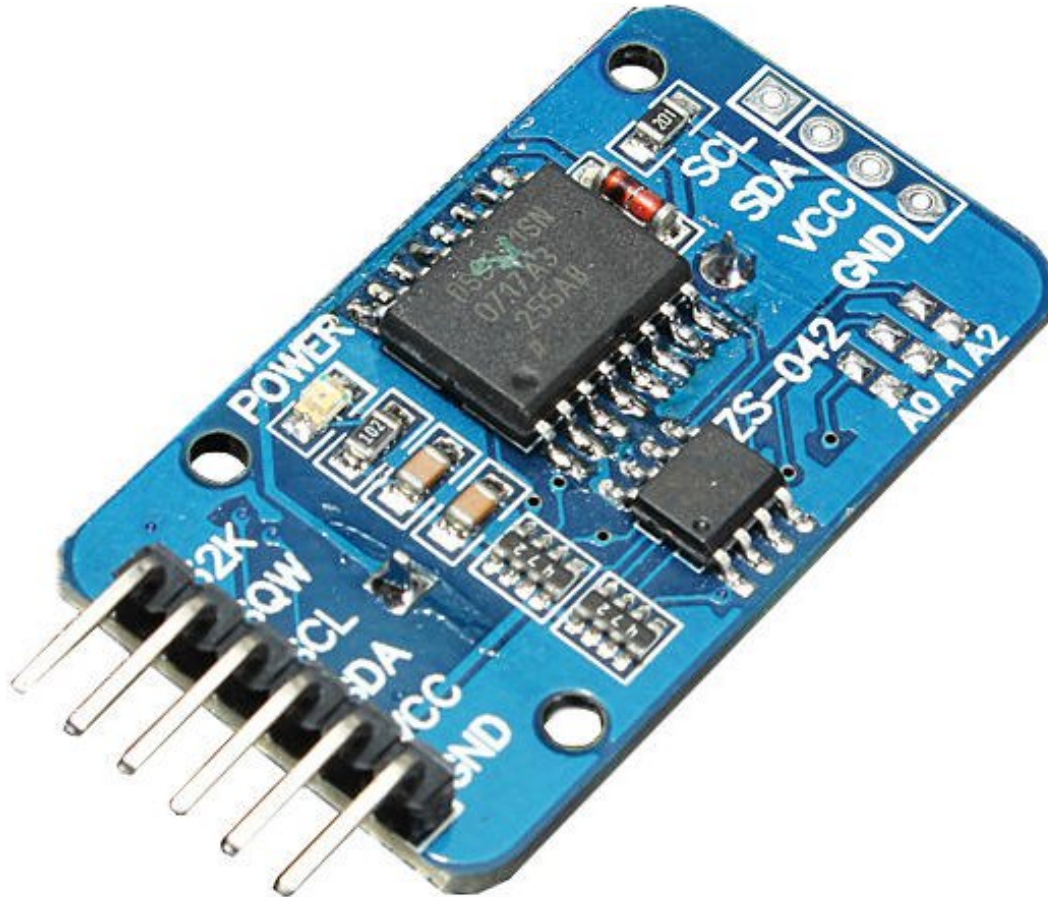


TV Amateur is a German Language ATV Magazine It is published 4 times a year and if you would like to subscribe go to <http://agaf-ev.org/> NOTE new URL

Micro Corner - real-time clock

By Mike G7GTN

In this edition we will look at adding a real-time clock to our system that has been developing across several magazine columns. Doing a quick internet search provides plenty of devices for us to choose from. Since we have been working with the I2C bus in recent magazines this narrowed down our preferred connection scheme even further for us. Within this we have plenty to select from, such as the older Philips PCF8583, Maxim DS1307 and also many other newer type devices that in the main have much higher accuracy figures due to employing internal TXCO oscillators.



A much newer device again from Maxim semiconductors the DS3231 is very commonly available from our favourite Far East suppliers as a small pre assembled module.

This contains the DS3231 a battery holder for an LIR2032 coin cell and also a 24LC32 4K X 8 (32K) eeprom device all within a (35 X 20MM) footprint. The LIR 2032 is a rechargeable coin cell, but you can fit a cheaper CR2032 type coin cell instead this requires the removal of the silicon barrel diode to de-activate all the charging circuitry.

Since the current requirements are ultra low even the use of this battery type should easily provide 3 or more years of backup time & date keeping operations.

The DS3231 clock chip has a fixed I2C address of (0X68) decimal 104 and cannot be changed by us. The eeprom device has a default address of (0X57) decimal 87 and if required can be changed to a different bus location by linking the small (A0-A2) solder pins in differing combinations.

Connections to the ESP8266 module comprise of our normal I2C pins SCL (D4) SDA (D3) and a +5V regulated power feed.

