CQ-DATV

dotMOBI

ePUB

Issue 34 - April 2016

Video Window

W6HHC

http://cq-datv.mobi

ISSN 2059-2191

Editorial

Welcome to CQ-DATV 34, the latest issue of our free ATV magazine. Here in the UK we have switched from GMT to BST in anticipation of what we call Summer. Summer also marks the start of the Radio Rally season. Last year we put a CQ-DATV stand together at the Norbreck Rally in Blackpool. This provided a chance to meet the public and show we really do exist. I think we even surprised ourselves with the impact ATV had on the rally goers when they saw an actual ATV repeater (GB3FY), linked in live, onto a big screen. Sorry we will not be repeating this next month, but Norbreck is still there proving there is life in the north of England and it is not completely off the cards for a repeat visit at a future Norbreck.

The news column is also buzzing. First with the proposal for New ATV repeater in the North of England. Steve G3WGU is the man behind the proposal. Also is TIM G4WIM who will do a lot of the technical side. The new repeater will exploit the terrain blocking hills South of Fylde, which presently block GB3FY's southern take off, with a proposed location of 2.7k north of Blackpool. Output will be digital with both analog and digital input. The NOV has gone in. Good luck Steve and anything CQ-DATV can do to help, you know where we are.

Other ATV news is the Art Towslee, WA8RMC, the hardware designer of the DATV-Express DVB-S transmitter PCB and Jean -Pierre F6DZP are proposing to design and build a DVB-S/S2 receiver module that connects to a USB computer port for use with the Minitioune PC software program. The design is in the concept stage, but would be a small assembled and tested module that converts a DVB-S/S2 signal into a serial transport stream for connection directly to a Windows PC. The guaranteed operation is from 250MHz to 2.1GHz, but will still operate 144MHz to 2.4GHz. The 2.4GHz upper frequency limit allows ISS reception, directly eliminating the need for a down converter. At 70cm it would become a highly sensitive

DVB-S receiver and at 144MHz it can be used for experimental low symbol rate operations in Europe. Art and Jean would like to hear comments on the proposal, as well as ideas for additional features.

We also have two projects in this issue. The first is a video router originally designed by our very own Mike Stevens G7GTN back in CQ-DATV 23 and taken to a new height by PA3WEG. Looks the sort of unit anyone of us would be proud to have in our shack.

Meanwhile Mike is back in the lab and looking at the Raspberry pi Zero - preparing for software development tasks and any potential ATV applications. There is also a description of the KiCad free software for PCB and schematic design. The 3D view of any completed project looks particularly appealing.

Trevor was going to dig further into using a bridge camera in the studio for still application but, despite his camera developing a flash problem and been returned to Simply Electronics, has still committed his thoughts to paper on the replacement of flash studio lighting with the more modern and inexpensive continuous illumination lights.

So let's hope we have produced a magazine that covers all the interest of ATV from RF to pictures, from activity to discussion. So enough of the introduction, please enjoy CQ-DATV 34

CQ-DATV Production team

Open source set-top box software

OpenPLi Welcome to OpenPLi. We are a community project focused on developing software for open source Linux dvb receivers using the Linux operating system.

We currently support STB models from various vendors using the Enigma2 application. Information about specific models can be found in our wiki:- *http://wiki.openpli.org/HomePage*

If you are interested in contributing to the code see our development information. Most of our communication takes place on the forums, so stop by there if you have any specific questions:- *http://forums.openpli.org/*

New video repeater application

Applicant Name: STEVE WILLIAMSON, G3WGU

Station Data: [Applicant did not indicate band] TELEVISION

REPEATER (NEW APPLICATION)

Proposed location: 2.17km N (0deg) of BLACKPOOL

Region: NORTH OF ENGLAND

Applicant comments:
Currently there is some ATV activity to the North of the Fylde but due to local terrain these signals are blocked to the South. Therefore it would seem sensible to locate a repeater on the high ground which is presently blocking these signals. We have the support of the local ATV operators and the NoV holder for GB3FY (10GHz repeater which is also blocked to the South).

New DVB-S/S2 Receiver Design Concept

I'm Art Towslee, WA8RMC, hardware designer of the DATV-Express DVB-S transmitter PCB.

Jean-Pierre, F6DZP and I propose we design and build a DVB-S/S2 receiver module that connects to the USB computer port for use with his Minitioune PC software program.

It will be basically an enhancement of his existing MiniTiouner receive module kit. The design is in the concept stage now while we decide on needed features and see if there is sufficient interest to go into production.

We would like to hear comments on the proposal as well as ideas for additional features.

The product would be a small assembled and tested module that converts a DVB-S/S2 signal into a serial transport stream for connection directly to a Windows PC USB port.

We selected special tuner/demodulator IC's to eliminate the need for a NIM tuner. The guaranteed operation is from 250MHz to 2.1GHz but will still operate 144MHz to 2.4GHz.

The 2.4GHz upper frequency limit allows ISS reception directly eliminating the need for a down-converter, at 70cm it becomes a highly sensitive DVB-S receiver and at 144MHz it can be used for experimental low symbol rate operation in Europe.

The finished product will consist of a small PCB approximately 2" x 5" (50mm x 125mm) completely assembled and tested and optionally mounted in an enclosure.

The main features are:

1. *RF input: 144MHz to 2400MHz.*

2. *4 inputs multiplexed into 2 independent receivers. SMA connectors on first 2 inputs.*

3. *Input sensitivity: -65dBm minimum. (It is expected that an external preamp will be used at antenna).*

4. *Power requirements: +10 to +20VDC (~0.7A @ 12vdc). (Cannot source power from USB port).*

5. *Output: USB type B connector to go to Windows USB2 port. (Should a type A connector be used here?)*

6. *Parallel transport stream PC pads from demodulator IC for optional connections bypassing USB port.*

7. *Custom low pass filters to optimize low symbol rate and for better S/N operation.*

8. *LNB power: 12 to 18vdc current limited for external preamp on input connectors. Voltage controlled by input voltage selection.*

9. *Jumper to disable DC power on input connectors.*

10. *Logic output for "signal present" or "signal locked". Signal also carried through to PC.*

11. *DiSEqC not supported. Chip set supports this but adds $10 to board cost. PC pads to add this circuit externally will be provided.*

12. *Target selling price is ~$120. (This is a not-for-profit effort).*

13. *Plastic enclosure is option. Extra SMA input connectors are option.*

Let us know what you think of the idea. We need feedback about features and expected volume. If we cannot justify builds of at least 100 units at a time, we question it as a worthwhile project. Report suggestions on this forum.
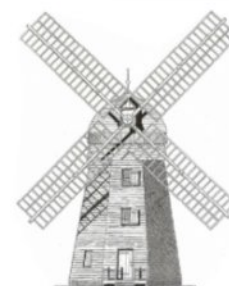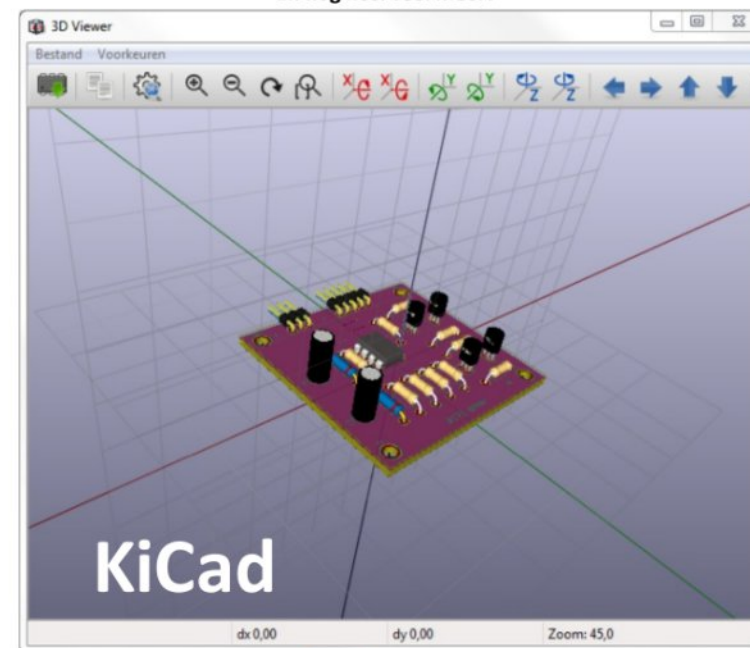
DigitalATV@yahoogroups.com

Art Towslee, WA8RMC

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

DATV-Express Project - February update report

By Ken W6HHC

Charles G4GUO has made good progress on a new piece of Windows software for the DATV-Express board that is called Express_DVB-S_Transmitter.

