ATCO NEWSLETTER

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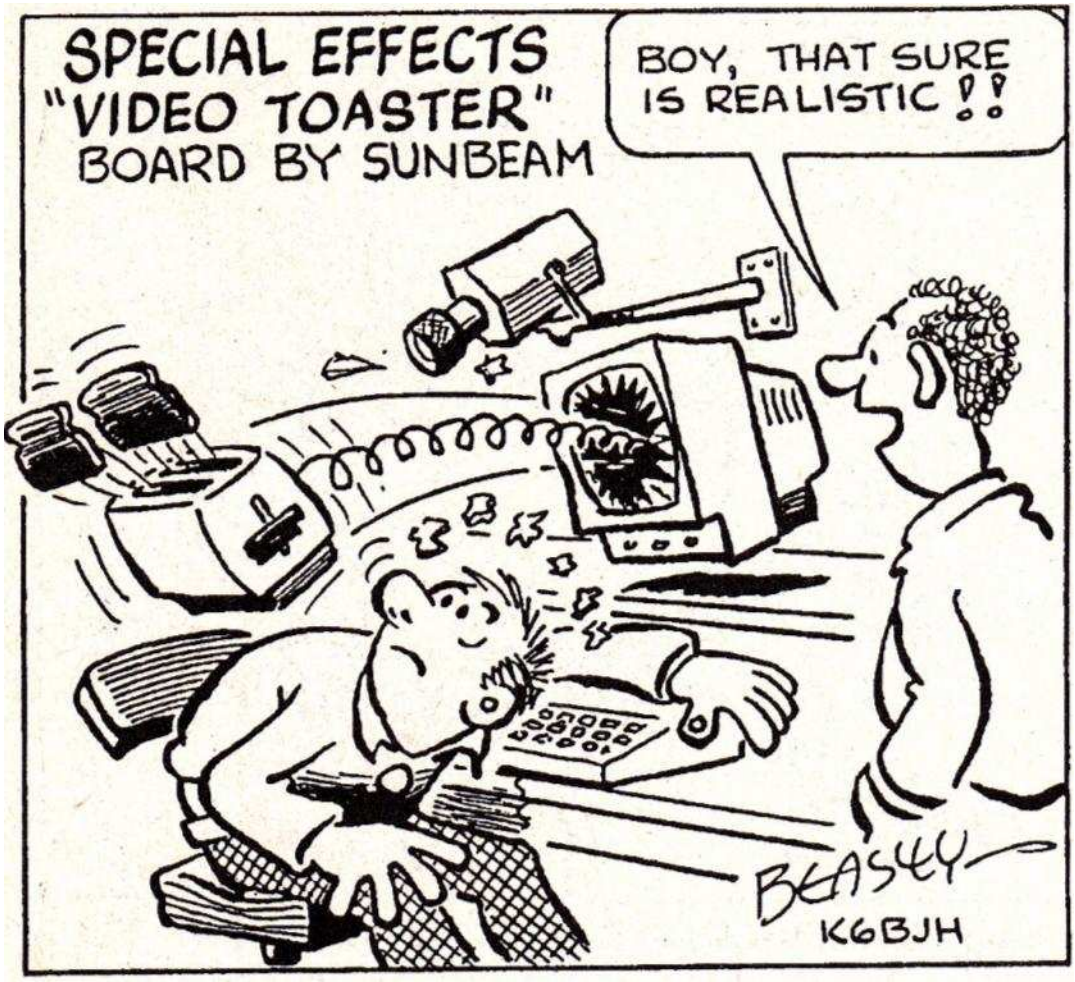
ATCO SPOTLIGHT TOPIC

Thanks to Beasley, K6BJH (SK) and ATVQ Magazine for allowing us to share his cartoons. For the complete book on "The Best of Beasley" go to the ATVQ Magazine web site (http://atvquarterly.com/) available for purchase.



