In this issue

Production Team

Ian Pawson G8IQU
Trevor Brown G8CJS
Terry Mowles VK5TM
Jim Andrews KH6HTV

Contributing Authors

Jim Andrews KH6HTV
Trevor Brown G8CJS
Ken Konechy W6HHC
Dave Pelaez AH2AR
Dan Rapak WA3ATV

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Please consider contributing an article!

Editorial

There has been a cyber attack on the WordPress door into the BATC IT. Always sad when people can put so much time and effort into destroying something that others have worked hard to build.

For those of you not familiar the streamer project, it was hand built by Chris Smith G1FEF. Chris is no longer on the team, so commercial solutions were adopted. The problem with commercial solutions is their roll out.

This provides opportunities for the hackers to open doors, that a one off solution built and maintained by Chris did not. Sad we have to resort to these commercial solutions and even sadder when it opens a door to a cyber attack.
The good news is that it is now back and working.

Let's hope that this was a one off isolated event. CQ-DATV has all its IT handled by Ian and most of it revolves around code he has personally written like the new magazine index. We are not being complacent and we are not throwing out a challenge to cyber hackers, but fingers crossed, we do not suffer any of the WordPress problems.

While others have been up to no good there has been a lot of people definitely up to some good in that they have produced CQ-DATV 70 and in this issue there is:-

- Jim Andrews, KH6HTV who has been revisiting his streaming the Boulder ATV repeater.

- Trevor is still experimenting with the Grass Valley control panel and now Mike has added a PCB design for his I2C interface

- Ken Konechy W6HHC has produced another DATV express report with a DATV picture received by G4GUO from G4BAO using QATAR OSCAR100

- Dave Pelaez has been adding digital ATV (D2) receive and transmit capabilities to the operating position by integrating new equipment into the ham shack, and finds this can get somewhat involved.

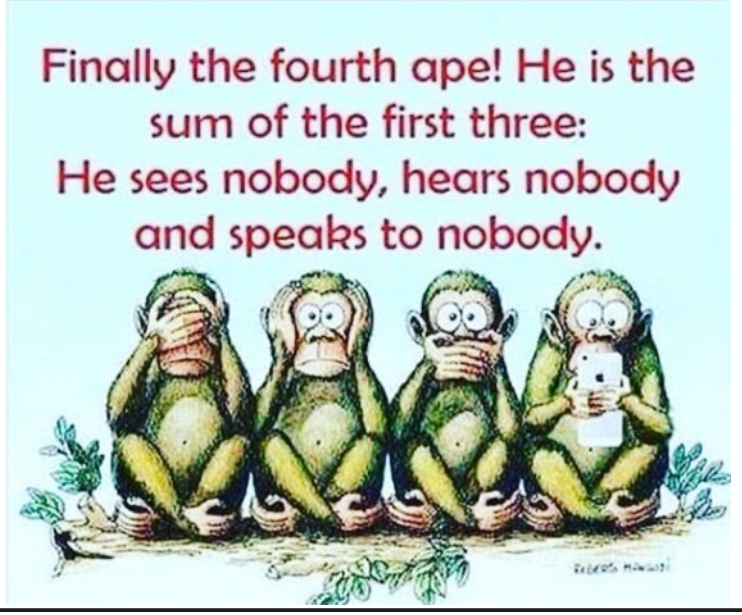
- Trevor has produced another step in the development of video tape recording, along the road that started with Quadruplex and has now reached digital recording, with many advantages from read before write and much more.

- Jim has been looking at the laws that govern ATV propagation, something well worth looking at

- Dan Rapak WA3ATV reports on MidAtlantic ATV that is a coalition of ATV repeater owners, with a strategic planning meeting that took place at Hoss' Restaurant in York, Pennsylvania. As the name implies, members are from the various states that make up the MidAtlantic region of the US.

- One from the vault is a look at the implementation of Tally Lights to the popular Vmix software and Trevor evaluates their rather unusual solution.

As we always say sit back and enjoy CQ-DATV 70.
CQ-DATV production team



ARRL Launching New Podcast Geared Toward New Radio Amateurs

(Edited from ARRL.ORG website by KI6X)

For those just getting started on their Amateur Radio journey, ARRL is launching a new podcast aimed at answering your questions, providing support and encouragement for newcomers to get the most out of the hobby. The podcast "So Now What?" will launch on Thursday, March 7, and new episodes will be posted every other Thursday.

Co-hosting "So Now What?" will be ARRL Communications Content Producer Michelle Patnode, W3MVP, and ARRL Station Manager Joe Carcia, NJ1Q. Presented as a lively conversation, with Patnode representing newer hams and Carcia the veteran operators, the podcast will explore questions that newer hams may have and the issues that keep participants from staying active in the hobby. Some episodes will feature guests to answer questions on specific topic areas.

Topics to be discussed in the first several episodes include getting started, operating modes available to Technician licensees, VEC and licensing issues, sunspots and propagation, mobile operating, contest- ing, Amateur Radio in pop culture, and perceptions of Technician license holders. Listeners will be able to find the "So Now What?" podcast on Apple iTunes, Blubrry, or Stitcher (free registration required, or browse the site as a guest) and through the free Stitcher app for iOS, Kindle, or Android devices…or wherever you get your podcasts. Episodes will also be archived on the ARRL website.

Source: Greg Bohning, W6ATB *W6ATB@w6ze.org*

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

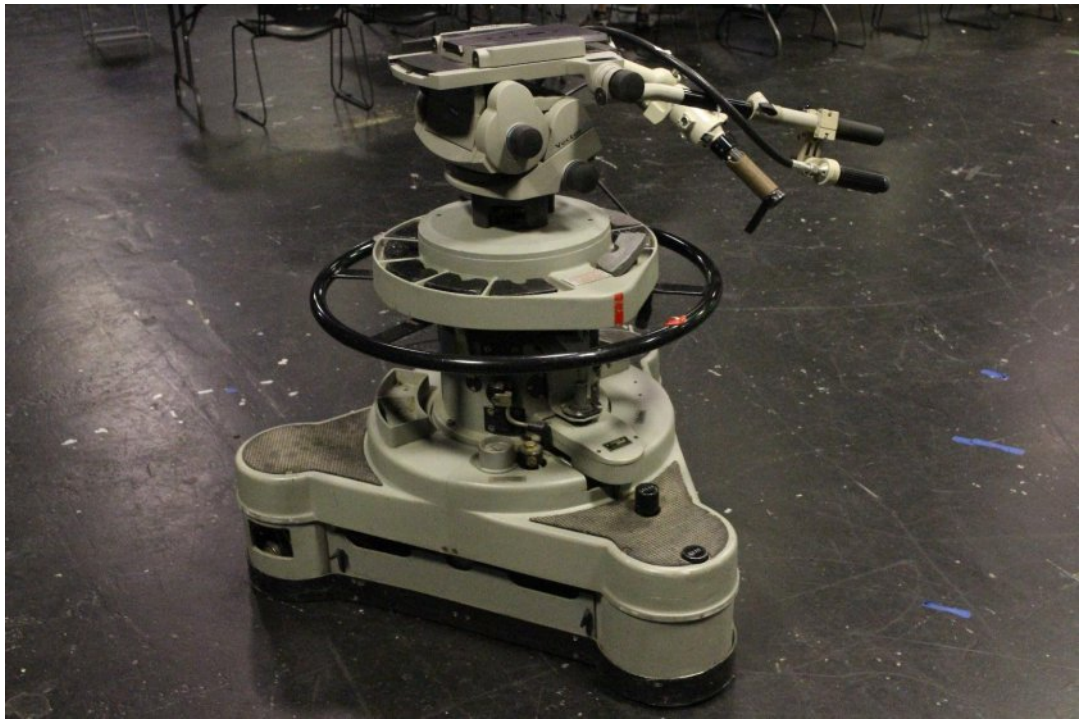
‘They all thought the world’ of Bury St Edmunds Vitec chief designer Ted Galione

Ted Galione

An influential and award-winning designer for a specialist engineering company in Bury St Edmunds has died aged 94. Ted Galione was the chief designer for broadcast equipment at Vinten, which produces camera support systems and accessories.

With the company’s then director Bill Vinten, he created the Fulmar pedestal – the first fully pneumatic pedestal for TV cameras – for which they won a Guild of Television Cameramen Award. Ted also received an MBE in 1980 for his contribution to exports.

“He was influential in his field,” said Andy Murrow, who joined Vinten in 1979, worked for Ted as an 18-year-old and is now principal mechanical design engineer.



Vinten Fulmar 3702, TV Station Dolly Tripod

“The Fulmar was the gold standard for TV studios around the world in the 70s and 80s.

“He was a real mentor and he was prepared to impart his wisdom to try to further your career. He was very supportive. He had come from the shop floor so he was able to engage with everybody within the company.”

Part of the generation who started work aged 14, Ted joined Vinten in London.

He was a plane spotter during the World War Two air raids and, in the Army, served in the North African and Italian campaigns as well as in Palestine.

On returning to Vinten, he became a draughtsman, moved with the company to Bury in 1964 and retired aged 65.

His work helped Vinten, which continues as a brand within the Vitec Group, in Easlea Road, win the Queen's Award for Industry.

Ted was a member of the Freemasons, Probus Club plus Bury golf and bowls clubs.

His brother Michael, 84, said: "He was probably the most liked person in Bury because everybody I've come across all think the world of him."

Source: *https://www.buryfreepress.co.uk/news/they-all-thought-the-world-of-vitec-chief-designer-ted-9063813/*

On the cheap?

Mario Badua KD6ILO has been busy. He just discovered using FM-TV on 5 GHz with el-cheapo gear. Here is his home brew 5GHz dish antenna.

The ATV in California

As I would expect and all of you already know that the BATC streaming service is down and will not be fixed or corrected till this weekend, maybe?

But I knew this would happen eventually and that is why I got a LIVE stream input on YouTube as a now primary to the backup [BATC] and has worked very well for us. Delays are few and far between. WW7ATS in Seattle, WA also has their stream on YouTube.

KD6ILO DATV
https://www.youtube.com/watch?v=Xe6JslORB3I

The team and I are conducting transmitter evaluation tests which include, power measurements, spectrum emission, adjacent channel and phase noise. and also modulation accuracy measurements, BER, MER and channel impulse response on the new units.

A new project on my home bench to support the primary DATV system, is a little brother to cover the shadowed areas that are in neighborhoods, valleys and small community's.

VR-Link, my name for this project, a SUV mobile platform to help Urban SAR, SAR, and CERT relay a Man-pack video unit to the main repeater network when on foot conducting damage assessments.

The 2 RU size platform is 13.8 VDC powered, it has a small AV control section, IP power [on/off] management unit or can be turned on manually, RF modulator unit currently a DVB-T dual-band 13cm/23cm transmitter.

The RF modulators can be changed out to different modulators. The receiver section also can be changed to what ever we want to integrate, AM/FM or Digital or mixed [three inputs available].

A mobile broadband 4G router is on board for remote access, computer interface, power unit off/on and transmitter on/off /standby. You can interface with a PC at the IC post via the onboard WiFi on the router to control the unit even with a smartphone app.

I'll be placing this in my Jeep Grand Cherokee. It can be used as a on site repeater [standalone] no up links to a repeater network, bring in Skype calls and other video conferencing to site.

The VR-Link project will be my last project build for the year 2019. Spring-Summer the team and I will be conducting field test coverage with the new repeaters, exercising the Man-pack unit and training the CERT communications teams with it and well deserved vacation.

Mario KD6ILO

Due to circumstances which we are unable to explain (ghost in the machine?), a line was missed out in the listing for the CVG Panel lamp Test BASIC program in the last issue (69).