 (a) The main difference from the DatvExpressServerApp is that the user does NOT have to install-or-configure utilities like GraphStudioNext to create a graph by configuring the "filters".
 (b) many video capture devices can now be used (including support for professional capture devices like the Blackmagic Decklink mini recorder or the Magewell USB3 dongles) to connect your camera.
 (c) the new software will extract the video and audio streams from the capture devices and encode them in software.
 (d) the ZADIG software is used to simplify the loading of drivers in Windows.
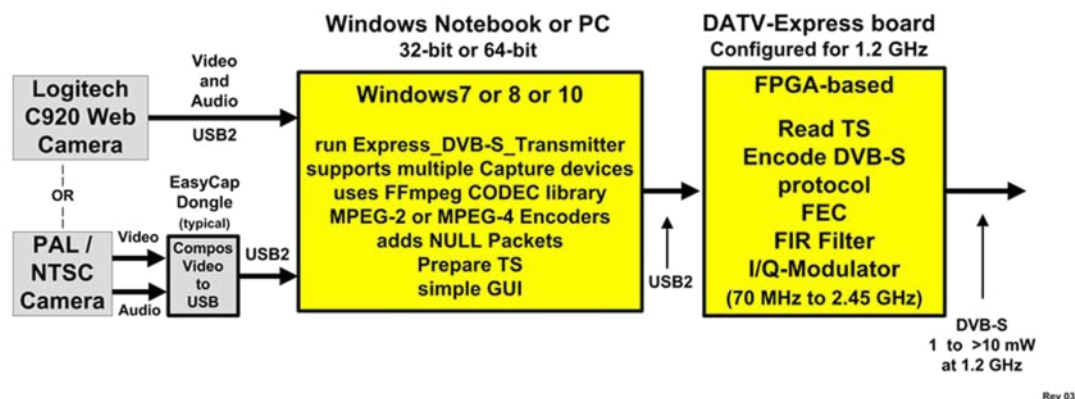
Block Diagram of typical set-up for Windows_Express_DVB-S_Transmitter software

The Express_DVB-S_Transmitter software is still in a highly "experimental stage" without any user guide yet….but has been successfully installed and used by several "early adopter" hams.

The software has been now tested on Window10 and on a PIPO Windows tablet. The current build of the software can be downloaded at:-

https://www.dropbox.com/s/97f5g8n9nw3bdmo/setup_datv_express_transmitter.zip?dl=0=0

Art WA8RMC had difficulty sending another batch of DATV-Express hardware boards to the project's distribution center in England. Between the US Postal Service and the Royal postal office in UK and the customs people, the in route box of boards sat idle from Feb 04 until Feb 22. The team expects the new batch of boards to be in England inventory this week.

Frank DL2JFL was very kind to translate the current ODROID User Guide for the DATV Express board into the German language. This German translation is now available for from the project teams web site http://www.DATV-Express.com on the DOWNLOADS page.

Frank explained that the PDF will also be available on his club webpage:-

http://dk0gno.dnsuser.de

(sorry…but that site is only in German).

"project is set to slow speed"….de Ken W6HHC

Not so Vertical Collinear

By Alan Critchley - G3XSC

After a few years of good service, the high winds took their toll on my Diamond X300 collinear, which was anything but vertical.

After removal and inspection, it was found that the thin walled tube supplied with the antenna had split from the screw hole - a weak point.

Rather than replacing it with the same, I decided to construct something a little more robust. The result is as seen above is a 300mm length of 40mm diameter aluminium bar bored out to take the antenna base, plug and cable. I had to turn down the outside of the tube to fit the original clamps.

The wall thickness at the top is 5.5mm which was thick enough to drill and tap M6 to take two additional Allen head screws. This alleviates any tendency to rock due to the slight clearance of the hole. The bottom section was turned down to 30mm to fit the clamps and bored out to 22mm to allow ample space for the plug to pass through. This still left a wall thickness of 5mm, much stronger than the original.

All I need now is the warmer weather to enable me to scale the roof and install and test my engineering improvements. I hope that my Diamond X300 collinear will once again assume the desired vertical position and be impervious to the prevailing winds for some time to come.

Idea to finished project?

The problem that many amateurs face is that of obtaining professional quality tools to produce circuit diagrams and PCB layouts etc.

Some professional programs offer a 'free' version, but this is usually so crippled as to make it unusable.

One solution to this problem is *KiCad* which is a Cross Platform and Open Source Electronics Design Automation Suite.

About KiCad

KiCad is an open source software suite for Electronic Design Automation (EDA). The programs handle Schematic Capture, and PCB Layout with Gerber output. The suite runs on Windows, Linux and OS X and is licensed under GNU GPL v3.

The first release date was in 1992 by its original author, Jean-Pierre Charras, but is now currently under development by the KiCad Developers Team.

Schematic Capture

Eeschema is powerful schematic capture software distributed as part of KiCad and available under the following operating systems: Linux, Apple OS X, Windows

Regardless of the OS, all Eeschema files are 100% compatible from one OS to another.

Eeschema is an integrated application where all functions of drawing, control, layout, library management and access to the PCB design software are carried out within Eeschema itself.
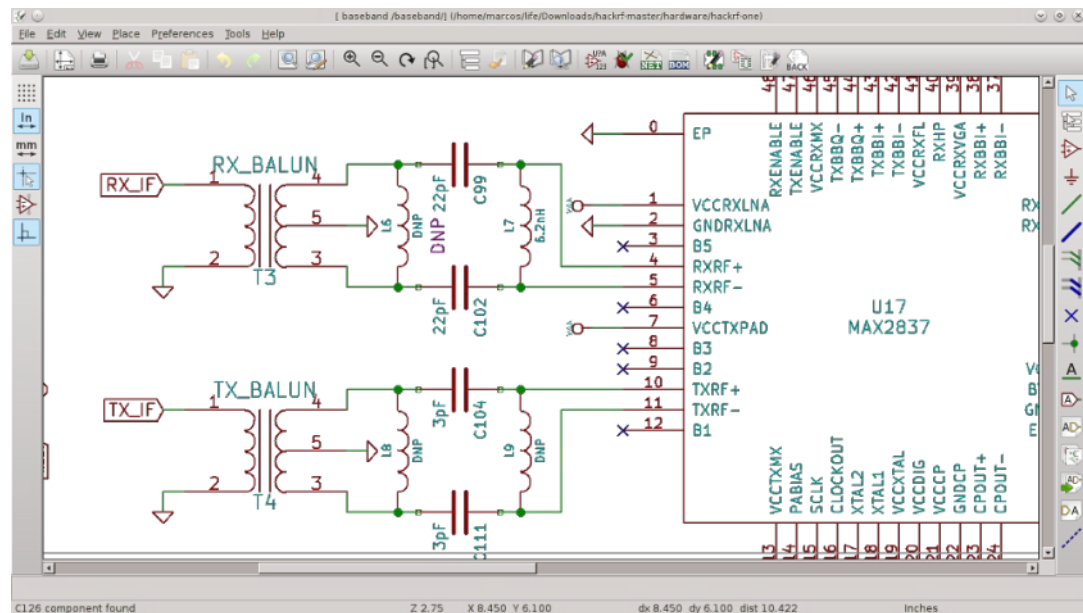
Eeschema is intended to work with PcbNew, which is KiCad's printed circuit design software. It can also export netlist files, which list all the electrical connections, for other packages.