ACTIVITIES ... from my Workbench

Well, it's the time of the year again for me to complain about the cold weather and my inability to perform antenna and tower work. Yes, it's cold but the work could be done. It just boils down to how much I want the work done…NOT THAT MUCH! In reality, I'm anxious to see how my new radio controlled tower winch will work. I built one from scratch the way I wanted it but it has been successfully tested only indoors so far. It must lift my 25 foot tower section that weighs about 150 pounds. The winch will lift a 300 pound weight so I think I've got the safety factors worked out. I have full up and full down limit switches ready to go but haven't built my miniature camera that will read the marks on the tower leg to indicate how high the section is without going outside (as I do now). Till I get the remote controls worked out, I'll have to go outside each Tuesday night to raise the tower for the net. OK, so much for my Ham activities. I'll think about them more while I'm basking in the sun in Florida for the next couple of weeks.

Repeater: Not much happening. The DVB-T transmitter / receiver is working OK depending upon how you look at it. They both have software issues so to accommodate them, from time to time it's necessary to power reset them to recover from lockups. I don't have to go to the repeater each time this happens, we devised a way with control codes to turn AC power off then on to reset them. I've elaborated in the specification page so I won't repeat the process here. Anyone that notices a problem with the DVB-T units can reset them. It's not restricted and you can't physically hurt anything. The problem surfaces when the DVB-T unit(s) detects loss of video or what it determines as bad video. An extremely weak signal can be detected as bad video. Sometimes it recovers when good video is sent but not always, thus the reset mechanism.

The receiver PID information is somewhat non-standard at the moment which may be updated in the near future. It seems that HiDes chose non-standard default values for their transmitters so when the repeater receiver is scanned, those PID's are captured and needed for any other transmitter sending data to the repeater. As it turned out because of a bug in the DATV-Express board transmitter, I can't create PID information with a value high enough for the HiDes unit. We are correcting the software glitch but we also need to standardize in PID values so all will be able to send/receive DATV data without having to set special PID values for each device.

We are also discussing the possibility of adding a Mesh Network node to the ATCO repeater. This could have significant advantages for us but we need to talk about it first. As I see it there are 4 main advantages: **First,** it will create an emergency communications network for all Hams. **Second**, it is an almost "plug and play" arrangement because the equipment needed is available commercially and very inexpensive. **Third**, it can be used to communicate wirelessly (2.4GHz) with video by using a Skype interface and a laptop web camera. **Last**, our public service Red-White-Boom efforts could be simplified by using the network to send video via 2.4MHz mesh and then via the internet to the EOC in police HQ. I see it as a win-win for ATVers. Those that can't presently get a video signal to the repeater will be able to if this network is created. Hopefully, this will create more ATVers in our area. There's more on the introductory details of this proposed network later in this Newsletter.

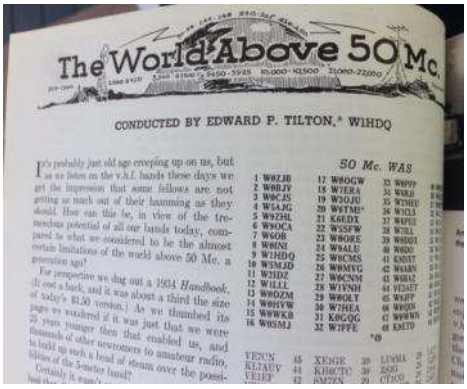
I'm working the design of a post amplifier for DATV DVB-S and DVB-T transmitters. It is a dual PHA1 amplifier with 15dB gain for use with the DATV-Express board DVB-S and 25dB gain for DVB-T powered directly from that board. The output from this amplifier will be about 200-300 milliwatts which is sufficient to gain access to the ATCO repeater. Parts cost for this amp is in the neighborhood of $30 and needs a 5 volt 1/2 amp power supply. Also I have a brick type amp that has over 30dB gain and runs with a separate 12VDC 5 amp power supply. That brick costs about $85. With this amp, the DVB-S and DVB-T power output will be in the neighborhood of 1-5 watts. Stay tuned for details.