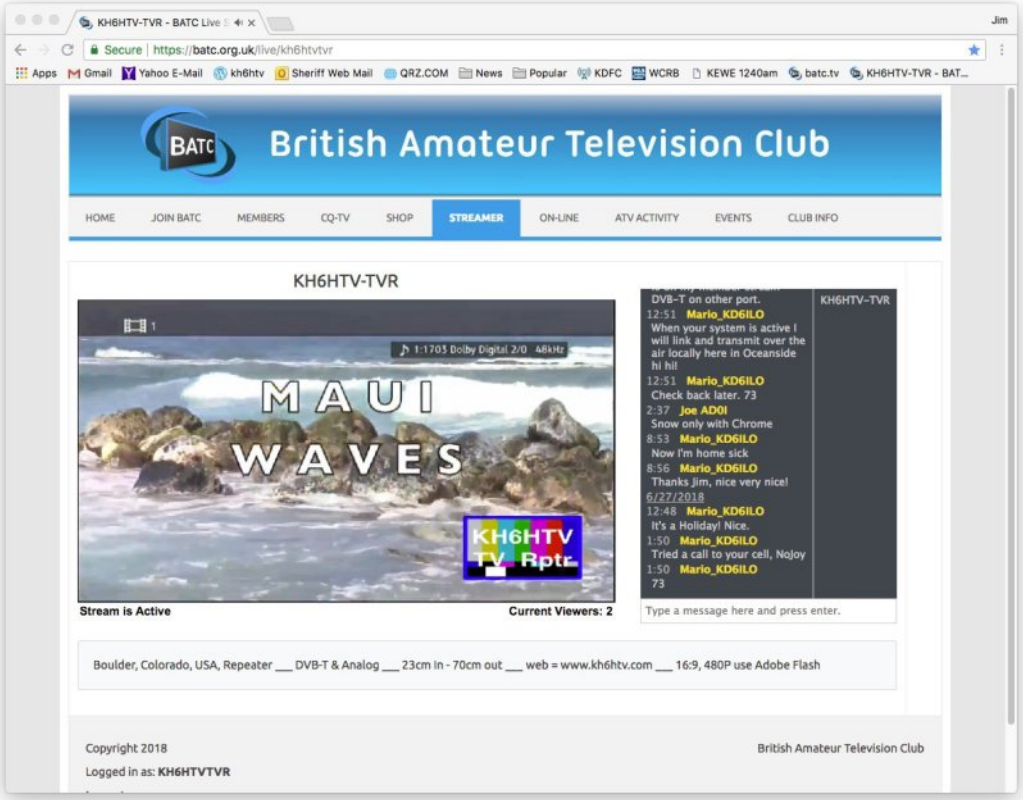
The full listing is shown at the right.
The line that was omitted has the comment 'latch number.


```
' GVG Panel Lamp test
let PRT1=63
let PRT3=61
let PRT4=56
 i2c.setup(4,5)
     i2c.begin(PRT1)  'set write lamps to low
       i2c.write(254)
      i2c.end()

for B=1 to 10          'number of flashes
  ' light all lamps
 for a=0 to 10
delay 10
i2c.begin(PRT4)        'data bus
   i2c.write(254)
    i2c.end()
     i2c.begin(PRT3)    'address bus
       i2c.write(a)     'latch number
          i2c.end()
            next a

' clear all lamps
for a=0 to 31
 i2c.begin(PRT4)          'data bus
   i2c.write(0)
      i2c.end()
         i2c.begin(PRT3)  'address bus
           i2c.write(a)
             i2c.end()
    next a
  next b
end
```

Notes on Streaming TV Repeater Video via BATC

Written by Jim Andrews, KH6HTV

Reproduced from the BOULDER TV Repeater's REPEATER March, 2019 with kind permission



In June of 2018, I worked out the ability to receive the Boulder TV repeaters' signal and stream it over the internet to the general public. The above computer monitor screen capture shows the result.

The key hardware/software items required included:

1. A DVB-T receiver with composite video and line level audio output.

2. A composite video (+audio) to USB converter. (plus driver software)

3. A PC windows computer

4. computer program vMix and

5. A connection to the internet.

RECEIVER: The receiver used for the DVB-T signal from the TV repeater was what is referred to by the local, Boulder, Colorado hams as the "Combo" receiver. Most ATV hams are using this receiver. We call it the "combo" because it is capable of receiving both UHF, DVB-T, and L-band, DVB-S. The receiver is very low cost and has been imported from China. It was intended for the consumer electronics market in Europe, etc. It was previously sold by KH6HTV VIDEO as the model 70-14.

Recently the firmware has been changed by the manufacturer in China. In the newest units shipped it can no longer be programmed to amateur, 70cm band frequencies. It thus is no longer available for ham TV use. I chose it for use because it always puts out a valid TV signal (both HDMI and also composite video) even when it is not receiving a signal.

When there is no signal, it displays an image of a TV tower and the text "No Signal". When these receivers are no longer available, I would suggest that the Hi-Des model HV-110 be used. It will however give a totally black screen when there is no input signal, unless the on-screen-display is activated.

VIDEO/USB CONVERTER: The USB dongle used to input standard. definition (480i) composite video (plus stereo audio) into the computer via USB was a *StarTech.com* model SVID2USB23, recommended by Don Nelson, N0YE.

It is available for purchase on-line direct from the manufacturer. It sells for $54. Driver software for this converter must be down loaded from the *StarTech.com* web site and installed in the PC computer to be used.

The composite video and stereo audio signals from the DVB-T receiver are connected directly to the RCA jacks on this converter.

PC COMPUTER: The computer used was an HP laptop running Windows 10. Nothing special, most any decent PC running windows should work OK.

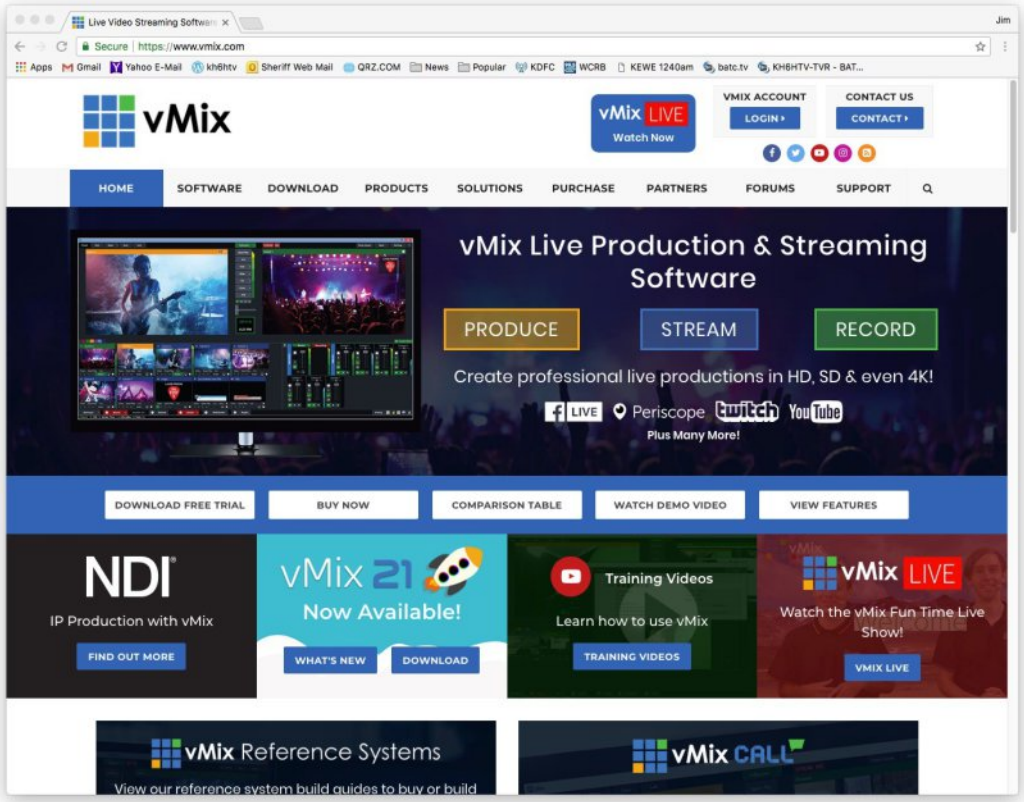
SOFTWARE: The program vMix was used to control the input video source and stream it out over the internet. A free version is available from *www.vmix.com*

The program is an extremely powerful program for mixing various video (& audio) sources, plus adding various graphical effects.

The resultant video and audio can then be output over HDMI, or recorded to a file, or streamed over the internet.

Depending upon the version purchased it supports standard definition (480i), Hi-Definition (1080P) or ultrahigh definition (4K). The prices range from $60 to $1200. A Basic version is also available Free at no charge. The Basic version supports up to four (4) A/V inputs with max resolution of 768 x 576.

While the basic version is intended for use a demo program, there is no time limitation on how long it can be used.



The screen shot shown below is the typical vMix screen.

The four images on the lower row are the four selected video sources.

The source on the left was the external video source of the combo receiver feeding live video to the USB converter.

The next source was a continuously running .mp4 file with repeater ID information. The third source was a simple .jpg file with color bars and the repeater call sign.

The fourth source was another, more extensive, .mp4 file with a 2 minute slide show of the repeater's photos and information.

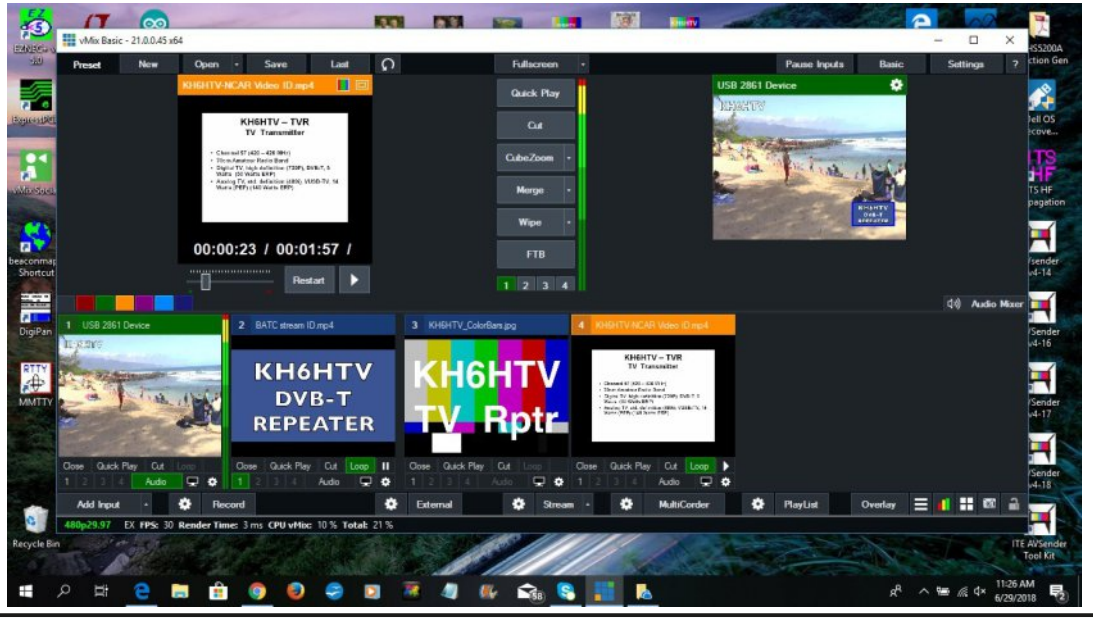
The image in the upper right corner is the actual image going out of the program currently.

The image in the upper left corner is the next video source selected to be moved into the output position.

What I am using is the free, Basic version. To use vMix, it must first be activated with a registration key.

This is obtained by registering your name, e-mail, etc. first with vMix. They then email to you the 18 character registration key. I would suggest that you first do some experimenting with vMix using various video sources, such as the external USB dongle video input, the built-in web camera, a stored .mp4 video movie file, a .jpg photo image, etc.

Try out all the various, available (not all available in the Basic version) features. I found it helpful to just work my way through the 263 page vMix User's Guide book. It is available in .pdf format from vMix's web site.



To select the external USB dongle video source – first click on the arrow on the "Add Input" button found in the lower left corner on the task bar.

This source does not appear in the available choices on the list.

Select "More".

This brings up the Master Settings menu and the sub-menu, "Video".

Next select "Camera".

On the next sub-menu, first line, click on the down arrow for a list of available devices. The composite/USB dongle is listed as "USB 2861 Device".

Select it.

Then make sure the Audio Device is also selected as "Line (USB2861 Device)".

Then click "OK".

The video from the DVB-T receiver should now appear in one of the pre-view boxes on the lower 1/3 of the vMix screen.

Access to most of the Settings is via the "settings" button on the upper right hand corner of the task bar. Other individualized "settings" are accessed via the Gear symbols found next to a particular item. I recommend that you do NOT change the vast majority of these settings, but leave them in the factory pre-set condition.

I used the Picture-In-Picture (PIP) feature to super-impose some additional info to help the internet streaming viewer know that he is watching the Boulder TV repeater's stream. I wrote a simple movie file of a few very simple slides to give some brief info about the repeater, to be used in the PIP box. Each slide lasted 4 seconds. It was saved as an .mp4 file on the PC.

The size and position of the PIP is controllable. This is accessed by clicking on the "Overlay" button in the lower right hand corner on the task bar. The values I opted to use were: Zoom = 0.2, Pan X = 0.65 and Pay Y = -0.65. I also added a Blue border with Thickness = 25 and Radius = 5.

BATC STREAMING SERVER: To stream the Boulder TV repeater's signal over the internet, I chose to use the open server provided by the British Amateur Television Club (BATC) in the U.K. Steaming on the server is a free service, available to all BATC members.