Eeschema includes a component symbol editor, which can create and edit components and manage libraries. It also integrates the following additional but essential functions needed for modern schematic capture software:

- *Electrical rules check (ERC) for the automatic control of incorrect and missing connections*
- *Export of plot files in many formats (Postscript, PDF, HPGL, and SVG)*
- *Bill of Materials generation (via Python scripts, which allow many configurable formats).*

PCB Layout

Pcbnew is a powerful printed circuit board software tool available for the Linux, Microsoft Windows and Apple OS X operating systems. Pcbnew is used in association with the schematic capture program Eeschema to create printed circuit boards.
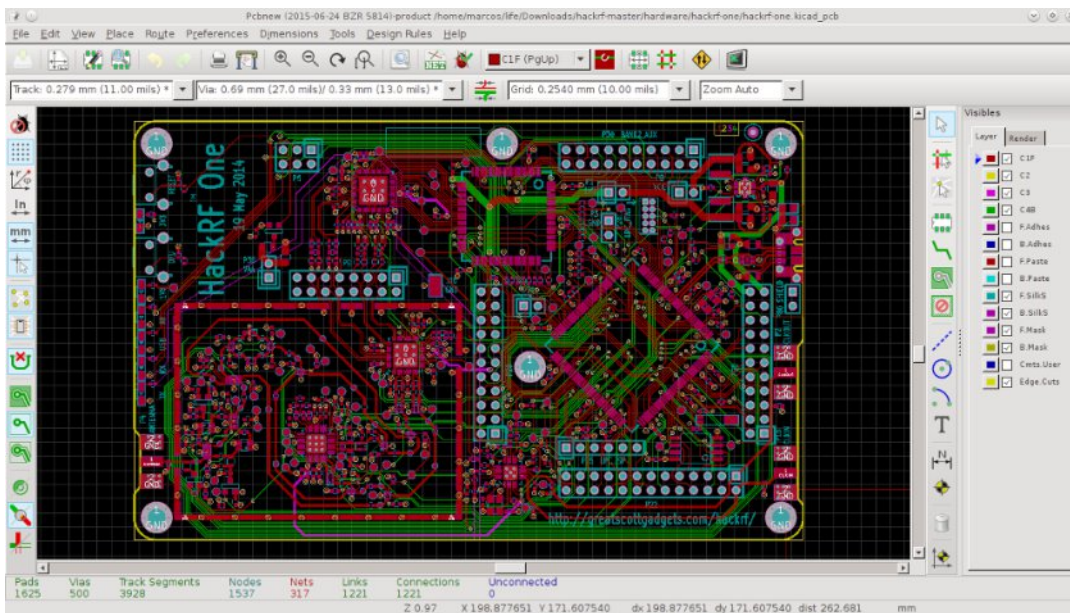
Pcbnew manages libraries of footprints. Each footprint is a drawing of the physical component including its land pattern (the layout of pads on the circuit board). The required footprints are automatically loaded during the reading of the Netlist. Any changes to footprint selection or annotation can be changed in the schematic and updated in pcbnew by regenerating the netlist and reading it in pcbnew again.

Pcbnew provides a design rules check (DRC) tool which prevents track and pad clearance issues as well as preventing nets from being connected that aren't connected in the netlist/schematic. When using the interactive router it continuously runs the design rules check and will help automatically route individual traces.

Pcbnew provides a rats nest display, a hairline connecting the pads of footprints which are connected on the schematic. These connections move dynamically as track and footprint movements are made.
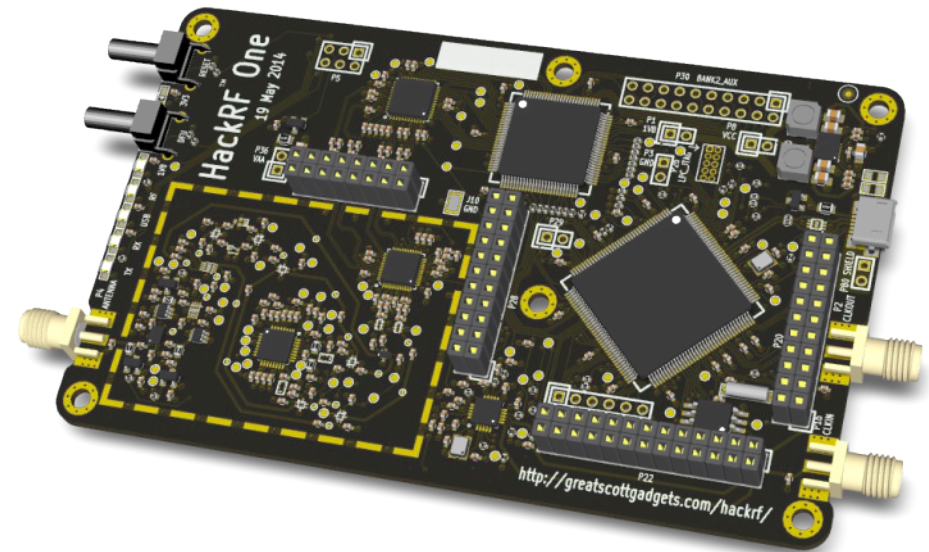
Pcbnew has a simple but effective auto-router to assist in the production of the circuit board.

An Export/Import in SPECCTRA dsn format allows the use of more advanced auto-routers.

Pcbnew provides options specifically provided for the production of ultra high frequency microwave circuits (such as pads of trapezoidal and complex form, automatic layout of coils on the printed circuit, etc).

3D Viewer

KiCad includes a 3D viewer which you can use to inspect your design in an interactive canvas. You can rotate and pan around to inspect details that are difficult to inspect on a 2D view. Multiple rendering options allow you to modify the aesthetic appearance of the board or to hide and show features for easier inspection.

Some videos showing its use can be found on youtube:

https://www.youtube.com/watch?v=zK3rDhJqMu0
https://www.youtube.com/watch?v=mI3iMBc-8yA
https://www.youtube.com/watch?v=hX4l8i4TSWY

TV-AMATEUR

Nr. 179
47. Jahrgang
4. Quartal 2015
EUR 6,- SFR 10,- US$ 6,-

agaf-ev.org · www.agaf.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://www.agaf.de/

Amateur Television Quarterly

WINTER 2015

Volume 28-No 1

ISSN 1042-198X
USPS 003-353

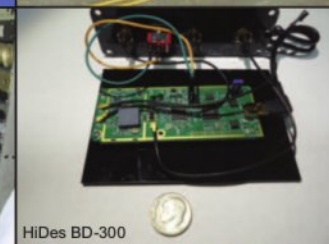SINGLE ISSUE
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How To Receive Amateur Digital TV

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Early Involvement with Television

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Raspberry pi Zero - preparing for software development tasks
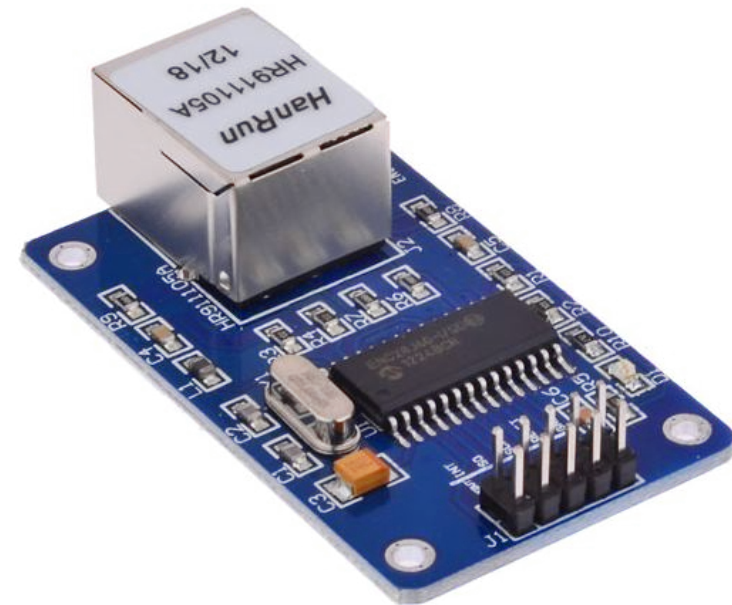
Mike G7GTN