That's all for now guys. Don't forget, the Mansfield Hamfest is coming up soon.
….73, WA8RMC

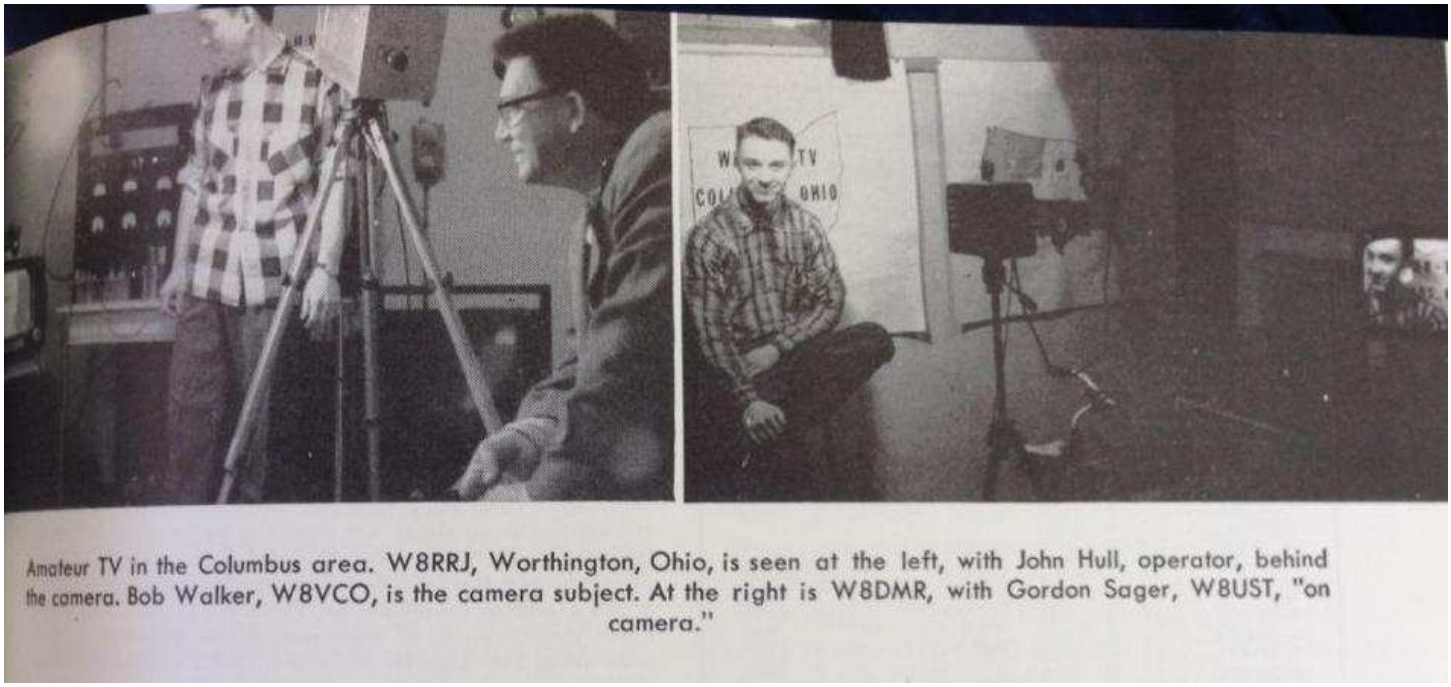
LOOK WHAT I FOUND IN THE ARCHIVES

Look what I found! By gosh, it's Bill Parker in 1959. With him are W8RRJ, W8VCO and W8UST. He appeared in the "50Mc and up" column of QST back then. He was playing around with video cameras and ATV even at that time! WOW!! I remember exchanging video contacts with Bill in 1967 when I was still in Toledo, Ohio but he was an ATVer when I was still in high school!