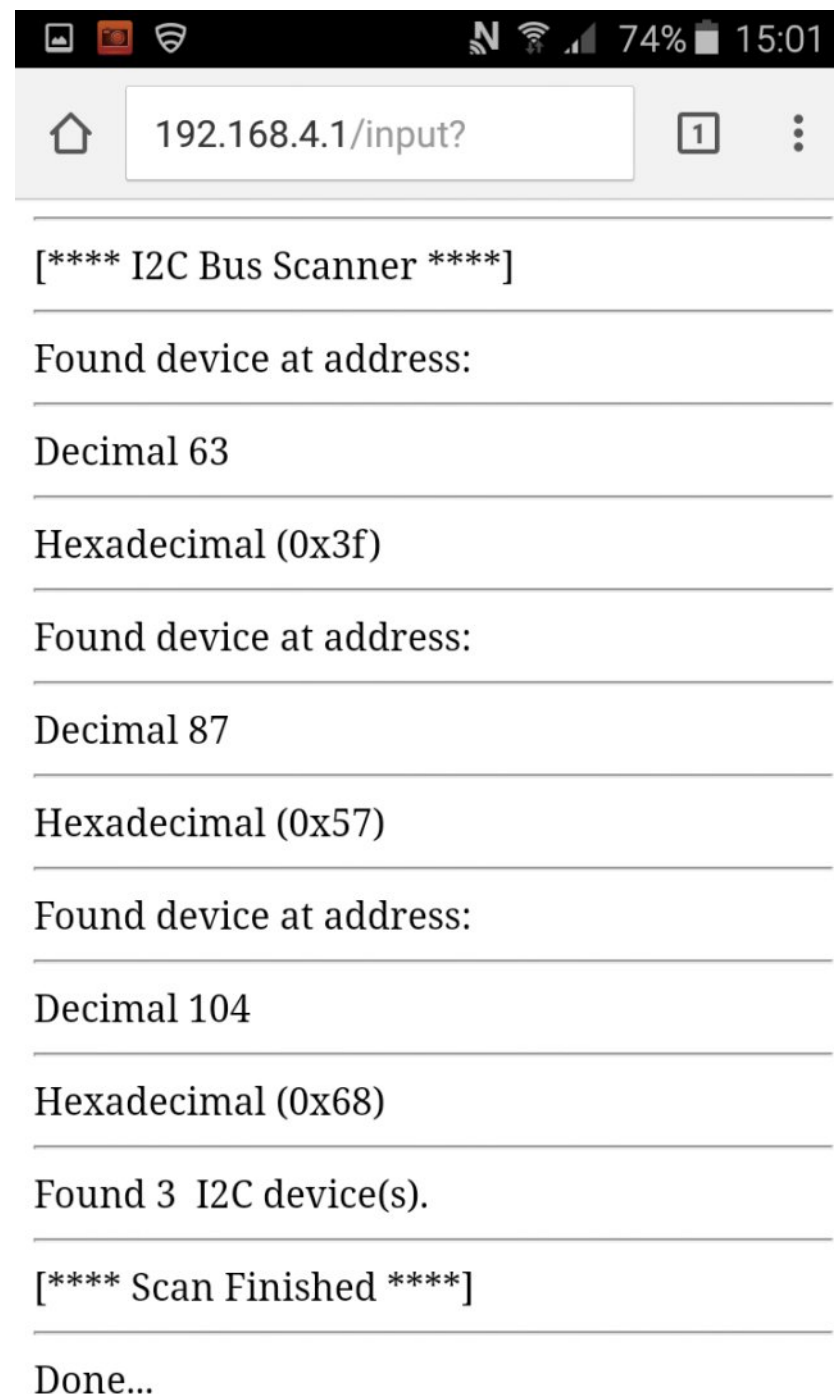
The DS3231 is a rather complex device with several registers that we need to both write to and read back to get any useful information; further complications arise as the data returned is in **BCD** (binary coded decimal) format and needs additional conversion work.

For this add-on a different approach has been taken in creating some additional commands in the Basic interpreter source code to make this module far simpler to actually make use of within our own **BASIC** code.

Once connected we can use our now standard BASIC I2C scan routine to check the addresses of our connected modules or other system components. With all being well we expect to see a reference to (0X68) and also (0X57) these are the two components on the RTC module. If you now also have an LCD connected as per the column in CQ-DATV 52 then this will also be listed as another additional detected device. As a quick aside instead of entering the basic code scan routine you may also call an internal command **i2c.scan()** to return the information as a basic web display. This is depicted in **Picture 1** on an Android Smartphone.

```
'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
```



Picture 1 - device scanning results

Now that we have detected the RTC correctly we can start to actually make use of the module by setting an actual time and then reading it back again. Our new clock setting commands are summarised in **Table 1** along with a new binary flashing file & some sample code that you can also download from the **CQ-DATV** software page. **Table 2** details the set of retrieval commands we can then make use of within our code.

Command	Sample Usage Code
ds3231.sethour(12)	Set required hour
ds3231.setminute(00)	Set required minutes from 0 - 59
ds3231.setseconds(00)	Set required seconds from 0 -59
ds3231.setday(1)	Sunday = 1 through Saturday = 7
ds3231.setdate(4)	Set date to the 4th
ds3231.setmonth(10)	Set month to October
ds3231.setyear(17)	Only the last two digits are required

Table 1 DS3231 realtime clock setting commands

Once we have been able to set our required time and date details making use of this can be as simple as declaring the command against a variable and doing something once this is returned. So we can now enter some very simple basic code to see how this will operate in practice.

ds3231.getyear()	Returns the year – last two digits
ds3231.getmonth()	Returns the month
ds3231.getdow()	Returns day of week 1 through 7
ds3231.gethour()	Returns the hour
ds3231.getminute()	Returns the minutes
ds3231.getsecond()	Returns the seconds
ds3231.test()	Send set data from Table 1 to I2C LCD

Table 2 DS3231 real-time clock retrieval commands



The result of entering & running the ds3231.test() command.

```
` ESP BASIC Return Current Month
```

```
month = ds3231.getmonth()
print month    ` return the raw month number
if month = "10" then
    print "October"
endif
```


Useful Links

BASIC Manual

https://docs.google.com/document/d/1EiYugfu12X2_pmfmU2O19CcLX0ALgLM4r2YxKYyJon8/pub

Original BASIC Source code

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

ESP8266 NodeMCU Windows flasher utility

<https://github.com/nodemcu/nodemcu-flasher>

A reference to the CR2032 battery charging issue

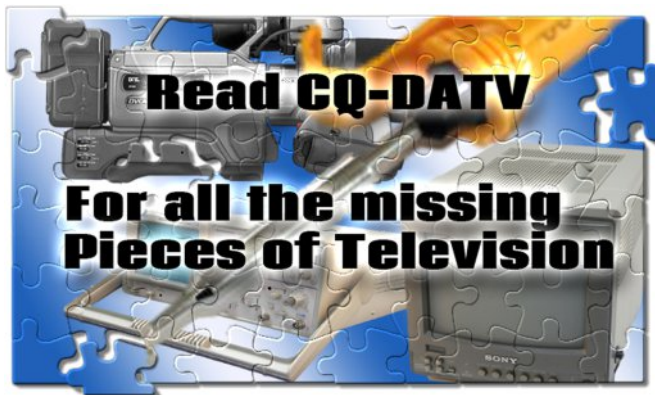
<https://woodsgood.ca/projects/2014/10/21/the-right-rtc-battery/>

Maxim DS3231 RTC Datasheet

<https://datasheets.maximintegrated.com/en/ds/DS3231.pdf>

Microchip 24LC32 Eeprom Datasheet




ww1.microchip.com/downloads/en/DeviceDoc/21072G.pdf



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Microwave ATV Transmitters & Receivers
ATN-CA Winter meeting
HackRF One SDR Equipment review Part 2
Getting Started with Mesh Video
ATCO Pizza Party / Ottobain Tour