Introduction

I have been setting up a simple development system based on the Raspberry pi zero modules to allow connection to a Windows PC to enable the use of a desktop machine for software writing. Documented are two methods firstly using wired Ethernet and lastly USB serial communication.
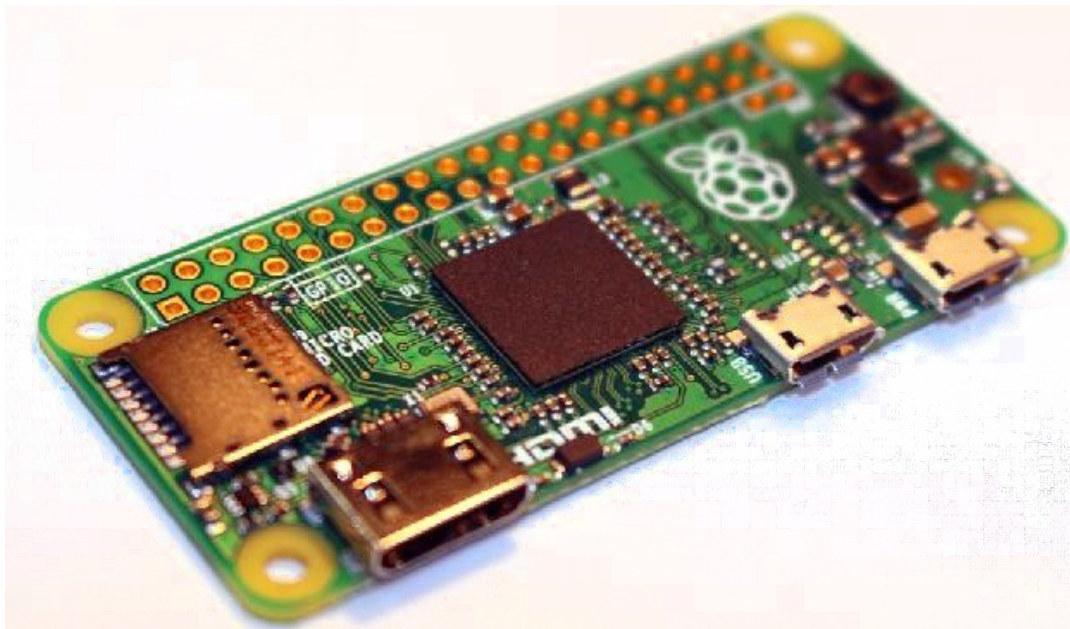
Wired Ethernet connection

To get the pi zero connected to the Internet the simplest and cheapest option was one of the eBay ENC28J60 Ethernet modules. These are 10MB speed and controlled via the SPI bus, more detailed information on this protocol is available from the following wiki article:-

https://en.wikipedia.org/wiki/Serial_Peripheral_Interface_Bus

The module requires several jumper cable connections as depicted in fig1

The first requirement is to enable the built in SPI interface, one method is to go in to the preferences menu fig2 and select Raspberry pi configuration then tick the SPI enabled option. Also whilst in this screen make sure you enable the SSH option.
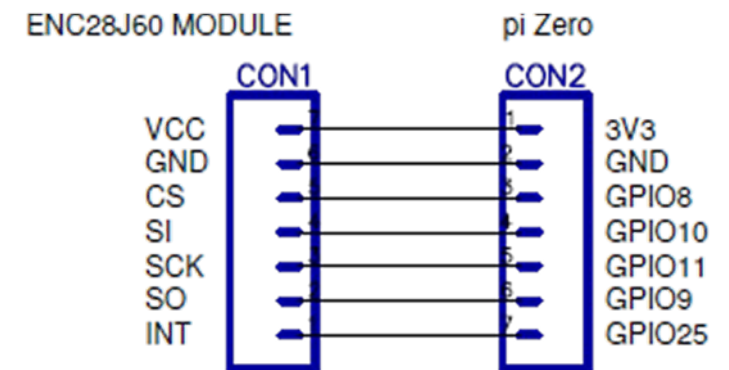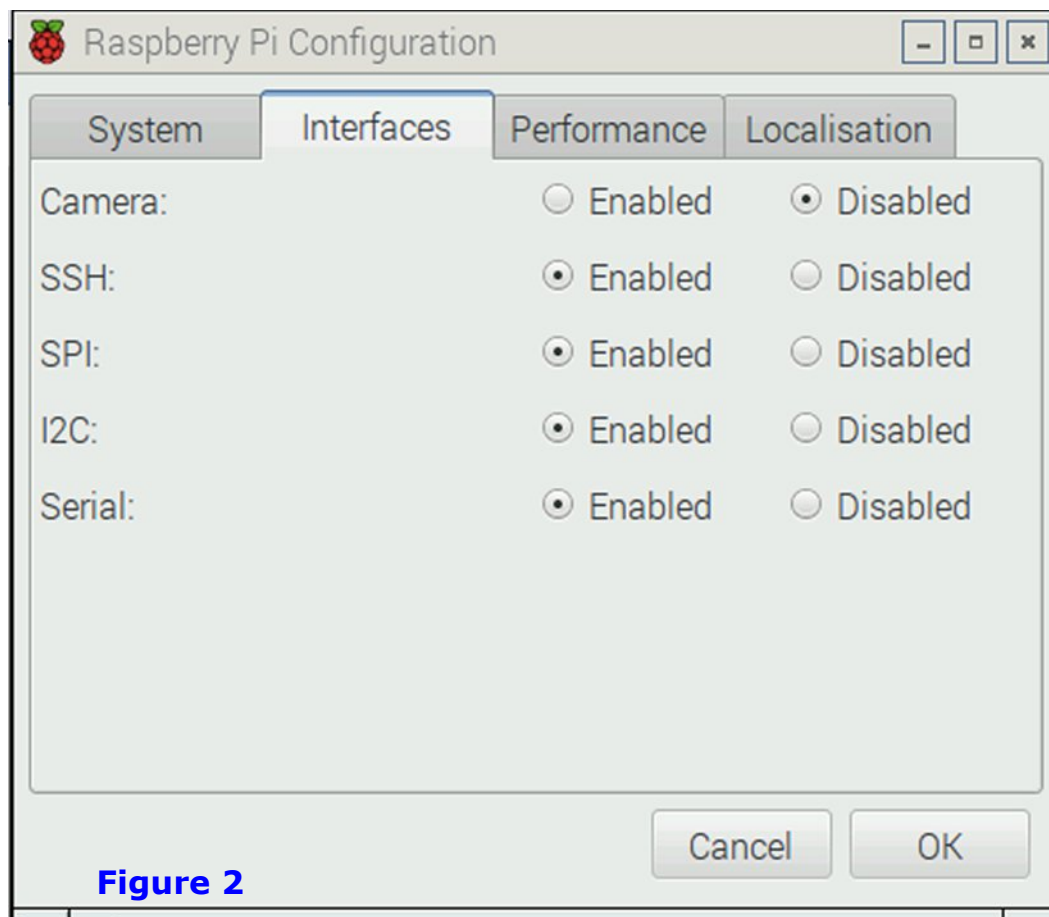
Figure 1

Figure 2

We now have to edit our main system config.txt file that is located in the boot folder to load in the required Microchip ENC28J60 driver module. The following additional line will accomplish this

dtoverlay=enc28j60

now re-boot your pi Zero for this overlay to be run on the next power up.

Once we have the hardware connected correctly we next need to find the IP address that has been allocated by your router or network switch. Open up a terminal window on your pi and enter hostname - I

We can see that an address of 192.168.0.16 has been allocated, write this number down ready to enter in to the Desktop PC's FTP client software later.

You have a few choices available the main requirement is one with SSH (secure shell login) already having FileZilla https://filezilla-project.org/ installed on my system this was the best option for me to use.

Whatever software you decide on will be similar and require the IP address that we have written down the protocol to be set to SSH mode. The user name and password for your zero (default is pi with the password being raspberry) once these details are entered press the connection button.