Just wanted you to see a picture of Bill back then.
…WA8RMC


The World Above 50 Mc.

CONDUCTED BY EDWARD P. TILTON,* W1HDQ


Amateur TV in the Columbus area. W8RRJ, Worthington, Ohio, is seen at the left, with John Hull, operator, behind the camera. Bob Walker, W8VCO, is the camera subject. At the right is W8DMR, with Gordon Sager, W8UST, "on camera."

CAPTION CONTEST

OK, I'm sure you can come up with a funny caption for this photo. Let's see what you can do. I found the picture so now it's your turn to supply a good caption for it. Email me your caption by March 1st to towslee1@ee.net and I'll send out a return Email by March 15 to all members to vote for the best caption. Return your vote by April 1st and I'll publish all suggestions along with the winner in the Next Newsletter due out about April 15th. All ATCO members will have one vote.

The winner will receive a $100 check from ATCO. Second place will get free ATCO dues for a year.

We have pizza parties but only the local people participate so I want to provide something **all** of us can do. So, you out-of-towners put your thinking caps on and come up with something. See if you can do better than the local guys.

…WA8RMC

DATV IN USA LAGS OTHER COUNTRIES?

The DATV effort in the USA is starting to pick up steam due to recent publicity and availability of inexpensive equipment. That's the good news. Unfortunately, I feel it isn't happening fast enough but we must be patient. It's a "high tech" product with much to learn compounded with conflicting topics. Yes, the European countries seem to be leaps and bounds ahead of us but when we catch up, LOOK OUT! Note below the comments from Clint in Australia with a post to the DigitalATV@yahoogroups.com forum.
WA8RMC

"I'm actually quite surprised you folks over in the States aren't leading the way for DATV....I thought it odd that during the last ATV QSO Party (that Peter Cossins VK3BFG organizes) I noticed that most if not all State side ATV Stations where analogue, not that there is a problem with that but I thought strange that DATV wasn't predominate in some way. I use an SR system transmitting DVB-S on 1276 MHz to Digital Channel 2 on the Melbourne DATV Repeater VK3RTV. This repeater has been on air since around 1975/76 and went Digital a couple of years ago transmitting on 446.5 MHz DVB-T which everyone can receive!....it took a strength 3 picture analogue to a glass hard picture!....admittedly the SR system is pretty expensive way to go initially but things are a foot and in time it'll be more affordable, I think the Express unit from BATC is a good investment into ADTV and you can find a Driver and P.A stages from Mini-Kits VK5EME...come America be progressive become Digital...."
Cheers
Clint – VK3CSJ

DVB-T SPEC SUMMARY

I'm repeating the DVB-T specs here again in hopes we can standardize on their use. If we can create a general standard, perhaps other groups both in the USA and elsewhere will follow so we can communicate with the least hassle. ATCO and ATN groups involved with DATV have generally agreed on DVB-T operation with the following characteristics:

Repeater DVB-T Tx Frequency: 423MHz FEC=1/2, BW=4MHz. PID: **PMT=4095, PCR=256, Video=256, Audio=257**
(423 is cable channel 57 which is identified as the 421MHz analog channel. 4MHz is selected to give better resolution when used as a repeater output. Always use FEC=1/2 for best spectral efficiency)

Repeater DVB-T Rx frequency: 438MHz FEC=1/2, BW=2MHz. PID**: PMT=4095, PCR=256, Video=256, Audio=257**
(ATCO DVB-T repeater input is: PMT=256, PCR=4097, Video=4113, Audio=4352 at this time because of HiDes defaults but it will change shortly. 438 is selected rather than normal 439MHz to take advantage of existing analog RF filters without re-tuning. ATCO uses lower sideband so the analog filter is already tuned for 439 +1.5 – 4.5MHz. Using 438 allows both analog and digital systems to share the same input filter without re-tuning).