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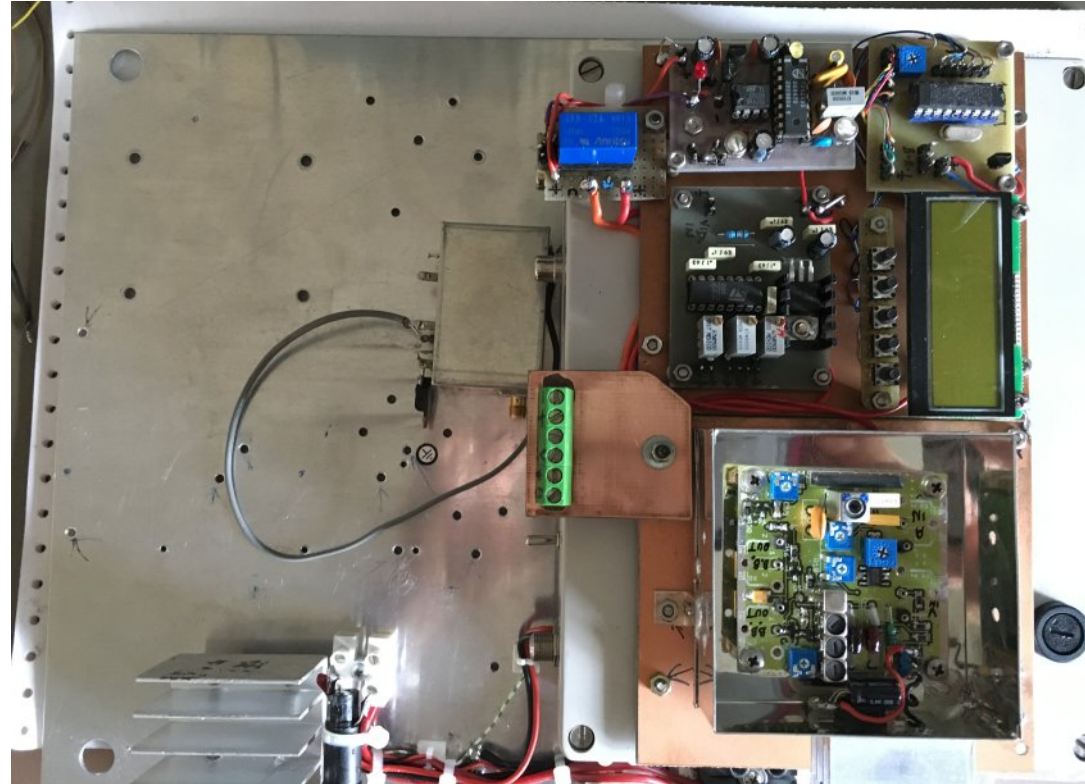
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Portable ATV Repeater

By Rudi Pavlic s58ru

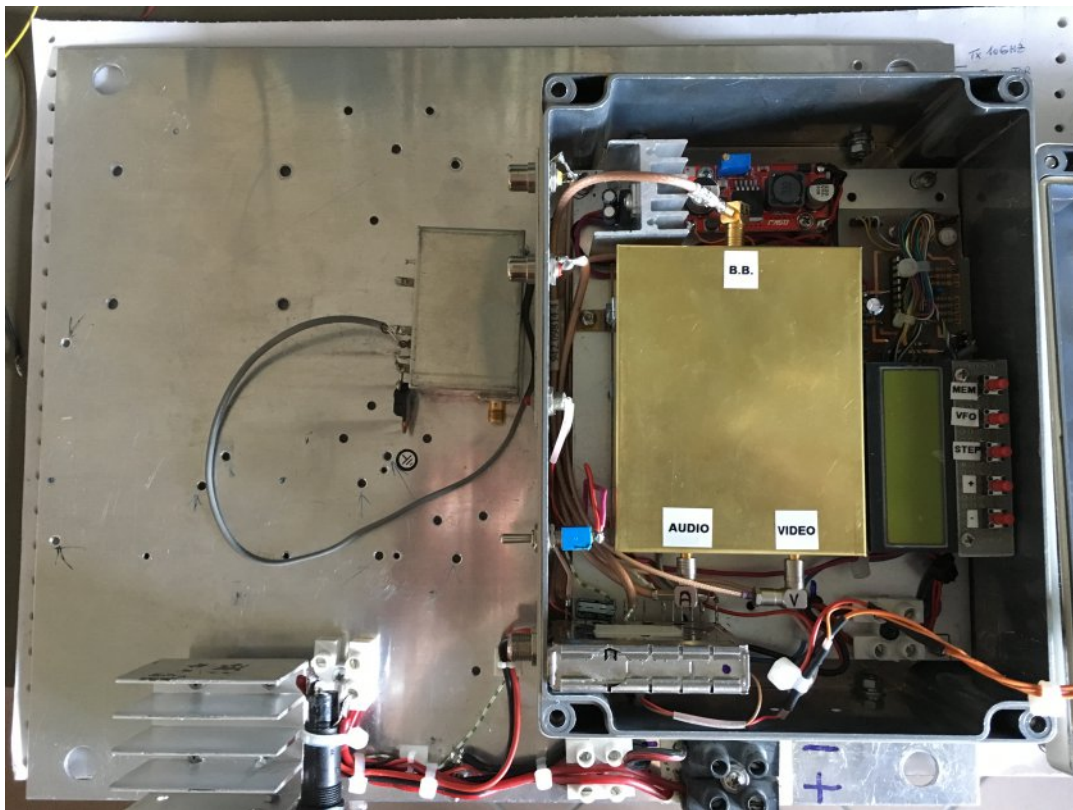


Mauro IV3WSJ has been working on and has now completed a portable analogue ATV Repeater. The Repeater will have a call S55TMR. The Input frequency is 1280 MHz and the Output frequency 10450 MHz, running 1watt of power to the slot waveguide antenna (16 slots, 16dBi efficiency) providing a 180 ° radiation with horizontal polarization.



The design came about as a result of a meeting at a Civil Protection Day Presentation, where the need for an ATV repeater that could easily be deployed in the case of natural disasters, was discussed.

This self contain unit, is mounted in a waterproof box, ready for rapid deployment should the need arise, it is powered by 12v for battery operation and so will not be dependent on a mains supply, this was a prime requirement for natural disaster deployment and will provide ATV communications such a need arises.