You may get an extra dialogue that pops up to warn you the host key is unknown, this should be allowed with whatever the default option is.
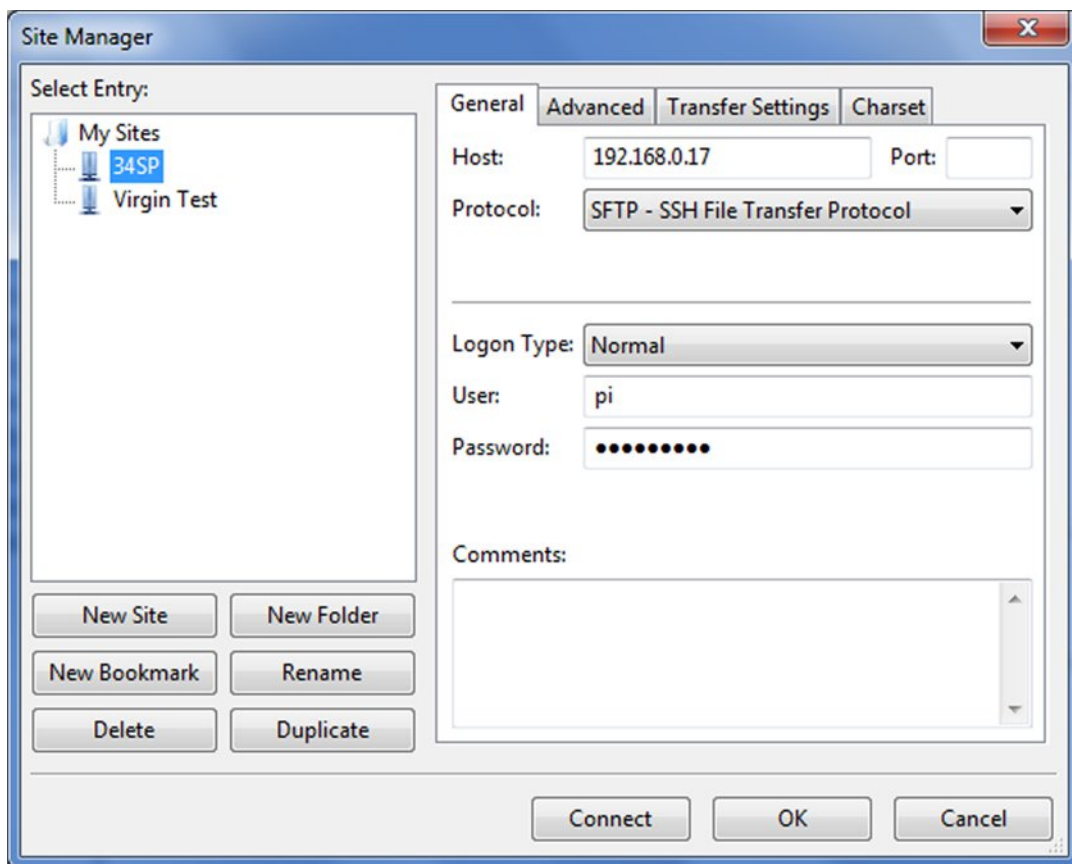
Now you can easily navigate the pi Zero SD memory card, both downloading and uploading files as you would with any normal FTP software package.

USB to serial communication
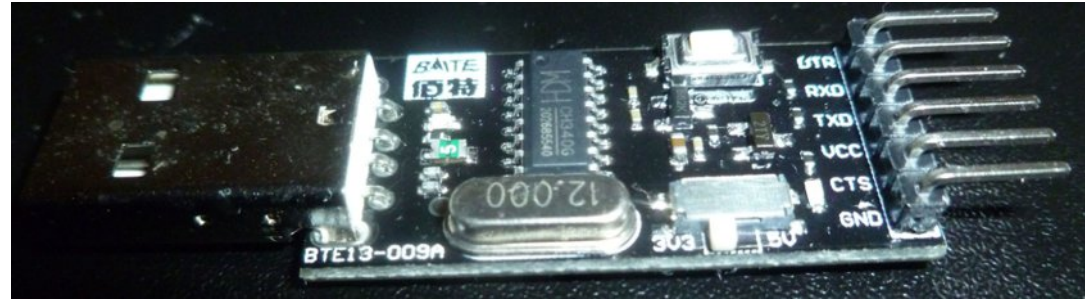
Another means of easily communicating with the Zero is to make use of a USB to serial bridge adaptor module. The one I used is based on the CH340G chipset. You need to make sure your particular adaptor can operate at 3V3 levels to ensure you do not damage the I/O pins on your raspberry pi. From the configuration screen make sure that the serial option is enabled and reboot the pi if you have just made this change now. The TX and RX pins are reversed on the pi zero end as per the diagram in figure3
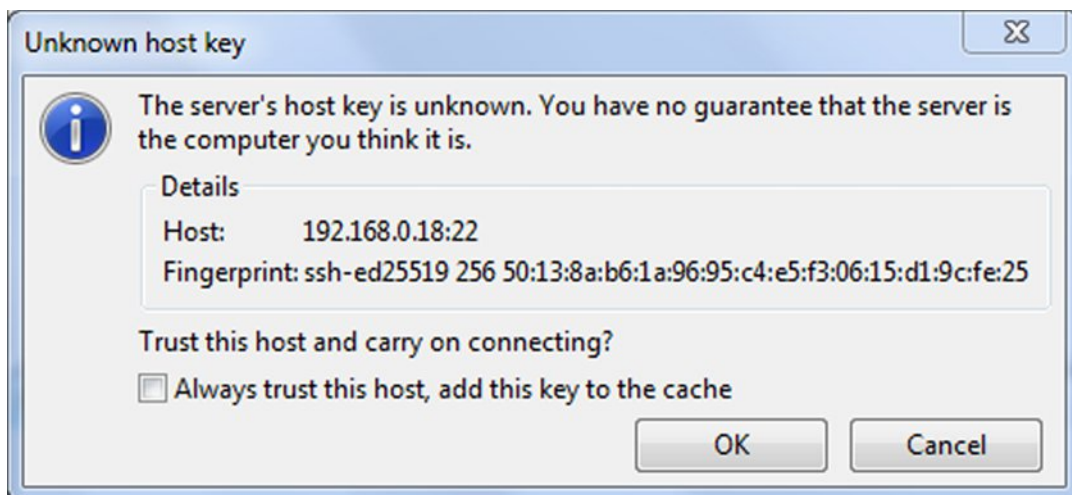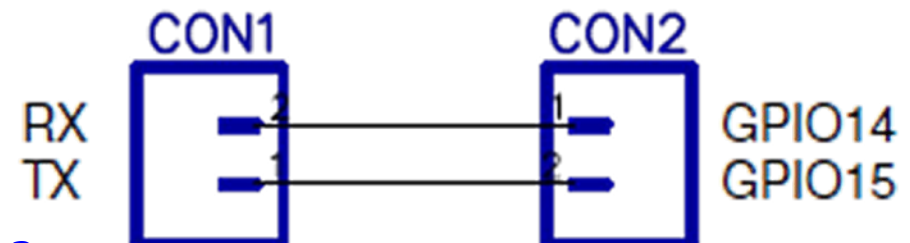

Figure 3

As with our wired Ethernet connection we now require a telnet client to allow the two systems to talk with each other. Since I use the Windows operating system I downloaded and installed Putty.

This is freeware software with enough features to make it ideal for our task. All serial communications on the Raspberry pi happens at 115200 baud rate with bits being 8 stop bits set to 1 and No flow control required.
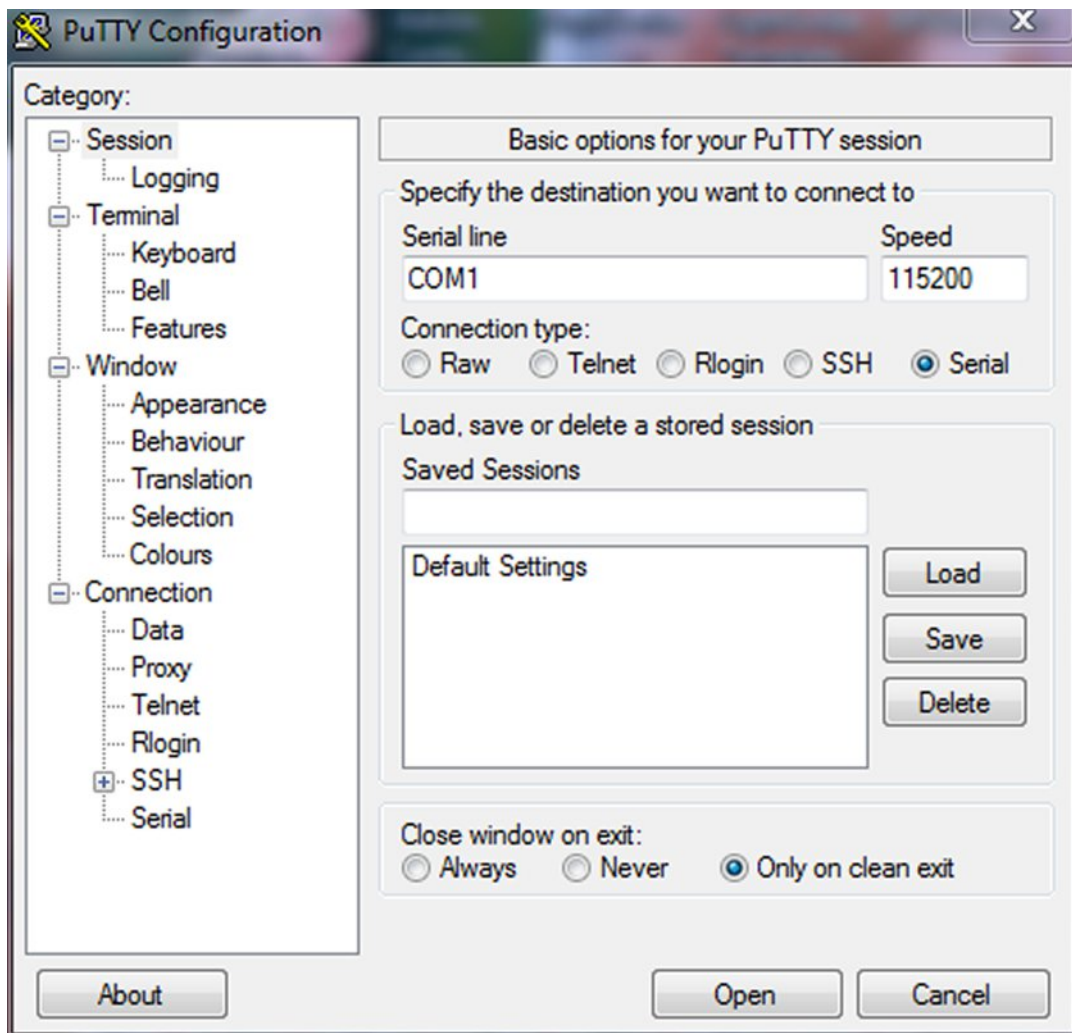
A nice handy reference to the common Linux commands is available from the Raspberry pi foundation