Tx and Rx simplex frequency: 438MHz FEC=1/2, BW=2MHz. PID: **PMT=4095, PCR=256, Video=256, Audio=257**
Bandwidth selection: 2 and 4 MHz (Note: these are not the standard broadcast bandwidths. Standard dongles are available only in 6,7,8 MHz BW selections because that is what is used commercially in Europe).

Mode: QPSK (QAM selections are normally available but not used for DATV because the signal to noise ratio suffers and not desirable for Dx operation. Resolution is degraded from QAM but not enough to warrant QAM use.)

FEC: ½. There are other FEC settings that have better error correction but require more spectrum. As Hams we should be able to put up with some minor pixilation in order to have better bandwidth efficiency.

FFT carrier selection: 2k. The 2K mode has the best bandwidth efficiency with the sacrifice of some high motion dropouts and resolution. ATCO is standardizing on 2K repeater input and 4K repeater output.

Guard interval: 1/32. Again, we emphasize on minimal bandwidth for acceptable performance. Lesser guard interval settings are capable of higher data throughput but have a higher signal to noise requirement.

symbol rate: DVB-T does **not** have a symbol rate selection

PMT = 256
PCR =4097 (PCR and video must always be the same)
Video = 256* (*The HiDes transmitter has Video = 4113 and Audio = 4352 as default. New firmware will allow changes but at this time the ATCO repeater receiver expects the 4113 and 4352 values)
Audio = 257*
.

VSWR: Why It Does Not Mean As Much As You Think

By Dr. Al Torres, KP4AQI (Re-print by permission)

Beyond every ATV transmitter/receiver is ultimately an antenna. So, unless it's working properly, poor ATV transmission and reception results! Lots of attention is on low VSWR for acceptable results but that's not necessarily the only answer. WA8RMC

Most hams are obsessed with the Voltage Standing Wave Ratio (VSWR) of their antennas. It drives them crazy not having a very good VSWR. So let's take a look at the VSWR concept. In order for proper radiation from an antenna, two essential items must take place. You must feed the antenna with RF Power and then the RF Power must be transferred to free space. How good you transfer the RF Power to the antenna is what we call VSWR; how well the antenna transfers RF Power to free space we call Antenna Efficiency. So let us first address VSWR. What is a good VSWR? Is 2:1 good enough? Most hams will say no. They want a number better than 2:1. So how much "RF power" have we transferred with a VSWR of 2:1? The power transferred is shown by Table 1.

Table 1: VSWR vs Power Transfer Percentage

VSWR	POWER TRANSFER (%)
1.0:1	100
1.25:1	99
1.5:1	96
1.75:1	93
2.0:1	89
2.25:1	85
2.50:1	82
2.75:1	78
3.0:1	75

A 2:1 VSWR is approximately 89% (not bad); even at 3:1 we are transferring approximately 75% of the transmitter power. If you do not want 2:1 how about 1.5:1 which is approximately a 96% power transfer? Unfortunately, VSWR is also dependent on the antenna frequency bandwidth so it is not going to be same for all the frequencies over the antenna frequency domain. Even broadband antennas have a small VSWR variability.

The second area of consideration is "antenna efficiency". Antenna Efficiency is for most hams very hard to measure or estimate. A very simple way for measuring antenna efficiency is to use the "Wheeler Cap" method, which I have used many times. The explanation of the Wheeler Cap method is outside the scope of this article but it can be best summarized by saying that you want to have the higher radiation resistance with the lowest ohmic resistance. High ohmic resistance makes the antenna very inefficient while high radiation resistance makes the antenna very efficient. Antennas made from good low loss materials (like Copper) are more efficient than antennas made from Aluminum. Antennas with traps are less efficient than antennas with no traps. Some examples of antenna efficiency are shown by Table 2:

Table 2: Typical Antennas and Antenna Efficiency

Antenna Type	Efficiency
Monopole: Copper Wire	93%
Dipole: Copper Wire	92%
Most Antennas: Aluminum	50-60%
Rubber Ducks:	15-20%
Dummy Load:	1%

So if you have a ¼ wave 2 meter monopole made from Copper with a VSWR of 2:1, and then you have a Rubber Duck antenna with a VSWR of 1.5:1, and finally you have a Dummy Load with a VSWR of 1.0:1, which do you think will perform the best? The 2 meters ¼ wave is 93% efficient x VSWR of 2:1 (89%) which gives you a total efficiency of 83%. The Rubber Duck is 20% efficient x a VSWR of 1.5:1 (96%) for a total efficiency of 19%. The Dummy Load is 1% efficient x a VSWR of 1.0:1 (100%) for a total efficiency of 1%. So the conclusion here is that VSWR does not mean as much as you think; you must take into account the radiation efficiency of the antenna in addition to the VSWR uniquely. ***A word of caution: the lowest VSWR will not produce the best antenna performance; the optimum value is very close to the lowest VSWR. You can determine this value by using a field strength meter for peak radiation value while adjusting the VSWR with a matching unit. It will not be the lowest VSWR!***

So start with a good efficient antenna (Copper material or Silver if you can afford it). Eliminate lossy components (baluns, right angle connectors e.g. elbows, etc.); select the best performing feed line, adjust the antenna for a low VSWR but not the lowest and measure the performance with a field strength meter. **Now, declare victory!**

NEW HiDes DC103H CAMERA W/BUILT-IN DVB-T EXCITER. 1st Look

The new HiDes DC103H camera/DVB-T transmitter seems like a nice piece of equipment but Dave, AH2AR, has had problems getting it up and running properly. Fortunately, Jerry and Calvin at HiDes have been most helpful in identifying the bugs and resolving the issues. I thought it to be of interest to follow Dave's experiences and appreciate his end result. I'm partial but for what it's worth, I feel confident that the Express board still gives the best transmitter feature and price for the money even though it is not a standalone board. A table of HiDes and competing equipment is at the end of this article. The Express board will run with the Odroid micro board computer (smaller and more powerful than a Raspberry Pi board). WA8RMC

On 12/26/14 Dave Pelaz, AH2AR, says,
I received the DC103H Wednesday and had the opportunity to get the camera running yesterday afternoon. Here are my initial comments: I struggled with getting the DC103H to communicate through the UART for programming, but after several hours of trial and error, I was able to get the camera to accept configuration changes. I ended up setting the camera for 2 MHz bandwidth QPSK and after running through a number of changes I was able to find the configuration combination that allowed smooth/no glitch operation. When comparing resolution quality with older DC101 (when operating glitch-free video), the DC103H is far superior. The best I could get the DC101 to run (at 2MHZ BW QPSK) was 720 x 480 pixels, but the DC103H allows for 1920 x 1080 pixels resolution, over double image quality. True HD, for sure!

There is the expected "high latency" when running 2MHz QPSK (about two seconds). At other settings (4 MHz 16QAM or better), there is probably about a 1/4 second or better latency. For my use, I will pretty much run 2 MHz QPSK, so latency can be expected.

The DC103H uses a metal case surveillance-style housing for the optics and all electronics. It has a pigtail coming out of the back which has a USB cable for installing firmware updates, a UART/USB connection which allows for menu-driven graphical-user-interface configuration changes (requires a PC running an iTE serial tool program), a 12 volt DC cable, a microphone cable, and an NTSC video output that provides a display of what the camera is imaging. The display allows you to know when the camera begins transmitting, and it takes about 20 seconds for the camera to start transmitting once it is powered on. The case is not waterproof (due to the pigtail).