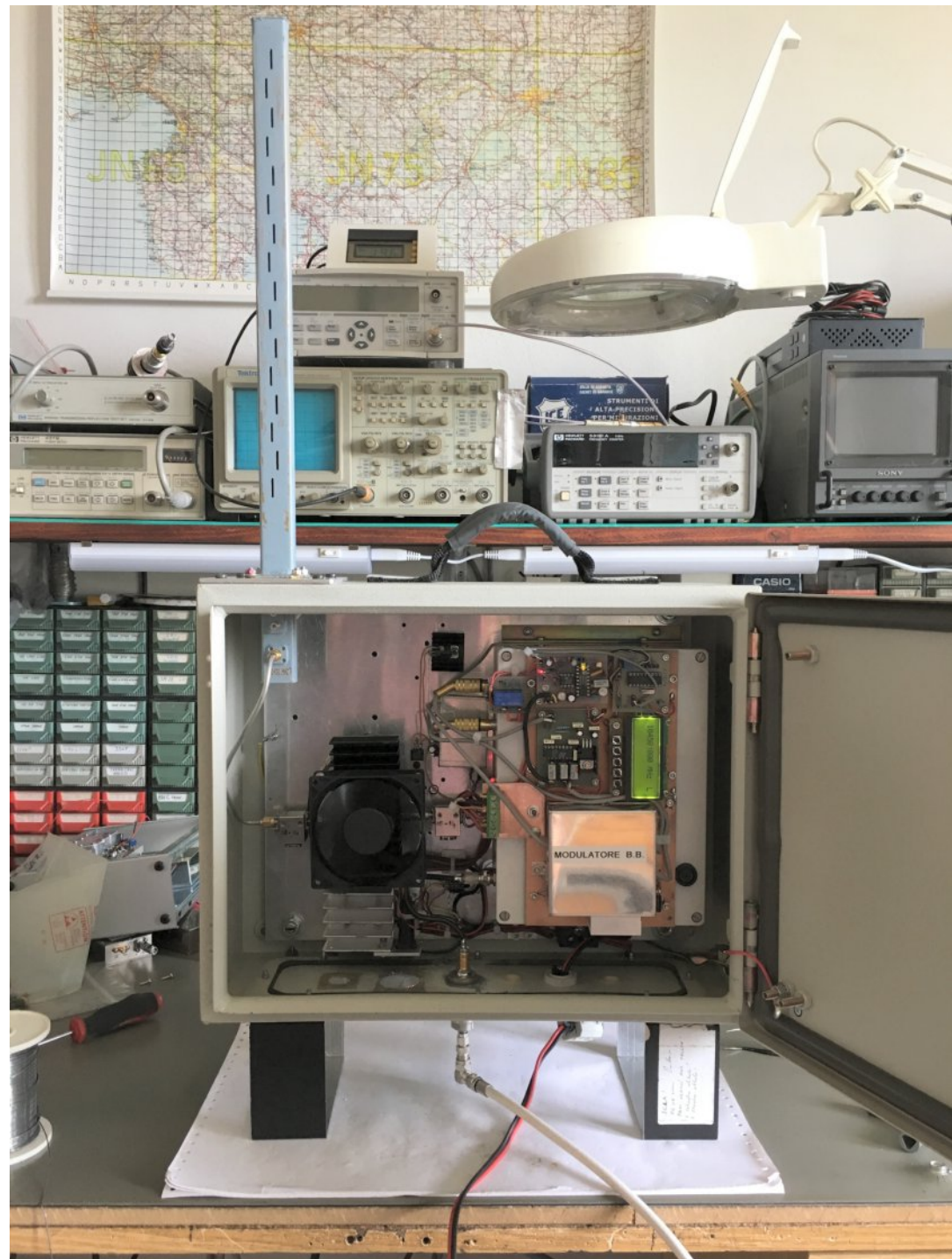
The unit is now having it final adjustments and then a soak test at Rudi's QTH, so far the result are excellent and as the pictures illustrate, it could easily be carried to, and installed in a remote location should the need arise.

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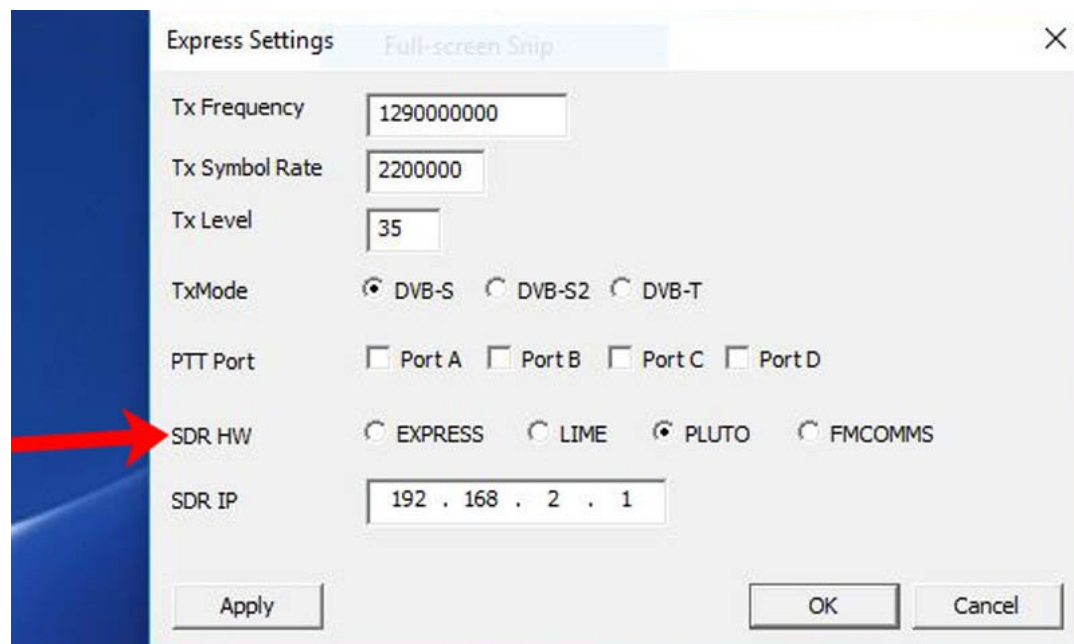
DATV-Express Project - September update report

By Ken W6HHC

Art WA8RMC reports that as of 2017/9/27 the DATV-Express boards have sold out and are no longer available until the project team decides if we want to make another production run.

If you want a board, send a message to support@datv-express.com and we will put your name on the list of those hams wanting boards. The PayPal BUY button has been removed from the PURCHASE NOW page on the [DATV-Express.com](http://www.DATV-Express.com) web site. Two new DATV products are getting ready to appear on the market. The Analog Devices ADALM-PLUTO SDR Tx/Rx may become available again in first week in January at a price of US\$100 or US\$150. The Lime-Micro mini-LimeSDR Tx/Rx is rumored to ship in mid-January at a price of US\$140. Both of these new SDR boards will be lower priced than the DATV-Express Tx-only board (US\$300).

Charles G4GUO continues to clean up reported bugs and try to improve performance with the early PLUTO-Express software for the Analog Devices ADALM-PLUTO SDR board as a modulator. An early-experimental alpha-release, v1.25p4 (based on the normal DATV-Express v1.25 software), has just been posted to the DOWNLOADS page of the <http://www.DATV-Express.com> website. This alpha-release corrects the RB-DATV wide-spectrum-“haystack” bug with DVB-S protocol reported by Brian G4EWJ on the BATC Forum. G4GUO explains the problem was caused by “math overflow” into one of the PLUTO buffers. The v1.25p4 software also corrects some bugs that prevented the hardware-abstraction-layer from allowing the user from switching between the PLUTO modulator and the DATV-Express modulator.