The streaming from it is open and available to the general public at no charge and with no log-in procedures. Plus, their streaming is directly viewable with most browsers and does not require proprietary software. The BATC web site is: *www.batc.org.uk*

The first step is to join the BATC. Annual dues are £8 (about $10). The next step is to contact the BATC administrator and request that he set you up for a streaming account. Note: if you are wanting to stream a repeater's video, he will then also set up a separate repeater streaming account with you as the administrator. The man I worked with at BATC was Dave, G8GKQ.

Dave then sent me to a separate web site, not directly accessible from their public site. This page gives full details about using their video streaming service and how to set it up. After Dave sets up your account (or 2 accounts if you are also doing a repeater stream), you need to go into your account(s) and enter some more data and make a few choices on streaming.

Here below are a few extra instructions Dave sent me via e-mail.

I sent Dave the question — "Does BATC have recommendations on the resolution settings of the video stream sent to your server? For example: can I use H.264, at 29.97 frames/sec and 720x480 ?? Or should it be at lower resolution, etc. ??"

Dave's Reply was — "The streaming server will package up exactly what you send to it, and send it back out. I use H264 25 fps 720x576 at 576 Kb/sec for all my streams, but H264 29.97 fps 720x480 will work perfectly.

It will have black bars either side as the window is 16:9, so you could send it 480x853 or 720x1280 if you have a 16:9 feed. You can adjust the bit rate depending on your target audience and your uplink bandwidth."

There was an issue with the name for our Boulder repeater. In the U.K. repeaters have a unique call sign. Here in Boulder, our repeater uses my own personal call sign. I explained to Dave that the FCC discontinued many years ago issuing separate call signs for repeaters. Thus Dave had to setup a unique name on their system for our repeater.

Once you have the assigned server password (key) from Dave, log in and, from the Members tab (where you should be straight after login), select account dashboard.

Scroll down and under streaming details you will see the "Stream RTMP Input URL". The 6 lower case characters there are the stream key. This key is private to you and prevents anyone else hijacking your stream. It should be kept confidential.

You should also tick the "Stream Listed" box so that your stream shows up on the list of available streams.

I would also suggest you tick "Chat On" and "Guest Chat Log In" to allow stream viewers to send text comments about your video stream.

Streaming Type: choices are either FLASH or HTML-5

This is a controversial selection.

BATC's default is to use FLASH. It directly impacts the user's ability to view the stream. BATC's wiki page discusses the differences.

In short, the whole notion of browser plug-ins are going away. Publishing to the web platform (HTML5 and JavaScript) is going to get you the best experience and widest compatibility inside a web browser over the long term.

From 2020, Adobe will no longer support the Flash plug-in.

I first tried to use FLASH, but found too many issues with it, so the Boulder ATV stream is now using the new and improved HTML-5.

Stream Description: We can type anything we want in this box. It will appear on the steaming web page below the streaming video.

Don't forget to click the "Save Changes" button after making (or changing) settings.

vMix STREAMER

SETTINGS: After you have your account(s) set up at BATC and you have the streamer name and key, etc. You now need to make some final settings in the vMix program.

Step 1: First click on the Gear symbol beside the STREAM button on the lower task bar.

Enter the following data: Profile = Default Destination = Custom RTMP Server URL = rtmp://rtmp.batc.org.uk/live/ Stream Name or Key = call sign + (secret 6 character key) Quality = h264 480p 1mbps AAC 96kbps Application = FFMPEG

Then click on the "SAVE and CLOSE" button

Step 2: Next open the General Settings Menu. i.e. click on the "SETTINGS" button in the upper right corner on the task bar.

Next click on "EXTERNAL OUTPUT".

In this sub-menu table:

select vMix Video/Streaming do NOT select Use Streaming Settings, External Renderer nor Use Display Settings For Frame Rate - set both boxes to NTS 29.97p

For Output Size - set the left box to 854 x 480 & set the right box to 720 x 480 (note: per Dave at BATC, 854x480 should give the proper 16:9 display ratio)

For Audio Delay – do not change, leave at 0 Then click "OK" button to save these settings. When these changes are made, vMix needs to be restarted.

Step 3: Click on the "STREAM" button on the lower task bar. Once your computer has established a link to BATC, this button will change colors to red.

At this point, your computer should now start streaming your repeater video and audio to BATC.

To check that it is working, fire up another computer and go to: *https://batc.org.uk/live/*

Click on your call sign.

You should now see a web page which looks like the screen capture photo shown at the beginning of this article.

If so, CONGRATULATIONS – You are Streaming ! ! !

Grass Valley Mixer Conversions - Part 3

Written by Trevor Brown G8CJS

Lets start by apologising a for a gremlin that crept into the code in the last issue. There are three lines of BASIC to each i2c routine and somewhere in the conversion to e-book and onto the PDF version that was created from the e-book, one of the lines of the 3 line i2c routine disappeared.

i2c.write(a) 'latch number

This missing line of code goes under the line with the comment "address bus" (the first one)

Apologies from me I did proof the article and my intention was to copy the code from the proof magazine into the ESP and dongle and test it, but my ESP module seems to be having problems, good job the ESP module is not mission critical and at the moment is just a way to look around inside the GVG switcher and try some routines via the i2c bus interface.

We also now have a second GVG panel and set of manuals. My thanks to Martin for driving up to Leeds from Market Rasen with these, but we are still a diagram short. The manuals Martin brought are Volume 1 and Volume 2, so two volume 2's and one volume 1 and still a module in the remote panel is missing. Perhaps there is a volume 3. If you know the answer drop me an email.

Our collection of GVG hardware and manuals is growing

Meanwhile I have been pressing on with a better lamp routine that is superior to the simple lamp tester I left you with in the last issue. The new code allows the dongle to control any specific lamp. I have also refined the code with subroutines so as it grows I can just add calls to the various subroutines. This should aid an understanding of what is happening and where within the programme. This is the code so far.

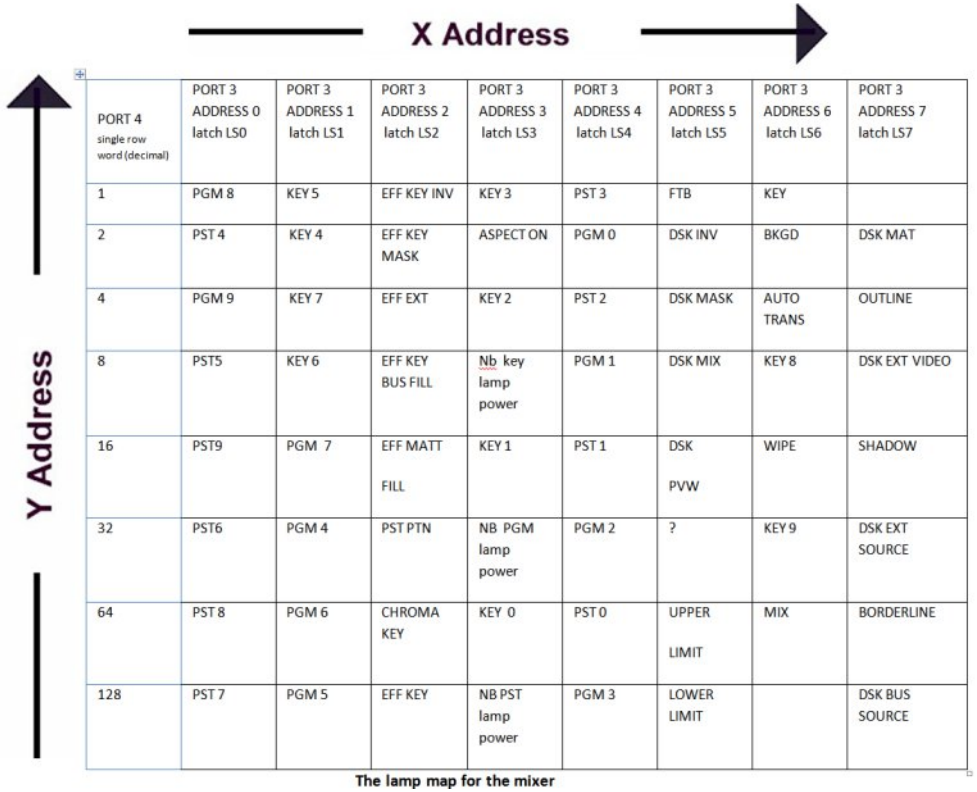
```
 ' GVG Panel
let PRT1=63    'control port
let PRT3=61  'address
let PRT4=56  'data bus
 i2c.setup(4,5)
'gosub   [lamp test]
 gosub  [clearlights]
 gosub   [enablelamps]
i2c.begin(PRT1)        'contol port
   i2c.write(62)      'writelamp
     i2c.end()
       i2c.begin(PRT4)        'data bus
             i2c.write(2)         'y address
                  i2c.end()
                    i2c.begin(PRT3)  'address bus
         i2c.write(4)            'x address
           i2c.end()
             i2c.begin(PRT3)  'address bus
               i2c.write(15)  ' gash latch number
                  i2c.end()
                    end
'      sub routines
       [clearlights]
for a =1 to 8
i2c.begin(PRT4)           'data bus
   i2c.write(0)
      i2c.end()
        i2c.begin(PRT3)  'address bus
         i2c.write(a)
           i2c.end()
             next a
               return
          [enablelamps]
i2c.begin(PRT4)        'data bus
   i2c.write(168)
    i2c.end()
     i2c.begin(PRT3)  'address bus
        i2c.write(3)  'latch number
          i2c.end()
i2c.begin(PRT3)  'address bus
       i2c.write(15)  'latch number
          i2c.end()
           return
 [lamp test]
for B=1 to 10         'number of flashes
  ' light all lamps
 for a=0 to 10
delay 10
i2c.begin(PRT4)        'data bus
   i2c.write(254)
    i2c.end()
     i2c.begin(PRT3)  'address bus
        i2c.write(a)      'latch number
          i2c.end()
            next a
              for a=0 to 31
               i2c.begin(PRT4)           'data bus
                 i2c.write(0)
                   i2c.end()
                     i2c.begin(PRT3)  'address bus
                       i2c.write(a)
                            i2c.end()
next a
next b
return
```

In ESP BASIC anything proceeded by an ' is a comment and will be ignored as an instruction.

It's a good way of adding comments to a programme and also a good way of stopping an instruction from working when trying to debug code. The lamp test routine is proceeded by a ' so it will not run, but can easily be implemented by removing the ' in front of the call. The code should just copy and paste from the magazine into the edit page of the ESP BASIC editor. Two of the lines have the comment Y and X address

```
i2c.write(2)        'y address
i2c.write(4)        'x address
```

and the numbers 2 and 4 in brackets will illuminate the PGM bank, button zero. These can be changed to illuminate any single button (remember to save the programme if you make changes). These numbers are from the Lamp Map in the last issue. I Have reproduced the map here.



PORT 4 single row word (decimal)	PORT 3 ADDRESS 0 latch LS0	PORT 3 ADDRESS 1 latch LS1	PORT 3 ADDRESS 2 latch LS2	PORT 3 ADDRESS 3 latch LS3	PORT 3 ADDRESS 4 latch LS4	PORT 3 ADDRESS 5 latch LS5	PORT 3 ADDRESS 6 latch LS6	PORT 3 ADDRESS 7 latch LS7
1	PGM 8	KEY 5	EFF KEY INV	KEY 3	PST 3	FTB	KEY	
2	PST 4	KEY 4	EFF KEY MASK	ASPECT ON	PGM 0	DSK INV	BKGD	DSK MAT
4	PGM 9	KEY 7	EFF EXT	KEY 2	PST 2	DSK MASK	AUTO TRANS	OUTLINE
8	PST5	KEY 6	EFF KEY BUS FILL	Nb key lamp power	PGM 1	DSK MIX	KEY 8	DSK EXT VIDEO
16	PST9	PGM 7	EFF MATT FILL	KEY 1	PST 1	DSK PVW	WIPE	SHADOW
32	PST6	PGM 4	PST PTN	NB PGM lamp power	PGM 2	?	KEY 9	DSK EXT SOURCE
64	PST 8	PGM 6	CHROMA KEY	KEY 0	PST 0	UPPER LIMIT	MIX	BORDERLINE
128	PST 7	PGM 5	EFF KEY	NB PST lamp power	PGM 3	LOWER LIMIT		DSK BUS SOURCE

The lamp map for the mixer

Once we have the routines for controlling the lamps, the next step is to start scanning the buttons and lighting the appropriate lamps.

This is where it starts to get complicated as lots of the lamps share the same latch. If you have PGM 8 selected and a button scan reveals PGM 9 has been selected then yes, you can arrange for the programme to put the values for PGM 9 into the lamp map and PGM 8 will be cleared automatically when Latch 0 is clocked and set with PGM 9. The Problem is if PST 8 or any of the other buttons controlled by latch 0 are illuminated, they will also be cleared when we reset the latch. Here I think BASIC and its decimal control might work against us, but I have a plan and will solve it by the next issue, ESP module permitting.