When installed in the surveillance camera case, the optics of the DC-103H can't be re-focused. Consequently, my particular DC103H is set up to provide a focus/depth of field from about 12 inches to 20 feet, certainly preset well for ham shack usage. According to some of the HiDes literature, the other "bare-bones" DC103 (no case) that is available allows you to re-focus the camera, but the DC103H require a complete disassembly to re-focus it. This is not an issue since I am using the camera in-shack.
Dave AH2AR

Follow-up on 12/26/14
It is somewhat expected, isn't it? Power output is 13-15 dB down of where it is supposed to be, and gain level settings have little effect on the issue... Will let you know what the outcome is...

Details from Dave to Jerry at HiDes about the DC-103 " bugs"
It's possible the RF power meter I was using was not accurately measuring small output changes at positive attenuation steps. I'll confirm with spectrum analyzer. Also, I will go ahead and use an additional amplifier stage with the current DC103H configuration.

Lastly, you are also correct in that I did not notice the RF output differences in the DC-103H specifications, but please keep me in mind if you make any further RF revisions with the DC-103.
Dave P

On 12/27/2014 Jerry at HiDes Technical Support wrote:
0~5 db change does work well, as I've measured with R&S ETH & Agilent Spectrum analyzer. Please provide more info about it. Negative (attenuation) setting issue is confirmed bug. Actually, DC103 power level is lower than UT-100, and we listed it clearly on the spec sheet and web shop. I guess you may not find the difference and just thought it should be the same as UT-100. We understand higher power level is convenient & important for HAM applications. We expect to have the new version of DC103v2 in Feb.
Jerry

12/272014
Power output is critical in our application as it would be extremely impractical for Ham radio application if the power output is so low. There are essentially no changes through the 1 dB, 2dB, 3 dB, 4dB, and 5 dB steps. I can't see any power level response changes from 1-5 dB. It does not appear normal. Of course I have only tried the camera on the primary ham radio frequency of 439 MHz. Also, I can't get any power level changes using any of the negative dB numerical values, so this may be what you mean in regards to the bug! I await your board revision. Do you think it will be a month or longer? Thanks in advance for getting this issue resolved!
Dave P

12/26/2014
You are right, DC-103 power is less than UT-100B by 5~10 dB. It's a design issue instead of defective component. We are revising the RF board design to provide higher RF power. I will provide you free upgrade when it's available. -25 db setting. Oops, it's a bug! The negative sign is not handled well. We will fix it soon.
Jerry

Unfortunately, there is a definite power output problem on the camera. It is at least 15dB lower than the UT100B power output. Additionally, when adjusting the gain at the -25 dB level, it actually goes up a little in power output. When running at +5 db, it sags down in power output. I am running the camera at 439 MHz, and it is unable to drive my amplifier at the reduced power level that I am experiencing, unlike the UT100B, that has plenty of drive. I suspect it may have a defective RF device in the front end? What are your thoughts? Any suggestions? This problem wasn't noticeable when I was initially using the camera with a small UHF antenna, as the receiver antenna was only 500cm away from the DC103H.
Dave P

Dave summarizes, this is what I have noted earlier:
I was running the DC103H (at 18000 kbps) at QPSK, 2 MHz bandwidth, and watching the demodulated video on a UT100D dongle, and there was only two seconds of latency present. This morning, I went upstairs in the ham shack and checked out latency time again but this time I was watching it through the UT100B. Latency ended up being (choke) 50 seconds. What is going on??? I needed to repeat the "experiment" to ascertain whether the parameters (that I did not change) somehow changed by itself, (unlikely), or maybe there is an unforeseen difference in the way the UT100B and UT100D respond to the specific parameter configuration that I was employing. As for the HV110, it could not keep up and it would lose lock every ten seconds, then re-start the demodulation, and then would drop out after ten seconds, and re-acquire the video again, and would repeat this cycle. It was acting as if the buffer couldn't keep up with the stream in the HV110. Magic, for sure.