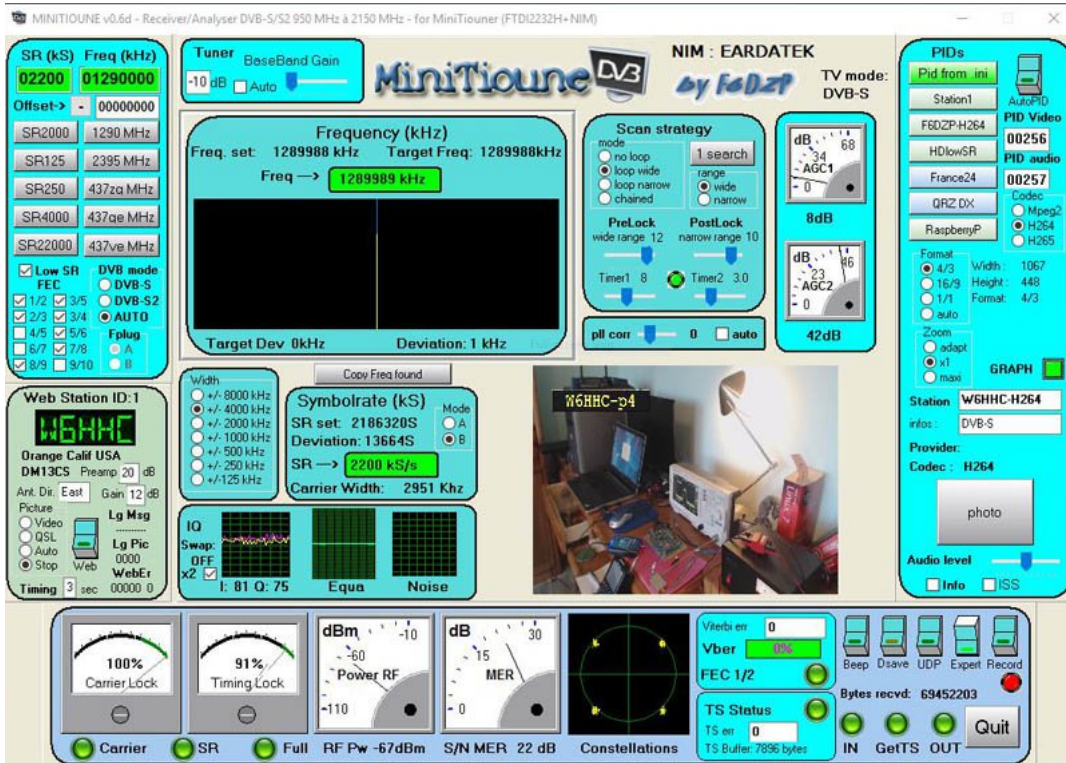
The PLUTO-Express software currently has a hardware selection menu to select between PLUTO board and DATV-Express board

Charles has determined that the limitation of the PLUTO Tx sample rate of around 4.2 MSymb/sec is apparently caused by limitations in the USB2 data throughput rate on the SDR board design. The Rx sampling rate can be set to 50 MSymb/sec for “waterfall” displays because the USB-induced dropouts are not “visible” in the waterfall. Tx USB-induced video dropouts are easily apparent (see pic next page).

In addition, Charles provided two YouTube videos that were posted by BATC from the CAT17 convention in September.

The main presentation was a talk about his testing of the PLUTO SDR. A second video was the Q&A session at the end of his main presentation on PLUTO.

These sessions can be watched on YouTube:-
<https://www.youtube.com>



The PLUTO-Express v1.25p4 software produces a nice 2.2 MS/s DVB-S2 sig from PLUTO board for MiniTouner analyzer

Finally, Art WA8RMC reports that the PCB layout files for the MiniTouner-Express version of the MiniTouneV2 board design are just about completed by Tom WB6P. The intent is to produce a smaller and assembled and tested version of the Serit NIM PCBA design at an affordable price.

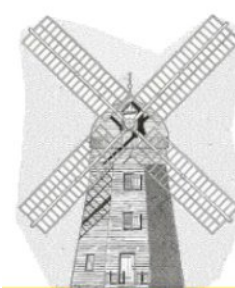
"Project speed set to slow" de Ken W6HHC

DKARS MAGAZINE



In dit nummer:

- ♦ Nieuws vanuit het DKARS bestuur
- ♦ Hulpverlening door zendamateurs en zend -professionals- aan Sint Maarten na hurricane Irma
- ♦ Tweede DKARS VHF-UHF-SHF Weak Signal Dag
- ♦ De ballonvossenjacht van 10 September 2017
- ♦ En uiteraard nog heel veel meer...