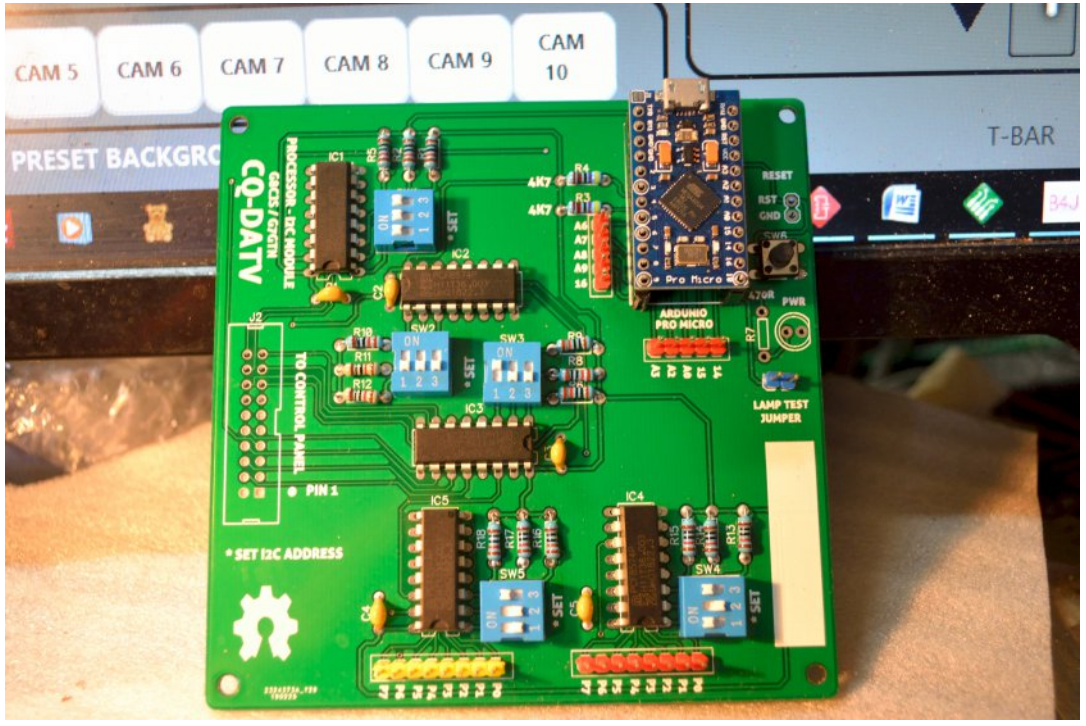
Before that can happen I need to re-flash one of the ESP 8266 modules and get it running on all four cylinder or whatever is the equivalent in the digital world. The web is full of ESP flasher software and the original BASIC flasher might just be getting a little long in the tooth, while the ESP8266 or Node MCU modules keep advancing and refining.

Not sure at this point what will replace the ESP module in the final project, but it needs to be something that can generate the MIDI commands necessary for Vmix control and also the exploratory dongle might need a few additions, perhaps another two port chips so the things like the positioner joystick that is used to move effects around can be redeployed to work operating a pan and tilt head, delivering a protocol, probably Pelco, (one of the big players in remote Pan and Tilt heads.

Nothing has been set in stone yet and Ebay may source one to experiment with. Somewhere along the line the EPS module is, I am sure, going to go and bury its head in the sand and probably never see light of day again.

I know Mike G7GTN is working on this from the other end and has produced a provisional PCB that we hope will be available by making the Gerber files downloadable from the CQ-DATV website.

A lot of work, but I am sure we will get there. From his picture (below) it would seem Mike is going to use an Arduino and has already added the additional I/O. Keep watching this space as the project develops.



Provisional PCB for the GVG interface

To be continued...

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/*

DATV-Express Project Report

Written by Ken Konechy W6HHC

Art WA8RMC reports that all inventory of MiniTiouner-Express, the DATV receiver/analyzer for DVB-S/DVB-S2, has now been exhausted with all available units being shipped to UK for distribution.

The PayPal order rate jumped for one-or-two per week, to two-or-three per day after the OSCAR-100 satellite was turned on.

Art has received long-lead-time blank PCB's and DigiKey components are starting to come in for assembling the PCBs.

The Chinese celebrations have delayed the ordering of the Serit NIM Tuners and the tuners will not be received until the end of March. Art expects that MiniTiouner-Express units will be available for shipment again, sometime in April.

Charles G4GUO received yet another box of 15 each units on March 01 for EU stock. However, each unit already had a buyer-placed order waiting for it. The "final" batch of 5 each units were shipped off to Charles during February and are expected to clear UK customs in another week or so.

Charles G4GUO has been having many successful DATV QSOs with the Es'hail-2 OSCAR-100 DATV satellite. Most are RB-DATV with most being 250 KSymb/s of 333 KSymb/s.

With a symbol rate of 250 KSymb/s, Charles can hit the OSCAR-100 with only 10W output of DATV RF power using his 1.8-meter dish antenna.

An SR of 1 MSymb/sec requires about 30W. Charles explained to the project team that – "every evening OSCAR-100 is very very busy".

Charles's home station consists of:

1. MiniTiouner-Express RX

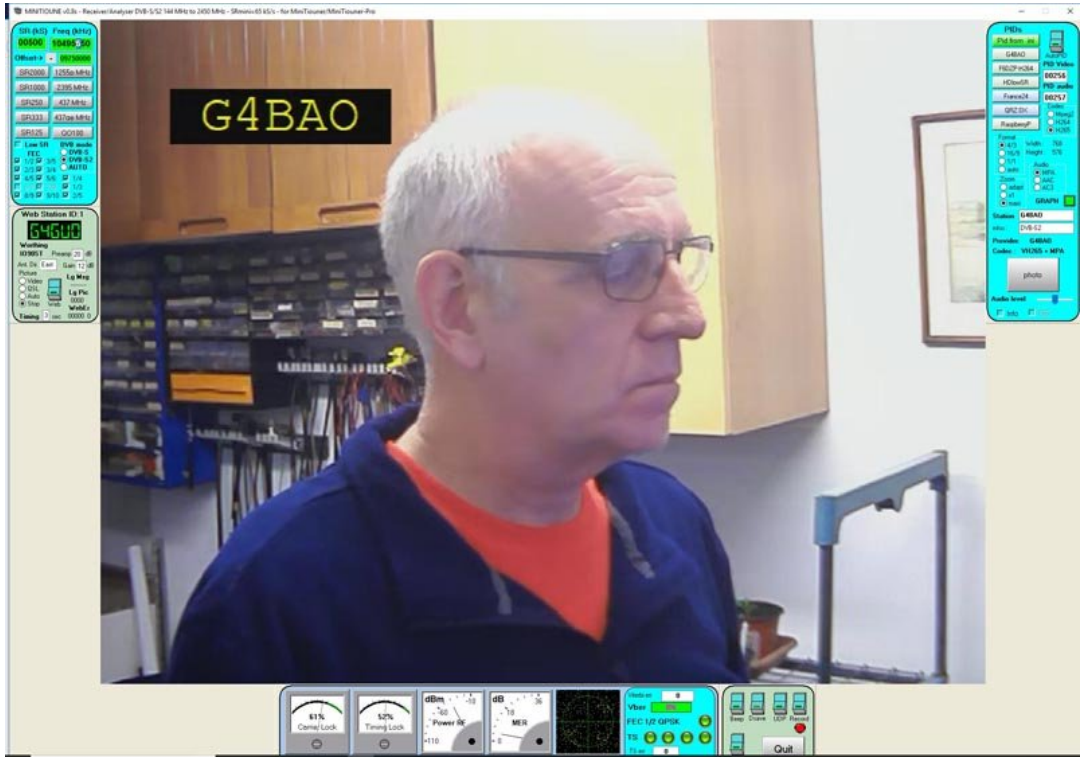
2. DATV-Express TX board

3. Express Transmitter software for Windows.

4. self-designed 2.4 GHz RF Power Amp (using MRF7S24250) currently delivering up to 130W of CW output power.

5. 1.8-meter dish antenna with dual-band-feed for 2.4 GHz uplink and 10 GHz downlink.

Project Speed is set to slow....de Ken W6HHC



DATV Video received by G4GUO from G4BAO using QATAR OSCAR-100

More pictures next page...

Above: Side-view of G4GUO Dual-Band-Feed for OSCAR-100 antenna

Below: G4GUO's 1.8-Meter dish antenna for using OSCAR-100

Integrating Digital ATV Capabilities Into Older PC Electronics A5 ATV Transceivers

Written by Dave Pelaez AH2AR

Re-purposed A5 transceiver transmitting a DVB-T ATV signal

Definitions:

- *HV-110: DVB-T HiDes Receiver*
- *HV-310E: DVB-T HiDes Transmitter*
- *TC70-10*: PC Electronics discontinued 10 watt 70cm A5 transceiver. Contains a TXA5-70B exciter and TVC-2G f downconverter and an RF module Toshiba S-AU4*
- *TC70-20s*: PC Electronics discontinued 20 Watt 70cm A5 transceiver. Contains a TXA5-70S 1996 exciter and TVC-2G S1 downconverter and RF module M57716*
- *PA5: PCB on the TC70 that contains the RF Module*
- *DMTR-10: Relay and monitor board inside TC-70 transceiver*
- *Tohtsu Coaxial Relay CX-120a : Available from Henry Radio, E-bay, required for switching A5/D2 exciters*

*Note: PC Electronics' Internal PCBs and RF Module versions may vary, depending upon date of manufacture.

The Idea

With the advent of stand-alone HiDes DVB-T ATV receivers and transmitters such as the HV-110 and HV-310E, adding digital ATV (D2) receive and transmit capabilities at the operating position is now possible, but integrating this new equipment into the ham shack can get somewhat involved.

T/R switching and amplifier integration require additional equipment and planning since the T/R feature and proper cabling and RF power levels must be accounted for to provide a workable and practical transmit and receive station.

Recognizing this potential dilemma, Mel Whitten, K0PFX had showcased his solution for integrating HV-110s and HV-310s into a very functional solution and has gone so far as providing plans and parts lists to anyone one who was interested in taking on such a project.

Other amateurs, such as myself, have resorted to cluging together, in "Rube Goldberg" fashion, switches, cabling and relays that are functional but may not be easily relocated or changed without having to resort to complicated disassembly and reassembly work.

Since I live in the Midwest, ATV activities still include analog (A5) ATV on 70cm as this mode is still extensively used for ATV DX contacts in this region of the country. Consequently, A5 and D2 activities in the Midwest are interspersed and this further complicates the ATV station layout.

Chaotic placement of cabling for power supplies, amplifiers and video sources result in a tangle of wiring.

While assisting a local long-time A5 ham (KE8QR) to suggest options for how he could integrate his newly acquired HV-110 and HV-310, I pursued an alternate solution to help eliminate the conundrum of wiring, relays, switches and working RF power levels encountered when jumping into the digital mode from A5.

As all of the ATVers in the local area have PC Electronics TC-70's, I thought that it may be possible to integrate this older ATV transceiver as a "host" to help eliminate redundant cabling and amplifiers when operating A5 or D2.

In keeping all of the functionality of the PC Electronics TC-70 intact, provision of a "Mode" switch and a relay could allow amateurs to simply throw a SPDT switch to change ATV modes on the fly. This sounded like an elegant solution worth pursuing.

Required Features

Any modification of the host PC Electronics TC-70 must be simple and practical. The goal of this project had to include these features:

- *Not counting the TC70 and HV-110/HV-310E, keep the parts count to a minimum (9 parts total) Includes the following: 2 bulkhead SMA connectors, 1 SPDT switch, 1 1N4001 Diode, 1 Tohtsu CX-120a coaxial relay, 1 chassis-mount DC power barrel connector, 3 miniature RF cabling runs with SMA connectors.*
- *All TC-70 A5 functionality must be left intact. Additions or modifications must not degrade or disrupt the normal workings of the TC-70 transceiver. The HV-110 and HV-310 can also be removed easily with no host transceiver A5 functionality lost.*

Pictured are two TC70 Versions, TC70-10 and the TC70-20s

- *No modifications must be made to either the HV-110 or HV-310 DVB-T receiver/transmitter.*
- *There must be a minimal number of umbilical connections between the host transceiver and DVBT gear. Consequently, only three connections between the host and HV-110/HV-310 is needed. Bulkhead SMA connectors and a bulkhead DC power connector for the HV-310 will allow for quick removal of the umbilcaled HV-110/HV-310 from the host ATV transceiver.*
- *A single mode-selector-switch will control A5 and D2 modes.*
- *To transmit in either mode, the original "Transmit" switch on the TC-70 will key the A5/D2 transmitter.*
- *The HV-110 receiver and the host transceiver downconverter will operate simultaneously, with no affect on sensitivity of the downconverter.*
- *The HV-110 receiver will be coupled to the downconverter in*

a manner that uses the GaAs MESFET preamplifier within the downconverter to provide additional receive gain for the HV-110.