https://www.raspberrypi.org/documentation/linux/usage/commands.md

References

Microchip ENC28J60 manufacturers' datasheet

http://www.microchip.com/wwwproducts/en/en022889

FileZilla FTP Client https://filezilla-project.org/

Putty SSH & Telnet client http://www.putty.org/
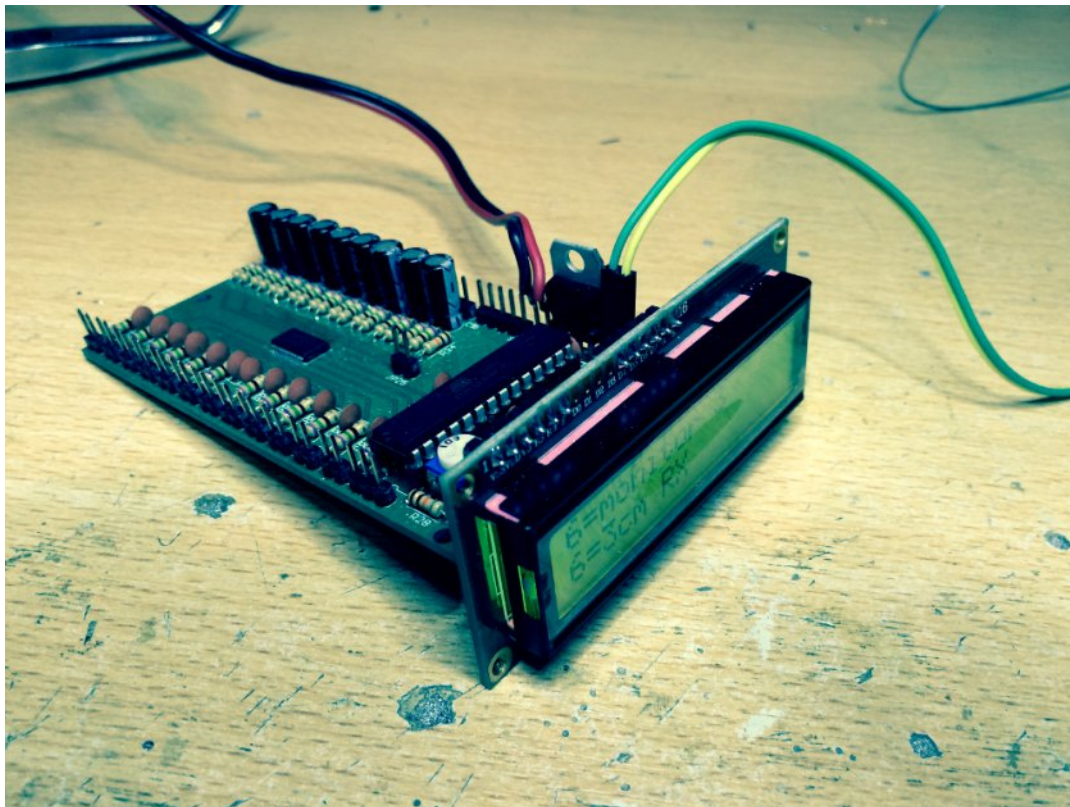
Video router update

By Marco PE1BR

Design

I read an article in *CQ-DATV magazine* about an video router by PA3WEG.

The video part is built around the FMS6501 SMD video matrix IC.

From his idea I built this video router with an Atmel 328 as controller and *Arduino* software.

The video router
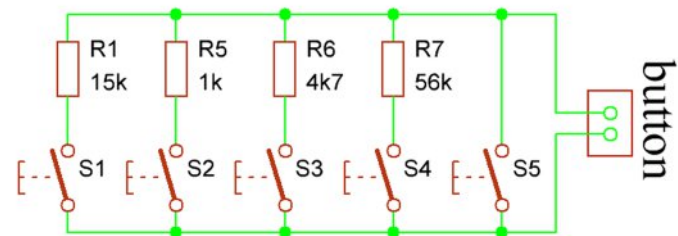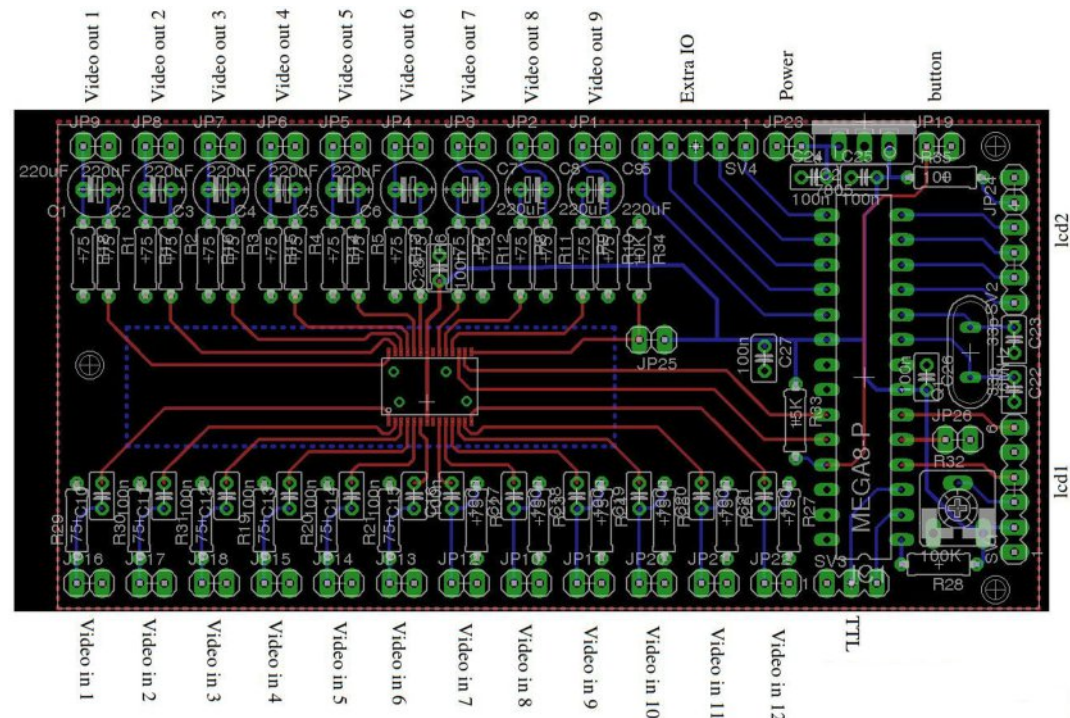
PCB and Buttons

Menu options

In the default start-up screen you can select the output channels 1-9 with the first 2 buttons.