DKARS
Dutch Kingdom Amateur Radio Society



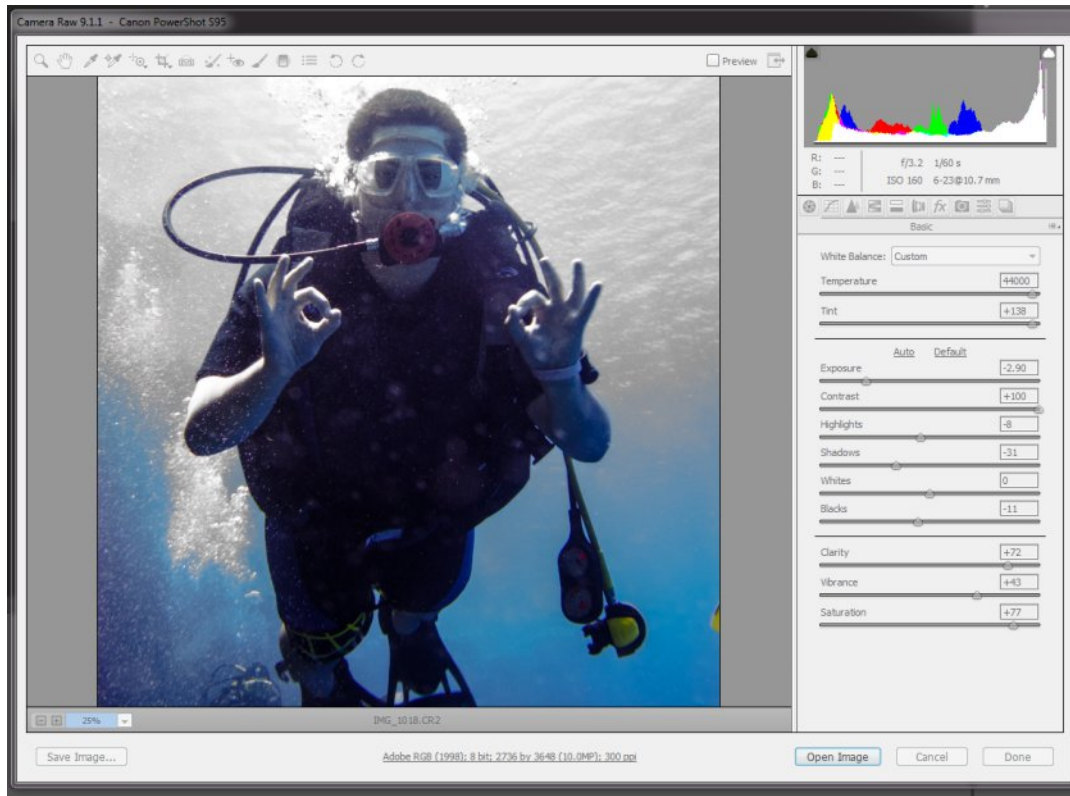
Prijs / Price € 0,00 / \$ 0,00

September 2017 editie 35

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

Magic Lanterns

By Trevor Brown



Let's start with a short history lesson, and wind back the clock to the golden age of film making.

The film stock may not have been perfect, but it had the ability to capture everything that came through the camera lens and still had latitude for exposure and colour correction, something video is still trying to achieve.

The colour correction was carried out at the Lab by a process called answer prints, these were supplied to the production house to view and make suggestions prior to the finally corrected show print.

Time moves on and we all want the instant access and low running cost that video cameras deliver, initially this involved high data rates that could only be captured on tape, but enter video compression which opened the door to SD card capture by removing a lot of the information coming through the lens and so reducing the options for correcting any exposure or colour in-balance of the recoding.

What we need to do is to re-implement the film world where everything coming through the lens is once again recorded, but using video technology and none of the compression removal of data.

Stills cameras had the same problems, but the solution was something called integrate to grey, where the prints were tweaked in the lab for equal amounts of Red Blue and Green, so if you were out to capture a Sunset, you may have been disappointed with the result, unless you used slide film where what you shot is what you got.

When stills went electronic they had similar problems! Compression (JPEG in their world) stopped colour and exposure correction.

Their solution was to create a file without discarding information, called RAW. In a RAW file virtually all the information coming through the camera lens is stored, considerably more than in a JPEG file.

This information can then be revisited in software, Photoshop being the most popular where errors can be corrected, the colour rebalanced and even a mood look can be added.

This can only happen if you have retained all the required information that came through the lens.



Left JPEG Image created by a Canon S95 and stored on the SD Card. Right same picture was also stored as RAW image and processed in Photoshop . The Canon S95 does not usually produce JPEG images of this poor quality. It was specially selected, but not created to illustrate the value of RAW, which is a feature of this small compact camera.

The RAW files are much bigger and for a still photographer the solution is buy a bigger SD card, but for video we walk into bit rate problems, and cameras that only offer compressed video storage.

The professionals are starting down this road and video cameras that can deliver RAW files are starting to appear, but not at prices we can afford.



- *Direct Docking to F65 4K Camera*
- *4K 16-Bit Double Bayer RAW Recording*
- *2K RAW High-Frame Recording*
- *SRMemory Recording*
- *16 Channels of 24-Bit audio*
- *Timecode In/Out*
- *£12,000+*

Enter Magic Lantern <http://www.magiclantern.fm/>

Magic Lantern is a free software add-on that runs from the SD/CF card and adds a host of new features to Canon EOS cameras that weren't included by Canon in the factory release. The software is open source so that users can see the code and for those of you that understand these things, you can add your own improvements, a sort of Linux for video camera users.

There is a help forum <http://www.magiclantern.fm/forum/>



One of the Magic Lantern screens on a Canon EOS camera

No they do not have a fix for every canon camera, but those that they support are not all top of the range models and some are old enough to be found at bargain prices on eBay.

Is magic Lantern software safe?

This is an extract from their website :-

No. Magic Lantern was created by reverse engineering an undocumented system that controls hardware. Therefore, we can't be certain that it's 100% safe.

Magic Lantern does not replace Canon code (which is stored in ROM), but it does change the settings (which are saved to a non-volatile memory). If Magic Lantern would set incorrect values for certain settings, this may cause the camera not to boot (even without ML).

The same risk is present if you use third party software for USB remote control. These programs use the same API for changing camera settings (properties), and Canon code does not always check the validity of the settings before saving them to NVRAM. Even developers of USB control software, who use Canon's own SDK, agree with this.

Imagine that your config file gets corrupted and you can't just delete it and start from scratch. We consider this a design flaw in Canon software. We did encounter such problems during development, but we were able to recover from them.

We believe the safest way to run Magic Lantern (or any third party camera control software) is to use custom modes - in these modes, Canon code does not save user settings to NVRAM.

In practice, we are doing our best to prevent these situations, and thousands of users are enjoying it without problems. However, this does not represent a guarantee - use it at your own risk.

As a precaution, the installer asks you to make a backup copy of your ROM files on the PC. That way, if something goes wrong, we have higher chances of being able to diagnose or fix the issue.

So far Magic Lantern exists for the following models: -
5D2, 5D3, 6D, 7D, 50D, 60D, 500D/T1i, 550D/T2i, 600D/T3i, 650D/T4i, 700D/T5i, 1100D/T3, EOS M

The feature list is impressive.

Audio

- Analogue / digital gain adjustments.
- Selectable input source.
- Toggle wind filter.
- Live audio monitoring through with headphones.
- WAV recording.
- Beep / test tones.

Exposure

- Custom Kelvin white balance.
- Auto ETTR (Expose To The Right).
- Exposure Lock for manual mode.
- Quickly switch between two exposure presets.
- Manually override exposure settings (movie mode).
- Toggle exposure simulation on/off (Liveview).

Live View Overlays

- Zebras for under/over exposed areas.
- Focus peaking for quickly checking focus.
- Magic Zoom window to fine-tune focus.
- Cropmark overlays for 16x9 bars or any custom shape.
- Overlay a ghost image in live view.
- Spotmeter in live view.
- False colour for precise exposure control.
- RGB histogram with RAW support.
- Waveform for perfect green screen lighting.
- Vector scope for colour tones.

Movie

- Full control over H264 bit rate.
- Full control of recording frame rate.
- Record HDR video.
- Custom vignetting for lens correction.
- Record 14-bit uncompressed RAW video to your CF/SD card.