- *When not being used for hosting D2, a single coaxial relay (internally placed within the transceiver),will default to A5 transceive functionality so as not to require user intervention.*
- *Receive and transmit on A5 and D2 must go through the transceiver's N-connector antenna connection.*

Concept of Operation

Think of it this way: all this modification does is electrically switch in-and-out the TXA5 (A5 exciter) and HV-310 transmitter in the host TC-70. This function is controlled by the Mode switch, allowing the output of either the TXA5 or HV-310 to be switched into the PA5 (RF Module PCB) As for the HV-110 receiver, it is simply coupled via a pickup loop to L3 on the downconverter PCB.

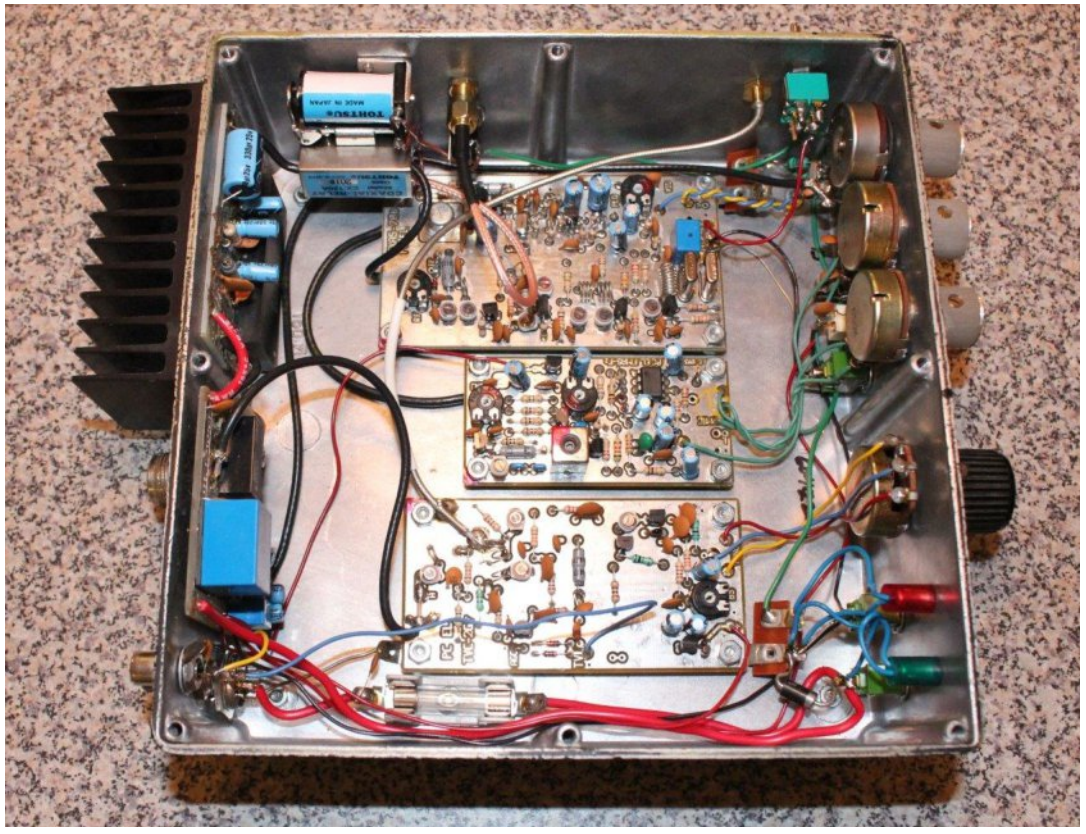
Before starting, its essential to understand the layout of the TC70. There will be some small internal differences between the TC70 versions, but the layout is essentially the same in all TC70 models.

TC-70 Layout

The photos provided here allows for a better understanding where the relay and Mode Switch can be placed, along with the RF cabling to the HV-310/HV-110 that are bulkheaded through the TC-70 cabinet.

I opted to place the relay closest to the PA5 board so the existing PA5-to-TXA5 line can be used without having to replace the line.

Note that the Mode Switch is located near the front side of the cabinet, since the front cabinet of the TC-70 essentially has no room for additional switch mounting.

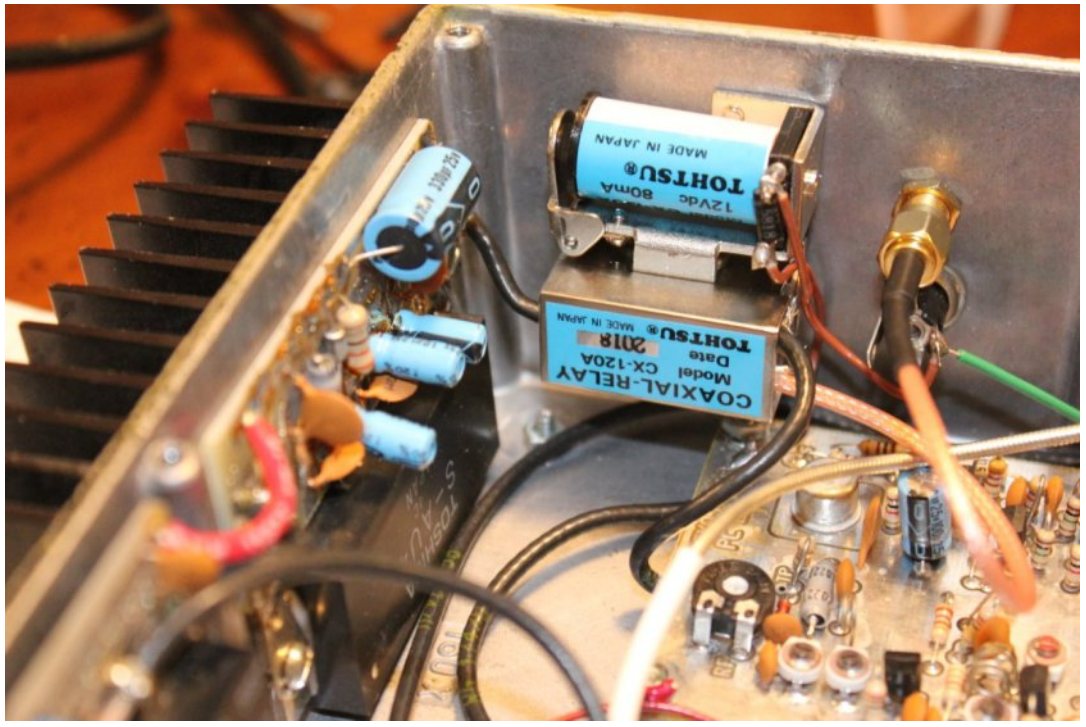


Installed relay is shown in the upper left corner of the cabinet

Adding the Relay

Two machine screws require drilling two holes in the side of the cabinet as pictured. Relay mounting is straightforward, with the Tohtsu CX-120 Coaxial relay's "single" coaxial output facing the TC70's PA5 board (See closeup photo of the mounted coaxial relay). This side of the relay is soldered to the PA5 RF input line.

If measured correctly, the RG-174 going from the TXA5 exciter to the PA5 board can be cut so the only soldering that is needed is soldering the cut lines to either side of the relay as pictured.



Close-up of the Tohtsu relay

Location of the mode switch, bulkhead SMA connectors, and power connector for the HV-310

Take extra care to ensure soldering of the center conductor of the cut RG-174 is low enough on the gold plated contact of the coaxial relay, so when the relay is re-assembled there are no solder high spots that could come in contact with the miniature screw-down clamps.

The coaxial relay is designed so the shielding side of the RF line does not require soldering. This "clamp-arrangement" allows for secure positioning of the RF line once the clamp screws are secured.

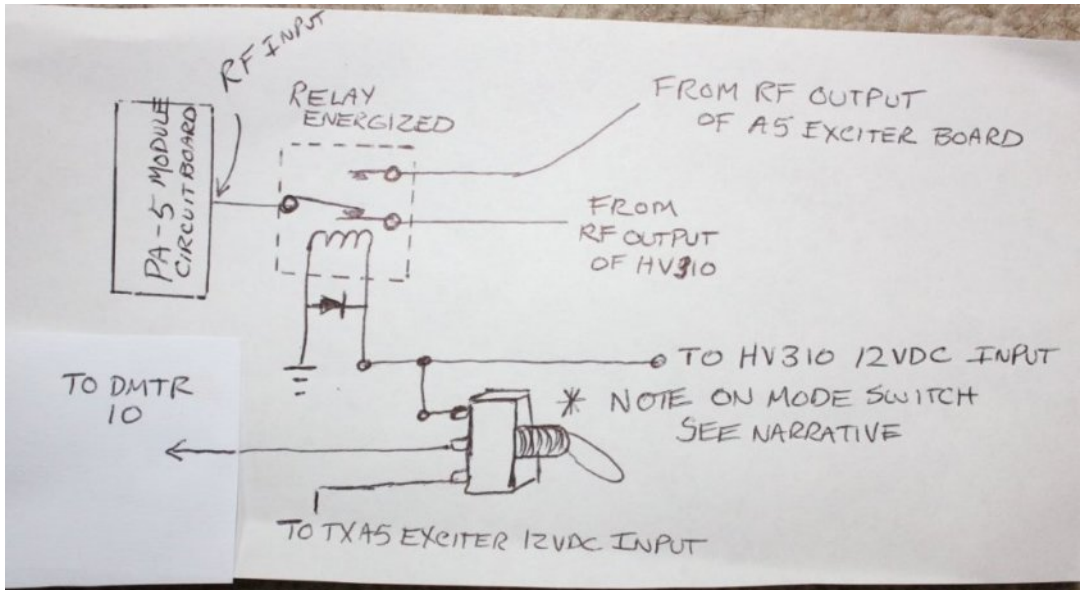
Note that the other end of the cut RF line coming from the exciter board is soldered to the relay post nearest the top of the transceiver chassis as pictured. When the relay is not energized, the TXA5 RF output will pass through the relay to the PA5 board.

The second pole of the relay passes to the bulkhead SMA connector as pictured. This is the RF connection for the HV-310. One side of the relay coil goes to ground, and the other side of the relay goes to one throw leg of the SPDT switch.

This + VDC line also goes to the center conductor on the chassis-mounted barrel connector. Don't forget to put a 1N4001 clamping diode across the relay coil, with the anode side facing ground.

Adding the Mode Selector Switch

Positioning the Mode Switch on the right front side of the TC70 cabinet provides for easy access. As already covered, the relay coil and its + line connects to the top throw post of the SPDT.

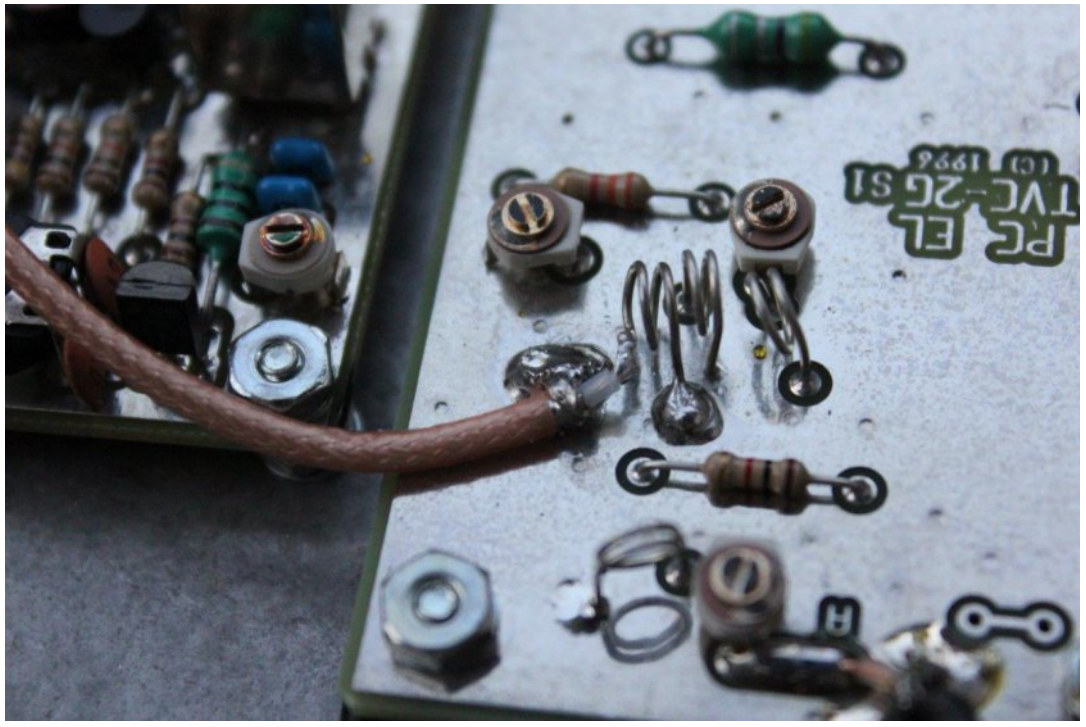


For the other throw post of the Mode Switch, cut the + line of the TXA5 and place the end of this cut line going to the TXA5 on the bottom throw post of the SPDT switch. The other end of the cut line that was going to the TXA5, and is now cut, should be placed on the center throw of the SPDT switch. With these connections made, when the mode switch is flipped to the "up" position, this will put the Mode Switch into "A5" and the down position will place the mode into D2.