With the second 2 buttons you can select the input channel 1-12 that has to be connected to the output channel.

The last button is to confirm your selection.

If you hold the confirm button more than 5 seconds you go to the change name menu.

Here you can select and change all the input and output names.

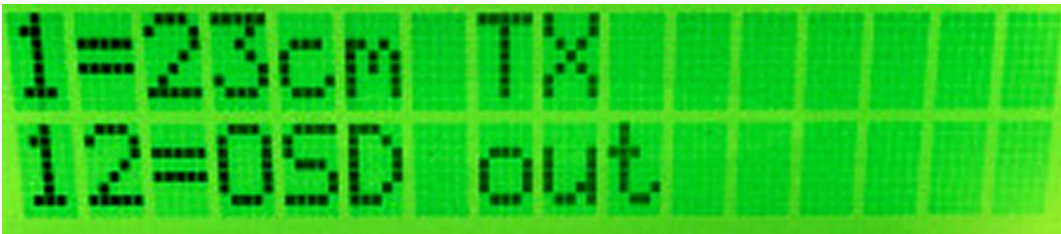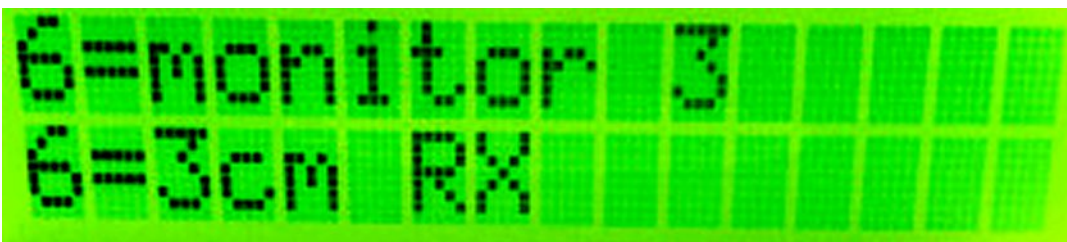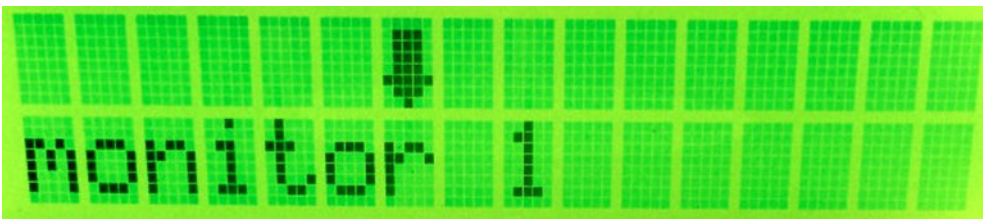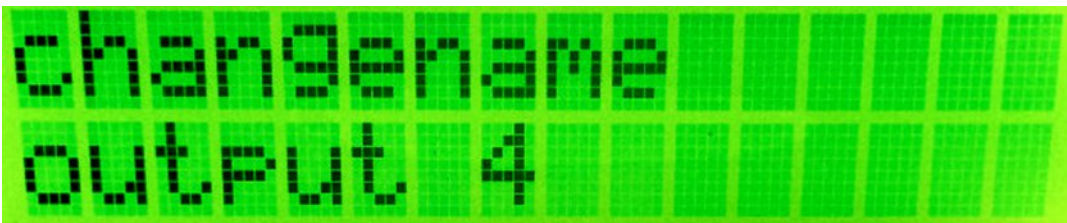All the data is stored in the internal EEprom of the microcontroller. So the next time you cold start the video router it remembered the input and output names and the input channels you connected.

Files

The following files can be downloaded from

http://pe1br.nl/?page_id=452

- schematic image
- board image
- eagle schematic
- eagle board
- arduino software

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Read CQ-DATV

For all the missing Pieces of Television

I have finally installed the v1.05 Express_DVB-S_Transmitter software for Windows on two machines in an effort to catch-up with Charles G4GUO's software development efforts. The new windows software ran smoothly on Win7 and Win10. On my notebook win7, not only did it install and run smoothly…but when I upgraded that notebook to Win10…it survived the Microsoft upgrade and was working as soon as I started Win10 without any changes or issues. Figure 1 below indicates that I was testing C615 and C920 webcams with and without a stand-alone headset microphone. All my testing so far has been for MPEG-2 (aka H.262).

Figure 2 - a screen-capture of transmitted video with the call-letters IDENT feature, received using an old DVB-S-only STB.
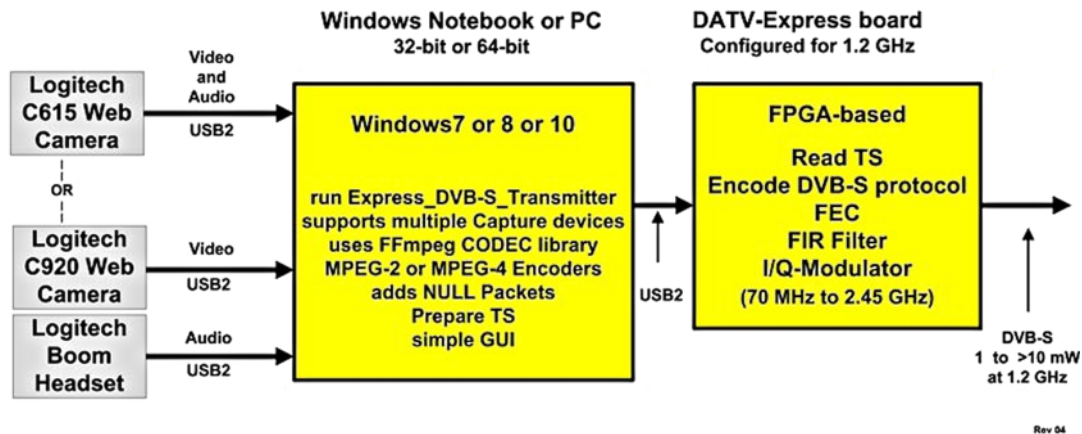
Figure 1 - Another typical set-up for Express_DVB-S_Transmitter software for Windows that I tested on Win7 and Win10. My testing used both the LogiTech C615 and C920 webcams for MPEG-2 (aka H.262).

One of the features that Charles has added is a simple "call letters IDENT" field that can be used to turn on your call letters being displayed during the transmission. See Figure 2 for a sample of MPEG-2 being received on an old DVB-S SetTopBox (STB). The SatLink DVB-S-only analyzer that I have captured the video and audio equally well.

I succeeded in sending MPEG-2 from the LogiTech C920 webcam without any of the long latency I had encountered with the C920 using earlier software with VMIX. You may remember that C920 outputs H.264 video as default…and my test set-up had to convert H.264-to-native-to-H.262, resulting in about 12 seconds of video latency (delay from camera). In fact, the C920 configuration latency was so short, I did not even bother to measure the latency.

The Express_DVB-S_Transmitter software allowed to sort through a large number of video capture formats. Figure 3 shows that for MPEG-2 testing, I choose a video capture format of "640 480 30 I420" and receive great video on both SatLink and STB.

Figure 3 - Some video-capture format settings available using C920 camera with express_DVB-S_transmitter software.