Shoot

- Bracketing for exposure, flash, or depth-of-field.
- In-camera intervalometer.
- Custom bulb timer for extra-long exposures.
- Motion detection.
- Silent pictures.
- Record voice tags for photos / videos.

Focus

- Trap focus.
- Follow focus.
- Rack focus.
- Custom AF patterns.
- Automatic auto-focus micro adjustment (DotTune AFMA).

The only Canon camera I have access to is the S95 which shot the underwater picture and stored both JPEG and RAW image. I later adjusted the RAW file for the right image, so no I cannot speak from experience, but it does inspire any experimenter to explore eBay and have a go.

There is an in-depth article on the Red Shark website for buying a Canon 50D for less than £200 and updating it with Magic Lantern software
<https://www.redsharknews.com/production/item/4898-how-you-can-shoot-raw-using-nothing-but-%C2%A3200-and-an-old-dslr>

Perhaps I can whet your appetite with an extract:-

There are two ways Magic Lantern will let a 50D shoot video. The first uses its on-board H.264 encoder to record in the same way as many other DSLRs. This was a dormant feature in the original 50D, which was one of the last Canon cameras not to have the ability to record its live view image, but was built on broadly the same hardware as those which could. It suffers from much the same aliasing problems as many DSLRs and there's no sound, but the pictures are reasonable for an early Canon video DSLR and the system is reliable. However, what's much more interesting to most people is the raw option, which stretches everything about the camera and its storage to their absolute limits.

Interesting for all of us that love experimenting, let me know if you go down this road. CQ-DATV readers are all TV experimenters and would love to share your results.

You might ask if the technology might be useful to us amateurs that might accidentally shoot something like the left side of the underwater photo and need the ability to convert it to something looking like that on the right, but do the professionals need this. Well yes not to cover filming problems, but to be able to create mood pictures, in particular for a drama.

Sony recently produced a new camera called Venice, if you have to ask, you cannot afford it. They did however shoot a demo..now on YouTube <https://youtu.be/IOEfJ7oqSK8>.

Yes ok good look for a video shoot and it does convey the mood of a drama. They also put on you tube the making of the demo <https://youtu.be/J2v2t3s7Fk4> and yes you can see some of the work the professionals put into these things, but also glimpses of the pictures before any tweaking.. which show why pictures need post recording adjustments and that was a fairly straight forward shoot, no day for night or

external shots taken out of order across several days with weather changes that need to match.

So RAW has advantages and well here is a chance for us to experiment on a budget, that is well below the cost of a Sony Venice.

Magic Lantern is evolving and developing its software...yes they will be meeting hardware limitations locked in by Canon..but never the less it is interesting what they can deliver, over and above what Canon sold the original cameras for.

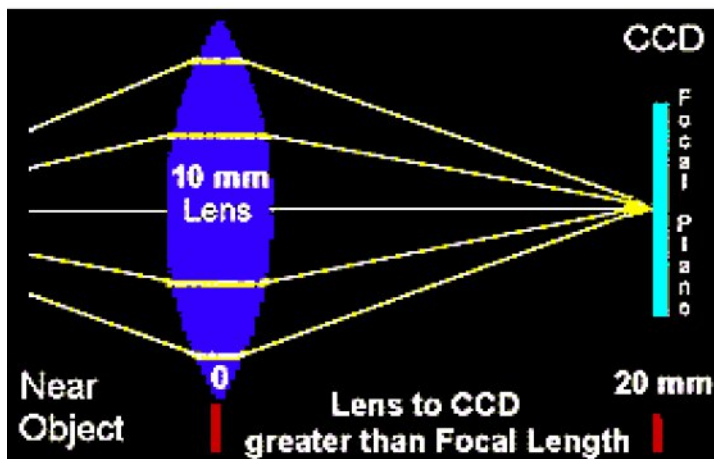
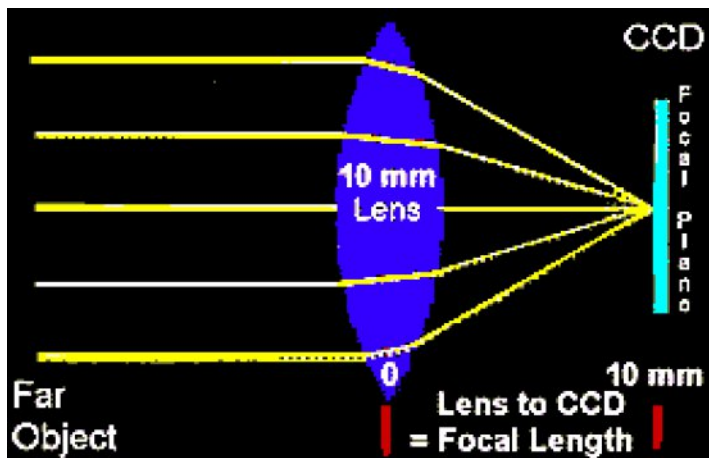


Television Camera Lenses: The Basics

Apart from protecting it from the elements and occasionally cleaning it, the average person doesn't think too much about a camera's lens.

However, variables associated with camera lenses have a major effect on how a viewer will see subject matter. The cameraperson who understands this commands a significant amount of creative power

The focal length of a lens affects the appearance of subject matter in several ways.



Lens Focal Length

We define focal length as the distance from the optical center of the lens to the focal plane (target or "chip") of the video camera when the lens is focused at infinity.

We consider any object in the far distance to be at infinity. On a camera lens the symbol ∞ (similar to an "8" on its side) indicates infinity.

Since the lens-to-target distance for most lenses increases when we focus the lens on anything closer than infinity (see second illustration above), we specify infinity as the standard for focal length measurement.

Focal length is generally measured in millimetres. In the case of lenses with fixed focal lengths, we can talk about a 10mm lens, a 20mm lens, a 100mm lens, etc. As we will see, this designation tells a lot about how the lens will reproduce subject matter.