ADDING THE HV-110 RECEIVE LOOP

Placing a #22 AWG 1 to 2 turn loop approximately 1/8 inch away from L3, the mixer input coil of the TC-70's downconverter, (with the cold side grounded) provides an excellent means for coupling the needed extra receive antenna port for the HV-110.

Some miniature hardline or RG-174 can be used to bring the coupled signal out as shown. This approach was suggested to me four years ago by Tom O'Hara W6ORG. Tom stressed that the preamp stage has plenty of gain and that the system noise figure is practically unaffected.



Pickup coil next to the down-convereter's mixer input coil

This provides a measured additional 5 dB gain for the HV-110 receiver, since putting the pickup loop in after the GaAsFET preamp on the TVC-2G downconverter provides additional receive sensitivity for the HV-110.

If you need a data sheet with the schematic and layout of your P.C. Electronics downconverter, since there have been a number of these produced, Tom (*ATVinfo@hamtv.com*) indicates that he will provide a copy, but you will need to provide him with the downconverter PCB version that you have.

See the photo (above) of how this addition is accomplished.

The Smoke Test

Once the parts have been installed, functioning could not be simpler. A flip of the mode switch up puts the unit in A5 mode. Placed in the down position, the mode switch is now ready for D2. To transmit, simply throw the transmit switch on the TC70's front panel and you are in business.

Additional information about this modification:

- *The HV-110 receiver is powered up continuously through its standard DC power connection. It does not need to be turned off during transmit cycling since there is plenty of isolation during D2 and A5 transmissions. This isolation is achieved since the TC70 powers the downconverter down when the transmit switch is energized. Isolation is so effective that its not possible to watch your D2 video on the HV-110 during HV-310 DVB-T transmissions.*
- *Video input-output connections must be configured in the normal way for A5 and D2 transmissions for the TC70 and HV-110 and HV-310.*
- *Under normal conditions, the HV-310 provides 15 dBm RF power output on its high power setting. At this power level the S-AU4 RF module in the TC70-10 provides 1 watt RF output measured on a Bird APM-16 with minimal spectral regrowth since the S-AU4 RF module remains in its linear range at this DVB-T power level. For TC70-20s operation that uses a M57716 RF amplifier module, its necessary to reduce the HV-310's RF power to 11 dBm in order to minimize spectral regrowth. By adjusting the HV-310's RF power to 11 dBm, driving the host transceiver with 11 dBm provides 3 watts output into the APM-16.*
- *When the transceiver is in D-2 mode and the TC70's transmit switch is thrown, this will power up the HV-310E, and as normal, the HV-310E will take about 7 seconds before the HV-310E will start transmitting. This delay is a normal part of the HV-310E's function.*

Host Transceiver with connected HV-110/HV-310 3 Watts output (APM-16) into dummy load

All A5 functionality of the TC70 remains intact. An additional modification can include an LED light indicating the transceiver is in D2 mode (see photo).

After five host transceiver modifications, the form, fit and function of this approach has proven to be sound. Also note that variations between TC70 transceivers are likely due to differences in RF module performance/age and changing manufacturer specifications. but I was able to achieve successful results with five different TC70s.

This modification could likely be accomplished with Wyman Research transceivers or use of other HiDes standalone DVB-T transmitter/receivers.

*NOTE: The APM-16 measures average RF power for digital waveforms but in this case does not provide the appropriate

KE8QR on-the-air with the host TC70/DVB-T system

A logical add-on after host-transceiver conversion is the addition of a "D2 Transmit" front panel light!

accuracy for actual/accurate RF power measurements of the DVB-T signal's complex waveform. To that end, a spectrum analyzer is a way to determine whether the DVB-T signal is driving the amplifier into its non-linear region (creating spectral regrowth) and wattmeters such as the Bird APM-16 can be used to determine relative power level changes in concert with employment of a spectrum analyzer.

Video recording goes digital

Written by Trevor Brown G8CJS

I think this might be my last VTR article as I have covered the development of Quadruplex, through C format and onto component formats. What happened next was the inevitable step - VTR went digital.

Lets not get embroiled in the "0" and "1's", it happened, but lets look at the plus side. Its still tape and tape has a bad habit of particles of oxide detaching from the mylar base and causing drop outs. We came up with a solution right back in the quad days, sample the rf envelope and if a loss is detected fill with the line before, (needed fiddling with for PAL) but it was possible and improvements came along and this process improved with every format change.

When digital arrived it was decided to shuffle the pixels around in a field store before recording the picture and shuffle them back in replay, so an oxide dropout would be distributed around the screen as small pixel size imperfections, rather than large one or two line splashes. This apparently made them easy to repair.

It was so good it was hard to evaluate a tape, so some machines had the ability to switch out the shuffle and compensation so the tape could be evaluated. A little bit of a pain but there was, in reality, little or no time being spent evaluating old tape, so it was seldom used. Tape dropout was almost non existent and the dropout compensator became digital error correction and error concealment. What you recorded was what came back. A video replay and tape copies looked just like the original, although the error correction and error concealment may have had to work harder as we copied the copies, but as nobody complained we just got on with it.

The other rather clever thing that was part of this move to digital was the head arrangement. If you cast your mind back to quad and its spinning head there was no video confidence head, but it had an audio confidence head, so you could check the audio was being laid down and as for the video, well just keep your fingers crossed and spot check the end of your studio recordings if time permitted.

When we changed to C format, this reversed we had a video confidence replay head but no audio confidence replay, so pictures could be seen about a third of a field after they were recorded, but the audio was a keep your fingers crossed time. Digital and somebody had a really good idea to put the confidence heads before the write heads, so you could monitor what you were about to overwrite! Sorry I am sure you are reading that again its not a typo, you can read what you are just about to overwrite, so how does that help a studio recording session? That's an easy question and the answer is it doesn't!

D3 digital video recorder equipped with read before write

Personally I did not care as I was now working as a video tape editor and where I was this was the best idea anybody had come up with since the concept of video recording. In editing you could only cycle a machine from replay into record and it looked like a vision cut. If you wanted to mix you had to make a copy of the end of the recording run it in sync, edit to the copy and then mix to a third machine. This was time consuming, required three machines and all the necessary control to get every thing in sync.

If the read head comes first and is passed through a delay line to compensate for it being in a different physical position, you could mix by going into a mode where it would re record from the read head and then you could mix through to a second machine - no sync problems and really easy to control.

Read before write was here and at first it overtook the edit controllers that would not let you cut to the same a machine as you were recording from, obviously a mistake and could not be selected. The work around you saw in every edit suite was to patch a record machine up as a another source on the vision mixer and mix to that. The edit controller thought it was something like a caption generator and allowed the mix and providing you had the pre read enabled everything was good. If not then your were speeding towards a disaster, but software revisions were on the way.

When they arrived, I was seated in front of a Sony edit controller (BVE 9100) and was taken aback by how good the revisions were! Select mix to record and it would automatically switch pre read on, and let you proceed. Idiot proof or not? Well almost. It worked for both video and audio and caption inlays.

The thing you had to remember was yes the EDL (Edit Decision List) would recall pre read edits, but they could not be repeated as the material had been overridden.

If the director decided to pull a 12 frame mix 24 frames early, it was ok, if they wanted it a tad later, well there was some repair work to do in the form of an invisible edit or remake the scene from an earlier cut before proceeding.
The suite I was running used Panasonic D3 machines and they were really rather good, yes it was PAL, but the digital path was really picture friendly and multi generations were not a problem, but you were locked into 4 by3 pictures. Panasonic also had D5 component machines and they could be exchanged from another suite if required and these were component and hence wide screen was possible. It was back to cut editing as the Grass Valley mixer was PAL and could not be used.

Never got my hands on the machine before the D3, the Panasonic D2, but there were rumours that the read head was not timed correctly so that the pre read was not useable. May have just been a set up problem, but for me it came alive with D3, with one exception, and that was digital effects which because the machine had frame storage that introduced propagation delays, so mix and key were fine, but if you needed a digital effect its was back to making a copy and a three machine requirement. You cannot win them all, but NLE (Non Linear Editing) was on the way where everything is sucked into a computer and the hardware of vision mixers and digital effects generators, along with caption generators, was replaced by software.

We are probably all more familiar with NLE editors. We have looked at several solution in CQ-DATV and will no doubt be looking at more in the future, but it will always be soulless video editing, nothing will ever replace the machines bursting into life under keyboard control. For me linear editing rules and probably still did for quite a while on events which just did not have the time to digitise everything before editing. But then tape was about to disappear and footage started to turn up on a chip already digitised.

TV Propagation - Part 1 (basic equations)

Written by Jim Andrews, KH6HTV

Fig. 1 High-Definition, Digital, Amateur Television — Confirmation photo showing a TV image received over a distance of 77 miles using a 23cm, 3 watt, DVB-T transmitter

I am often asked the question by other hams. "How far can a ham TV signal go ?" Fig. 1 above is a good example of long distance DTV DX. My typical response is "Line-of-Sight". If you can see the other location, chances are good that you can get a TV signal to it. This has been borne out by many years of experience in ham TV. As opposed to very high power TV broadcast stations, DTV hams are typically running QRP level, low power (≤ 10 watts) and our signals just don't have the oomph to get much energy diffracted over and around path obstacles.

For line of sight, UHF and microwave propagation, there also becomes the question of "Where is the radio horizon ?" If we lived on a flat earth, the answer would be infinity. Columbus proved that idea wrong. Because we live on a spherical earth (radius = 6370 km), the curvature of the earth limits our horizon. It effectively puts a "hump" in the middle of our rf path. The line of sight horizon is set by pure geometry. Note this may not be your personal optical line of sight set by the resolution of your eyes, even using binoculars. The distance to the horizon is set by our observation height (or antenna height) above ground level. It is given by these equations:
- optical distance (km) ≈ 3.57 * √ height (m) - or - in miles ≈ 1.23 * √ height (ft)

The radio horizon is actually a bit further than the geometrical horizon. The refractive effects of the atmosphere cause a bit of bending in the radio waves and will push them typically about 15% further..
- RF distance (km) ≈ 4.12 * √ height (m), RF distance (miles) ≈ 1.41 * √ height (ft)

However, these atmospheric effects are totally dependent upon local weather conditions. In extreme cases, strong ducting might occur sending our RF waves far beyond the predicted RF horizon, while severe local storms might drop it back dramatically.

A few quick examples are: 5' => 3.2 miles, 30' => 7.7 miles, 100' => 14 miles, 1000 ft => 45 miles Adding antenna height at the receive site, we add the numbers for the two heights. For example transmitting from an automobile with an antenna height of 5 ft. to a remote base station with the antenna on a 30 ft. tower, the radio horizon = 3.2 + 7.7 ≈ 11 miles This calculation really only works over really flat terrain. On a large lake or the ocean, we do have such a flat surface. Obviously either putting up a higher tower or finding a high hill or mountain top works wonders. But of course, this is not news to us hams !

We have been doing that since the early radio days of Marconi.

So after determining our radio horizon, the next issue to contend with is RF Path Loss. Path loss is the natural phenomena of radiating a certain amount of power but this power, again due to spherical geometry, gets spread equally over an ever expanding globe as it propagates away from the source. Thus the power density in Watts/m2 gets much smaller the further we get from the source. The formula for free space path loss based upon this geometry alone is:
- Free Space RF Path Loss(dB) = 20 * log10 (f in MHz) + 20 *log10(D in Miles) + 36.6dB

Note in this equation the frequency dependency. The frequency effect in this equation is due to the inclusion of the transmitter's wavelength with the assumption of using a 1/4 λ antenna. The actual wave propagation path loss expressed in power density (Watts / m2) is not dependent upon frequency.

In the above equation, for example, going from 70cm to 23cm bands we suffer about a 10 dB hit in path loss. A few quick calculations will give you an appreciation of the importance of path loss. As an example, for the 70cm band (430 MHz) we get: 0.1 mile => 69dB, 1 mile => 89dB, 10 miles => 109dB, etc.