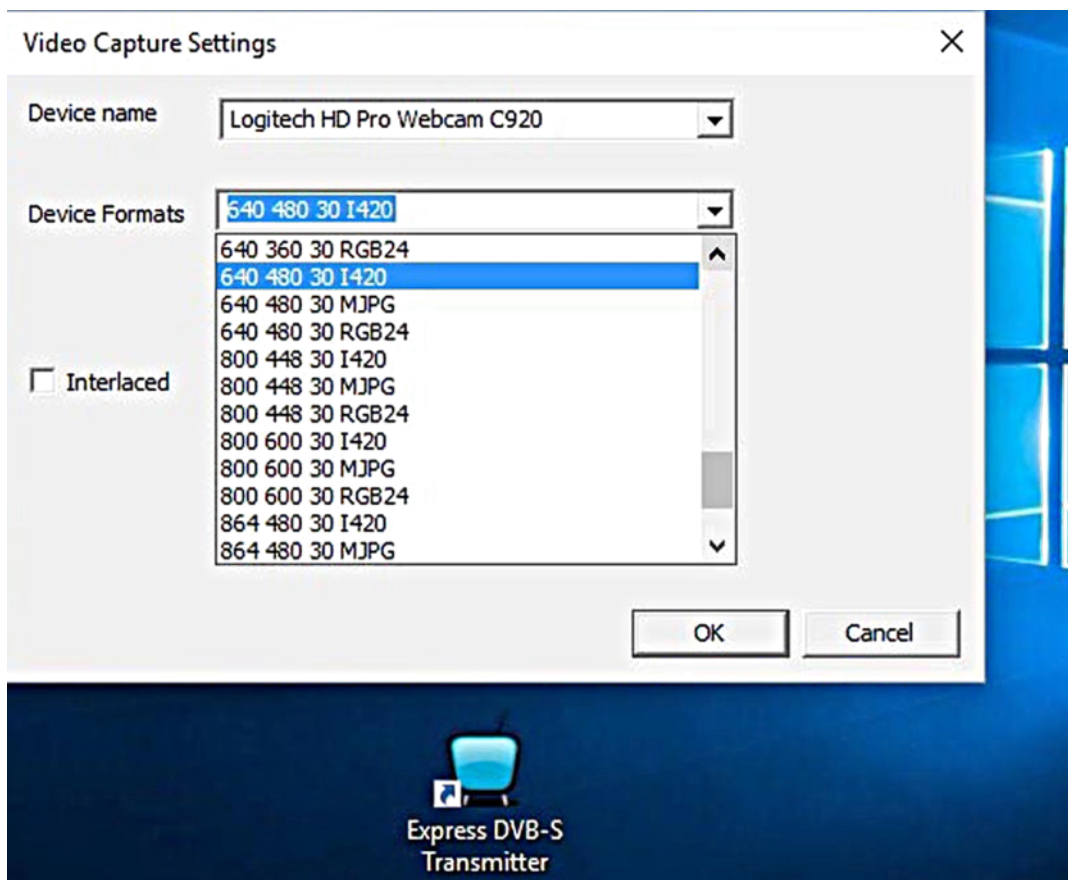My next test will be to try H.264 (aka MPEG-4) video from a C920 webcam as the video/audio payload for DVB-S protocol

73...de Ken W6HHC
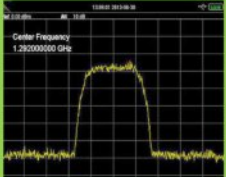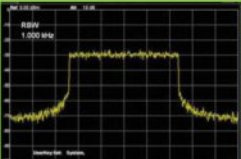
Digital Amateur TeleVision Exciter/Transmitter

now available from

DATV-Express

- A more affordable DATV exciter can now be ordered
- Fully-assembled and tested PCBA
- DVB-S protocol for DATV (using QPSK modulation)
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The problems of still pictures and flashguns - Part 3

By Trevor - G8CJS

In this series of articles, I have been looking at what are now called bridge cameras. I started with the Canon S95 and traded up to the Samsung NX500, which has now being used on two wedding shoots countless family birthdays and several studio shoots to produce a modelling portfolio.

I have used the NX500 with an Olympus mount telephoto lens via an adaptor, not the easiest of lenses to work with, but by using aperture priority and leaning heavily on the focus assist (Manual focus Lens), which produces 8 times magnification in the viewfinder for focusing purposes, it can be focused and for a lens which is close to 200mm when you factor in the crop of this APSC format camera and open it up to F2.8, can only be described as challenging.

There have been down-sides, my biggest moan with the NX500, apart from auto focus only in movie mode, was the fact that when you crank it up beyond HD resolution to 4k mode movie mode, the crop factor increases making it difficult to produce hand held movies. It is fine at HD and with the lens set to 16mm. Even with an APSC size sensor it performs well and if it was full frame, well I think it would be awesome.

I love pictures shot with a small depth of field, they really bring subjects in the foreground out.

Studio Shot using the NX500 and a White Studio

My pet hate that is guaranteed to spoil any portrait picture is something distracting in the background. Like a tree or worse a flag pole or sign growing out of the subjects head. The solution for both stills and movies is to soften the background with a telephoto lens and large aperture, hence the Olympus lens.

The worst thing bridge cameras do is panning shots and like all bridge cameras there is some frame jerk. That really needs slow panning, but the NX500 does fair a lot better than camera costing more.

In this issue I was going to finish off by looking at inexpensive studio lights and shoot some examples of good and bad studio lighting. Unfortunately, between issues the flash gun stopped working and I have had to return the camera to Simple Electronics.
It has been with them two weeks now and I have not heard a peep which is worrying.

The original purchase was via mail order as Samsung seemed to have pulled out of all the UK camera shops and in a recent press release, said they were reviewing their presence in the UK camera market.

I notice that the Simply Electronics website lists them as no longer in stock and I am starting to worry if Simply Electronics engineers are not up to sorting out why when you switch on the small flashgun the camera will not acknowledge its presence on the menu.

Olympus telephoto lens at F2.8 and a subject that will not pause for you to set focus, when working with very limited depth of field

It was a sub £400 camera with interchangeable lens and capable of 25M pixels+ and 4K movie mode and will be hard to replace, if I end up with a refund rather than a repaired camera.

I had already made some studio lighting decisions and the first one was to use continuous light sources, not because of the flash problem, but lighting always revolved around xenon flashguns, they were good at the time as heat was kept down and the provided enough light for 400 ISO films. The down-side was they were difficult to position as you could not see

the light, this was partly overcome by adding tungsten modelling lights, but it inevitably required actual pictures to verify the results which is a digital hassle, but back in the film days was a nightmare.

Technology has moved on and the 400 ISO film shoot is now behind us with the introduction of digital cameras. Apart from instant pictures, required light level has dropped as 400 ISO shoots are a thing of the past . Continuous lights enable you to see what you are doing when you position them and also they can be used for movie shoots, interviews and the like, which makes them dual purpose so why would you go back to flash lighting.

Proposed Studio Lights and background at around sub £100

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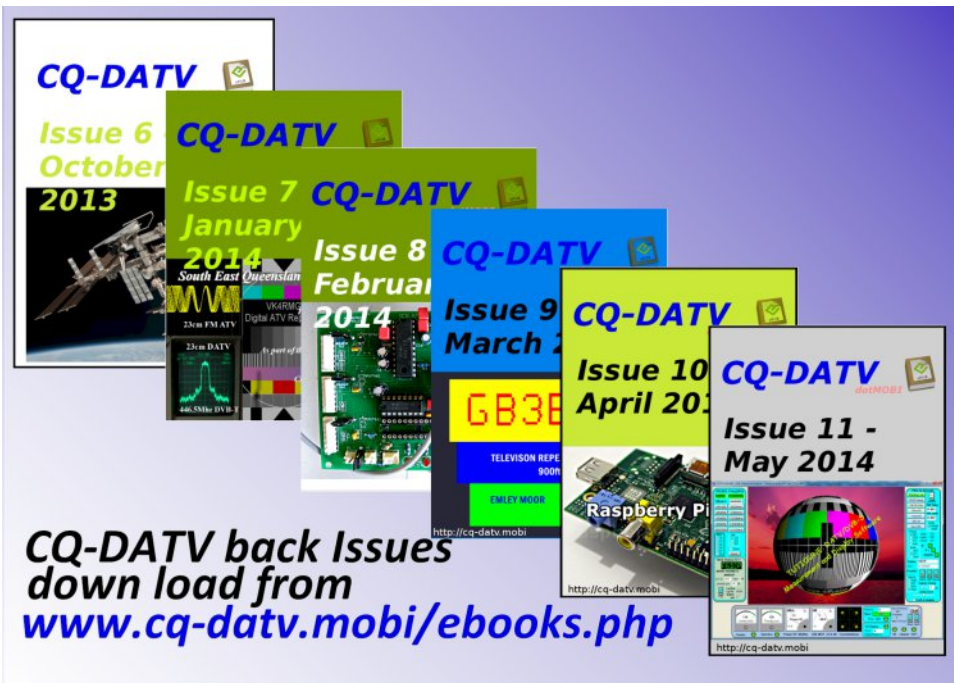
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CQ-DATV
dotMOBI
Issue 35 - May 2016
http://cq-datv.mobi
ISSN 2059-2191