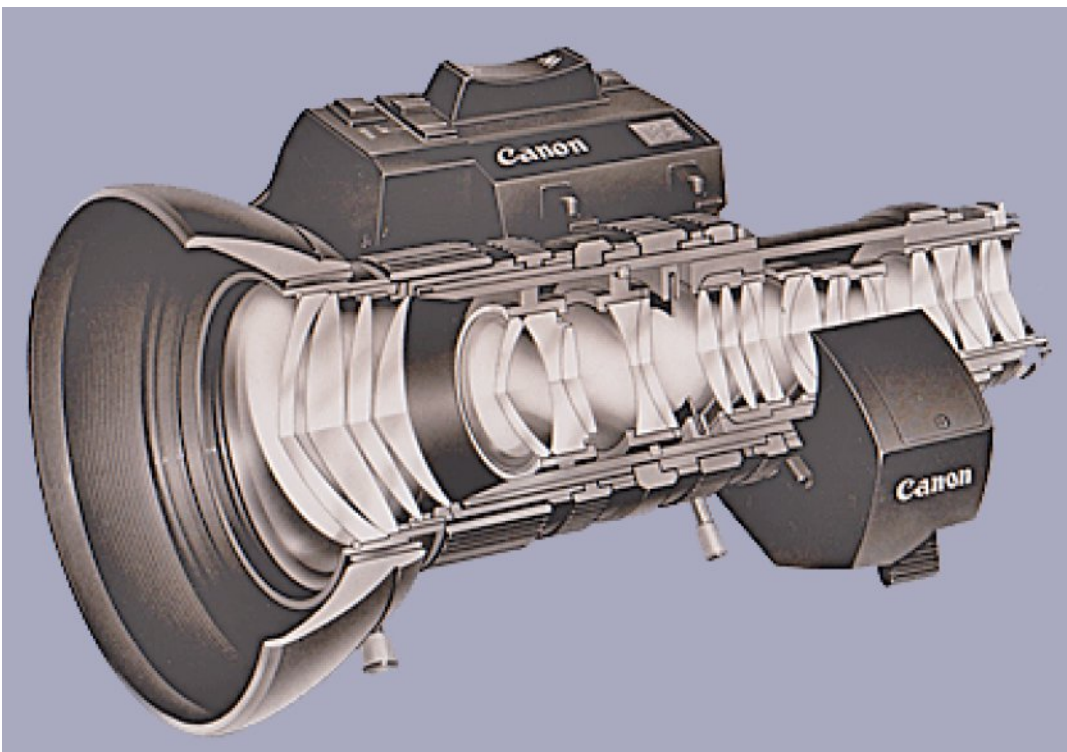
Zoom and Prime Lenses



Zoom lenses came into common use in the early 1960s. Before then, TV cameras used lenses of different focal lengths mounted on a turret on the front of the camera, as shown on the right. The cameraperson rotated each lens into position and focused it when the camera was not on the air.

Today, most video cameras use zoom lenses. Unlike the four lenses shown here, each of which operate at only one focal length, the effective focal length of a zoom lens can be continuously varied. This typically means that the lens can go from a wide-angle to a telephoto perspective.

In this cutaway view note the complexity of this zoom lens with its nearly 30 precisely ground and polished glass elements. As the lens is zoomed in and out these elements are automatically repositioned.



It was only with the development of computers that such complex optical designs as this were possible.

With prime lenses, the focal length of the lens is set and cannot be varied. It might seem that we would be taking a step backwards to use a prime lens or a lens that operates at only one focal length.

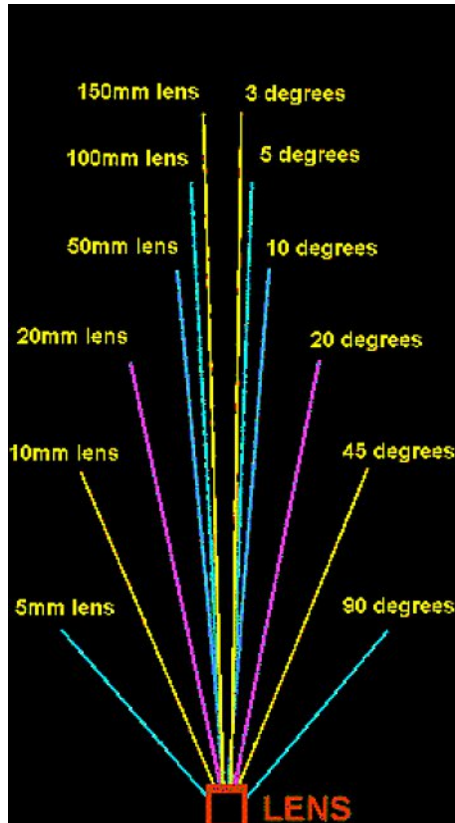


Not necessarily. Some professional videographers and directors of photography -- especially those who have their roots in film -- feel prime lenses are more predictable in their results. (Of course, it also depends on what you're used to using!)

Prime lenses also come in more specialized forms, for example, super wide angle, super telephoto, and super fast (i.e., transmit more light).

However, for normal work, zoom lenses are much easier and faster to use.

Angle of View



Angle of view is directly associated with lens focal length. The longer the focal length (in millimetres), the narrower the angle of view (in degrees).

You can see this relationship by studying the drawing on the left, which shows angles of view for different prime lenses.

Although there is no exact definition for a "telephoto" designation, we would consider the angles at the top of the drawing from about 3 to 10 degrees in the telephoto range. A telephoto lens (or a zoom lens operating at maximum focal length) has a narrow angle of view.

The bottom of the drawing (from about 45 to 90 degrees) represents the wide-angle range.

The normal angle of view range lies between telephoto and wide angle.

With the camera in the same position, a short focal lens creates a wide view and a long focal length creates an enlarged image in the camera. The following two images shot from the same position demonstrates this.



Put another way, when you double the focal length of a lens, you double the size of an image on the target; and, as you would assume, the reverse is also true.

This is an extract from **"Television Production, A Free, Interactive Course in Studio and Field Production"** by **Ron Whittaker, Ph.D.** from the **Cyber College**.

<http://cybercollege.com/tvp010.htm>

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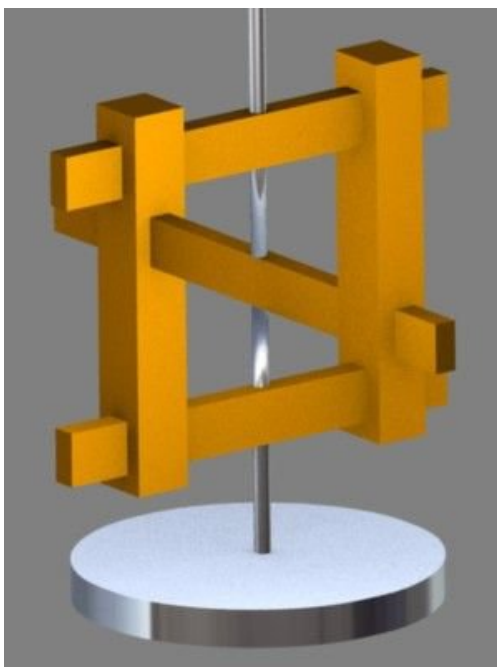
Images should be in PNG format if possible and the best quality available. Do not resize or compress images, we will do all the rework necessary to publish them.

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CQ-DATV HotMOBI

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**Merry Christmas to all
from the three wise men**

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