To determine the best case situation for a particular rf path we need to include all of the major rf components. Calculations are done easiest in dB with power levels expressed in dBm and antenna gains expressed in dBi. To determine the power input into the distant receiver, we need to know:
- Rcvr Pwr(dBm) = Trans Pwr (dBm) - Trans Cable Loss (dB) + Trans Ant Gain (dBi)
- -RF Path Loss (dB) + Rcvr Ant Gain (dBi) - Rcvr Cable Loss (dB)

As an example using this calculator, let's enter the parameters of a typical 70cm ham ATV station:
- Transmitter Power = 5 watts (+37dBm) Cable Loss = 1dB each end
- Yagi Antenna Gain = 11dBi each end
- Desired Receiver Power = -65dBm (40 dB s/n, P5 for analog,VUSB-TV)

The calculator gives the answer of 43 miles for pure, unobstructed, free space, line of sight path. The theoretical results really only apply for outer space applications. In the real, terrestrial world, we encounter a lot of other obstacles and we would never achieve this ideal. In the fall of 2011 and again in Sept., 2016, several Boulder, Colorado area TV hams have run TV propagation field trials. See Application Notes, AN-3 [1] and AN-32 [2] for details. We made measurements of the actual received signal strength in dBm.

One observation that stood out was "Over very clear, line-of-sight paths, even with directional antennas, where multi-path was not a major issue, the actual path loss was typically 5 to 15 dB worse than the calculated, theoretical path loss." For obstructed paths, even more loss was typically encountered. Thus the likelihood of our ever experiencing just free space path loss is extremely rare.

The above equations were for ideal, unobstructed, line of sight situations. What can limit us in the real world ? Lots of things including: ground reflections, vegetation, tall buildings, urban building clutter, hills, ridge lines, mountains, etc. The absorption by vegetation, due to water content, goes up with increasing frequency. I have noticed a significant difference in the signal strength hitting our local TV repeater between summer and winter. When the leaves were gone from the trees between my former qth and the repeater, my signal strength at the repeater, especially on 23cm significantly improved.

Getting over obstructions to our line of sight path involves diffraction which can introduce considerable extra dB loss. Most of the rest of the losses result from Multi-Path. This is reflected waves from other objects which arrive at the receive site later in time and can cause standing wave patterns in the receive signal which at certain frequencies might totally null out the desired direct path signal. Another perturbing effect can be "Doppler" shift due to moving objects disturbing the various multi-paths.

A pure, free space, channel is called a "Gaussian". It is very rare in a terrestrial environment. If there is a direct line-of-sight path, but also multi-path signals arriving at the receive antenna, then this is called a "Ricean" channel. If there is no direct line-of-sight path, but multi-path signals arrive at the receive antenna, this is then called a "Rayleigh" channel. See Fig. 2. Each type progressively degrades the channel performance and leads to more path loss.

Are there computer programs available to help us predict the anticipated rf path loss for a particular path. The answer is "Yes". Parts 2 & 3 in this series will discuss this further. This series of papers is based upon my application note, AN-33a [3].

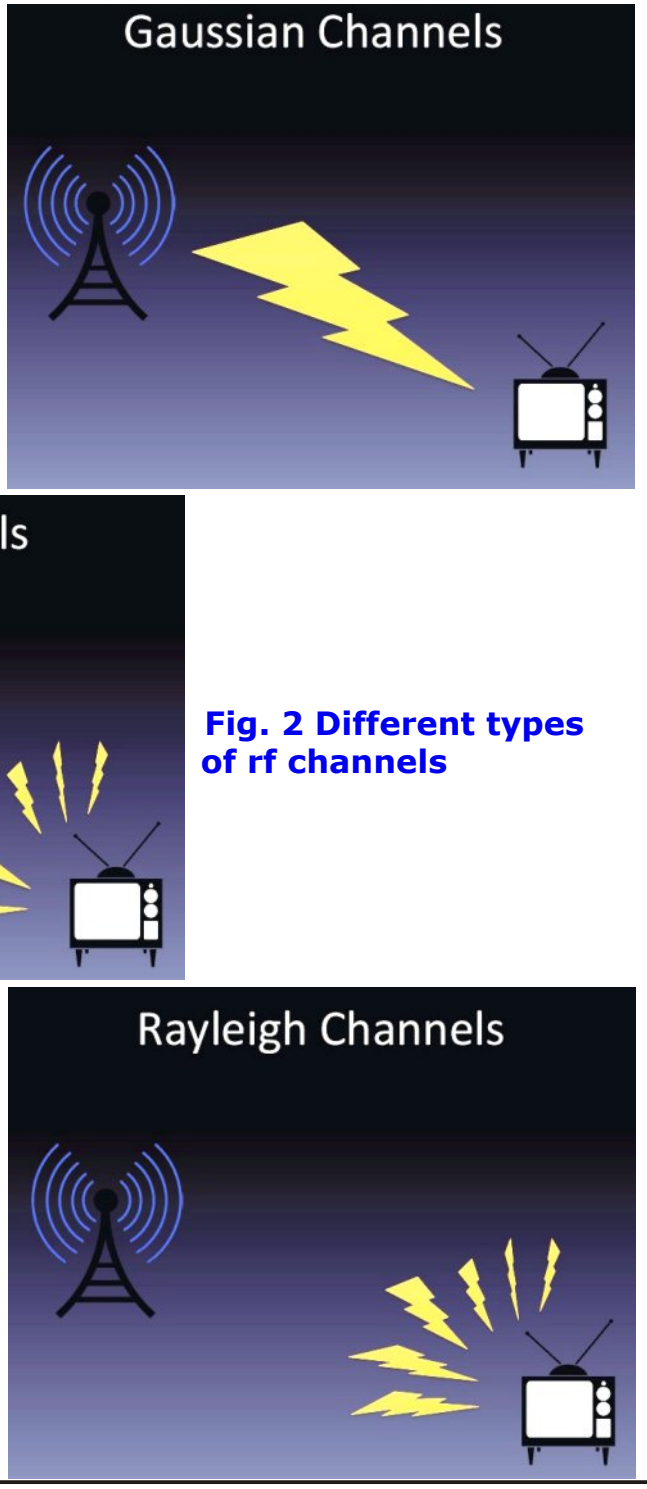


Fig. 2 Different types of rf channels

References:

1. "Field Trials Comparing VUSB, FM, DVB-S & 64-QAM Television", Jim Andrews, KH6HTV Video, Application Note, AN-3a, Sept. 2011, 4 pages
2. "Boulder, CO - DTV/ATV Repeater Coverage", Jim Andrews, KH6HTV Video, Application Note, AN-32, Sept. 2016, 10 pages
3. "TV Propagation", Jim Andrews, KH6HTV Video Application Note, AN-33a, Oct. 2016, 12 pages

(note: all KH6HTV Video application notes are available to be downloaded in .pdf format from *www.kh6htv.com*)

Summary of Mid-Atlantic ATV Meeting March 9, 2019

Written by Dan Rapak WA3ATV

Mid-Atlantic ATV is a coalition of ATV repeater owners, hams interested in constructing ATV repeaters and hams generally interested in this aspect of amateur radio. As the name implies, members are from the various states that make up the Mid-Atlantic region of the US. A strategic planning meeting of sorts took place this afternoon at Hoss' Restaurant in York, Pennsylvania. The meeting was held with an eye toward the future of this branch of our hobby, including the possibility of linking ATV repeaters in the region together. A great deal was accomplished!

White Rock Remote Receiver

Results from the remote receiver our group has at the White Rock, PA tower site (with video viewable via the web) were discussed. There has been an issue where, under certain signal conditions, the receiver will hang up and become stupid. When this happens, someone needs to physically go to the receiver to reset / power cycle it as there is currently no way to reboot it via the web.

This is a relatively remote site. It might be many days before someone is able to go to the site, and so Jeff Elliot (W3JVU) is going to supply an Internet controllable power switch that will permit us to do a hard reboot via the web when necessary.

The receiver is currently connected to a directional antenna as that particular antenna was already in place on the tower. It was felt that more testing should be done with an omni-directional antenna. That change out can be made with an antenna yet to be determined as weather conditions improve.

Rib-Cage Antenna

Dave Stepenowski (KC3AM) and Vince Vitullo (N3BFZ) brought along a new, omni-directional, horizontally polarized, rib cage antenna they had constructed. Dave has been using a similar model at his Ebright, Delaware ATV repeater for some time. Vince did the physical blacksmithing on this one and did a great job! What remains is to tweak the antenna's matching transformer. To that end, yours truly brought the antenna to the home QTH in order to sweep it out with a return loss bridge to see where things stand and possibly make adjustments. We'll see how that goes.

Results of Our First DTV Beacon Transmitter Test

Tests of the beacon transmitter which had been located at the WA3ATV QTH near Summerdale, PA are complete. Rich Reese (KR3EE) performed field reception tests at multiple locations. In a previous life, Rich performed field testing for a cellular company and so had his test procedures down pat. Rich did a super job! Many thanks for all the timeand effort he put in on behalf of our group! The bottom line of the tests is that Rich found that the actual field test results tallied very closely with coverage predicted by the Radio Mobile software modeling our group has been using.

This will hopefully reduce the number of field locations that need to be tested for future beacon tests at other locations. A discussion of the next location for beacon transmitter tests ensued. Based on the Radio Mobile propagation modeling, it is hoped that we can obtain permission to place the beacon at the Cornwall, PA repeater / CPIN microwave relay site. This site is a stone's throw from the former location of the Cornwall analog ATV repeater which has since gone dark. If Dave's rib cage antenna can be tuned up in time, the hope would be to use it as an omni-directional antenna for the next beacon test.

Repeater Antenna Polarization

The question of standardizing the polarity of DTV signals came up. The pros and cons of each mode for our application were discussed at length. Ultimately, the group unanimously decided to use horizontal polarization for repeater outputs.

Advantages include the inherent isolation from interference to / from vertically polarized voice repeaters and compatibility with U.S. over-the-air broadcast television. The biggest obstacle is the need for omni-directional, horizontally polarized antennas at the repeater sites.

The off-the-shelf pickings are rather slim and leave something to be desired in terms of performance. It is hoped that Dave's rib-cage antenna will provide a solution, hence the desire to use it in the next beacon test.

It's important to note that only the repeater sites themselves require the horizontally polarized, omni-directional antennas. Thus, only a few such antennas will be needed. Individual hams accessing a repeater will all be using directional antennas and therefore have multiple, readily available antennas to choose from.

Frequency coordination

The group reached the conclusion that it would make sense to coordinate a common output frequency for all repeaters in the region, with input frequencies coordinated by the individual repeater operators as they see fit based on local operating practices and conditions.

Given the antenna systems and power levels we will be using, the terrain and predicted coverage plots from various active and potential repeater sites, it is unlikely that one repeater will interfere with another.

In addition, with COFDM modulation in use for both DVB-T and ATSC 3.0 it will eventually be possible to operate linked repeaters as a SingleFrequency Network (SFN) that would allow the signals from multiple repeaters to augment rather than interfere with one another.

Finally, the use of a common output frequency will allow much more efficient use of valuable ham radio spectrum and (hopefully) make frequency coordination an easier task.
Power Amps

Rich Reese has also done a fair amount of research into the availability of power amplifiers that might be suitable for DTV use. The issue of course is the need for an absolutely linear amplifier since any sort of phase distortion will corrupt a DTV signal. This eliminates the use of Class B or Class C amplifiers.

Rich has found a number of amps on the web that are allegedly suitable for digital voice use. Whether they would be linear enough for application in the DTV world is another matter. However, Rich did purchase surplus power amp modules from a decommissioned DTV broadcast transmitter that might serve as a PA. He also purchased a lower power linear amplifier that could be used as an IPA to drive the PA.

He will keep us informed on how his experimentation progresses.

Status of ATSC 3.0 Deployment

The status of deployment of the new ATSC 3.0 standard for over-the-air broadcast television here in the U.S.A. was discussed. This is similar to DVB-T in that both use COFDM modulation. However, ATSC 3.0 uses an IP based data protocol that more easily supports simultaneously connecting consumer devices to the web for interactive television programming.

ATSC 3.0 is also more spectrally efficient, so much so that it can transmit full motion 4K images over the air in a standard 6 MHz U.S. television channel.

It was learned that Sinclair Broadcast Group will be partnering with Nexstar Broadcast Group to facilitate the rollout of ATSC 3.0. These are the two largest TV station group owners in the U.S. and own several stations here in the Mid-Atlantic region. Such partnerships are necessary for the transition from ATSC 1.0 to ATSC 3.0. During the transition, it will be necessary for two stations to broadcast their programming on one ATSC 1.0 transmitter while the second transmitter is being converted to ATSC 3.0.

Surprisingly, Sinclair expects to have more than thirty (30) ATSC 3.0 stations on the air by the end of this year! This is a much faster rollout than most people would have predicted. This means we will likely be seeing ATSC 3.0 television receivers on store shelves and in Internet stores much sooner than expected. Sinclair is pushing hard for the new format as they view the interactive aspects of the system as a whole new revenue stream.

What does this mean of those of us interested in amateur DTV? If a repeater transmits using the ATSC 3.0 format, hams will be able to use consumer TV sets to receive the signals, similar to the situation we had in the analog NTSC days.

To facilitate the rollout, Sinclair is also involving itself in the hardware end. They will be partnering with manufacturers to build and distribute low cost converter boxes for existing TV sets as well as dongles that will permit reception on smart phones, notebook computers and desktop PCs. It is unknown at this point whether these devices will be capable of receiving ATSC 3.0 / COFDM modulation on cable channels or not, but if this proves to be the case, it will be possible to tune these consumer devices directly to the 70 cm ham band.

An immediate question is, what does this mean for hams in the U.S. that already have an investment in DVB-T, DVB-S or analog equipment? The answer is, not much. ATSC 3.0 does not make other formats that hams are currently using obsolete. If anything, ATSC 3.0 simply adds to your tool belt.

A repeater may transmit using ATSC 3.0, but that repeater can still receive whatever format is in use in the area in its input(s.) Just as it is possible to receive analog video at a repeater and re-transmit it as a DVB signal, it will be possible to receive DVB-T, DVB-S, ATSC 1.0, VSB, FM-TV or any other format and re-transmit it as ATSC 3.0.

Repeater owners would be free to accept whatever signal formats on their inputs they choose based on their particular local practices and preferences.

501(c)3

There was brief discussion about the merits of making MidAtlantic ATV a 501(c)3 tax exempt organization which would allow companies and individuals to donate equipment and/or funds with tax benefits for the donor. It was decided that we are not yet at that point.

In the meantime, should any opportunity to accept such a donation present itself, the donation could be made by way of one of the 501(c)3 clubs affiliated with our coalition.

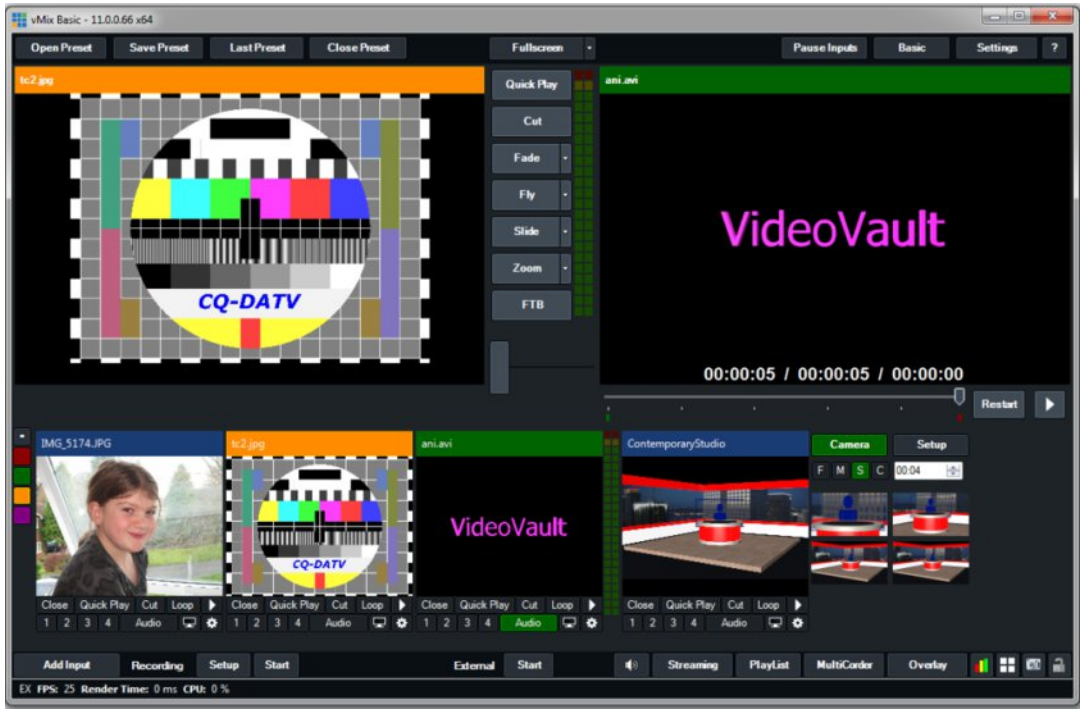
Join the MidAtlantic ATV group's page at *https://groups.io/g/MidAtlanticATV* to keep abreast of future developments.

First published in issue 9

Vmix 11 Tally Lights

Written by Trevor Brown G8CJS

Back in DATV5 I reviewed Vmix software for a multi camera shoot for either streaming or on site recording, that was version 10 and version 11 is now with us. There is still a free download of this new version *http://www.vmix.com.au/* and it has grown a lot more features, but the main one is Tally Lights.



The USB control of separate Tally boxes, that can be fitted to each camera is still possible, but on version 11, they have gone one step further and added tally lights that work by Smart Phone or Android Tablets.

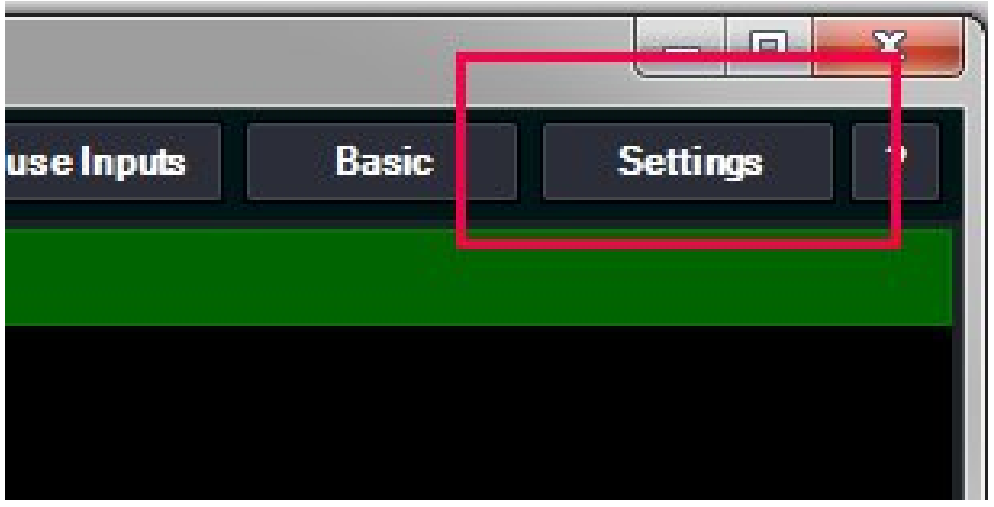
If you are televising an event and want to get the best shots then you need to man the cameras and each camera operator needs to know when he is on air or more important, not on air, so he can compose his next shot, and until now this has involved pulling in extra tally cables and all the associated problems, with Version 11 you can use Smart Phones or Tablets over the WI FI with one provision, the smart phones or Tablets must be on the same WI FI as the PC running the Vmix switching software. I must stress the Vmix PC must be linked via WI FI and connect by LAN to a router with WI FI is not sufficient.

Another added feature is that any one of the Smart Phones or Tablets can also work the vision switcher which is very handy if you are short on Crew.

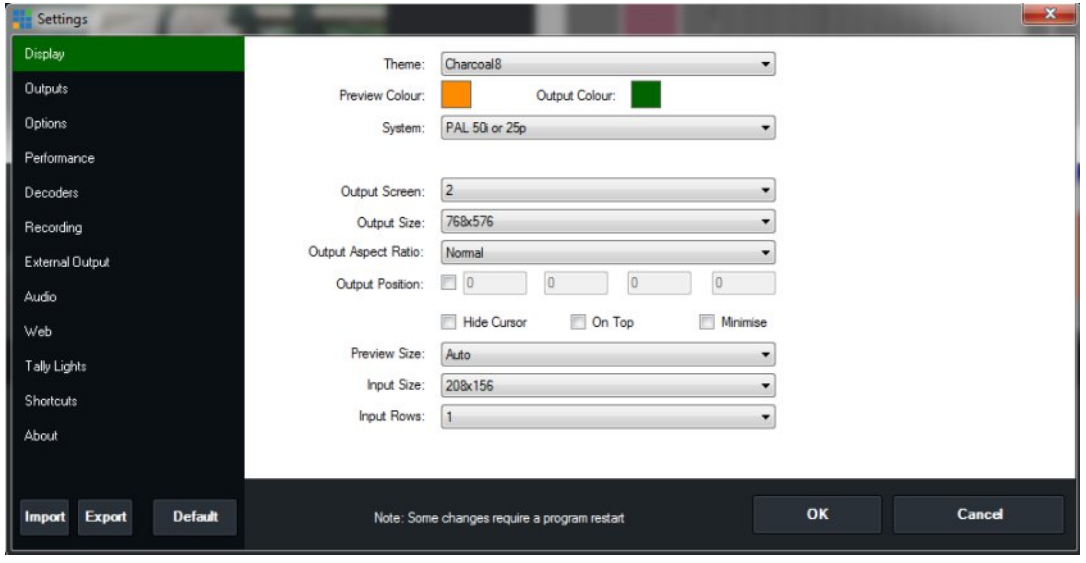
This would enable one man operation of both a camera and a switcher, so a wide unmanned camera could be selected while the shot is composed on the second manned camera and then switched on line by that operator.

The remote screen is shown here, select the indicated icon to obtain this display. To switch a camera select it on the Yellow matrix and the select Cut or fly, (if you must) to make the cut on the green matrix, it could not be simpler.

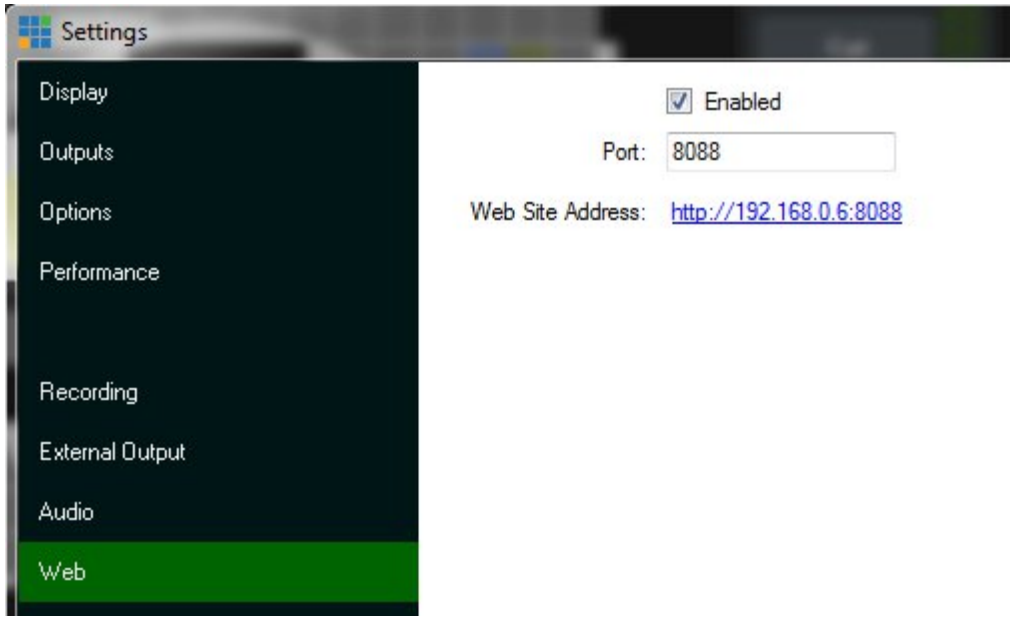
The green matrix shows which camera is on line so you know if it is safe to compose a camera shot. You have all the controls of the main switcher in your hand, you can even select clips on the Vmix PC's hard disc and play them in. Is it difficult to set up ? well this is Vmix and I have yet to find any software as friendly to use.



Select settings (Top Right)



Tab down to Web and select web



Enable web and browse up the address shown on your Smart Phone or Tablet

Any problems visit *http://www.vmix.com.au/help11/*

This really has to be the best addition to some already winning software, that is available free with a limited range of inputs and standard definition, no watermarks and with reasonably priced upgrades that allows more sources. It works well with, Adobe live stream for Internet streaming and it really comes highly recommended for any live multi camera event and now with the Smart Phone hook up it just got better.

So far I have tried it with an old iPhone and an iPad sorry I did not have an Android tablet to hand to test it, but I have no reason to doubt it will not work.

All we need now is a DATV transmitter that will interface to Vmix particularly the ones that use in computer Mpeg compression, surely the Vmix stream can be intercepted and connected to the coder input.

External links

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

But if you have a Kindle 3G then yes, but only to Amazon, and there is not a lot of ATV material on their site.
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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.

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.

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