I re-ran this experiment, and the UT100D (receive-only dongle) is running as I speak, unbelievable, as the UT100D continues to have only 2 seconds of latency and outstanding HD full motion video. When I use the UT100B, I'm getting 50 sec. latency. The DC103H is providing the HD video signal, at QPSK, 1920x1080 pixels at 1800kbps. I rechecked all of the camera parameter settings and nothing has changed. All conditions experienced yesterday are being duplicated today. Note: The HV110 works at this DC103H bit-rate setting, but it continually recycles, as if it is experiencing buffer overflow. Can anyone provide an explanation of what is going on?

I have two identical Netbook-style computers, both purchased new for digital TV receive applications (two (2) Acer Aspire One computers. One computer is dedicated only to the UT100B transceiver. It has no other applications on it (other than Win7) nor is it on a router. It is completely "standalone".

The other Acer Aspire One has multiple apps on it, and is used for other ham radio-related activities. This is the computer I am using for test activities (and have a UT100D receiver Dongle that I can use for test purposes).

I checked the "CPU meter" Windows 7 gadget on both Acer computers when they are running the UT100's in receive mode and discovered that the dedicated Acer is (for whatever reason) running at a high CPU percentage (at times up to 99-100 percent) when receiving the described digital video. Since there is nothing loaded on that Acer, other than the UT100 software, I am further looking into why that (identical) computer is getting bogged down and creating the observed latency. This is counterintuitive, since the computer that is doing all of the so called "heavy lifting" is the one that is not having its CPU overtaxed when running the UT100D.

This points to a consideration in running DVB-T dongles, one of which is that observed "extended" latency (or lack thereof) can be a product of CPU performance. Obviously, the answer here would be to possibly consider the consequences when using either "inexpensive" computers or older computers, otherwise, additional latency can be experienced.
Dave.

Jerry,
I have a question. The video glitches when using the DC103H with the HV110 when using QPSK with a 2MHz bandwidth. It receives fine with the UT100 (running QPSK at 2 MHz bandwidth), but not with the HV110. This is what happens with the HV110: I tried a very large number of parameter combinations at 2 MHz QPSK, and most of the parameter settings (within reason) worked with no problem with the UT100, however, the HV110 performed erratically, and what happens is that the HV110 goes through a "work-not-work" cycling sequence, and good video will only run uninterrupted from 2 to 14 seconds, then the green light goes out, along with the "00" display, and there is a delay of about 5-7 seconds, then the lock light goes red, then the lock light goes green, and the "00" display comes back up with a small delay, then the video begins and will last from 2 to 14 seconds, and then drops back out to repeat the behavior. Oddly, this never happens with the UT100 as the UT100 holds solid with no dropouts. I tried a number of video bit rates and I kept them at the recommended 20 percent less than the modulation rate, with no affect on the problem with the HV110.

I also tried changing the pixel resolution from 1920 x 1080 to a value of 1080 x 720 pixels, with no affect on the problem with the HV110. Is this normal? The update Calvin is referring to is to update the DC103 firmware to prevent it from causing glitches when being received by the HV110 @ 2 or 4 MHz QPSK video.
Dave

You will need to update DC-103 firmware soon. It's related to the issue you found with HV-110.
Jerry

It was a very easy process for updating the firmware for the DC103H. The firmware update now allows the running of 2 MHz bandwidth into the HV110 receiver with absolutely no glitches. At 2 MHz, it does require the resolution settings of the DC103H to be

1080 x 720 pixels for smooth operation with the HV110 receiver. Any higher resolution causes the HV110 to drop out intermittently.

The DC103H's settings at higher resolution (1920 x 1080 pixels) at 2 MHz works fine when viewing on the UT100. (No dropouts).

Finally, it was a very easy process to update the DC103H firmware. The firmware update now allows running 2MHz bandwidth into the HV110 receiver with absolutely no glitches. At 2 MHz, it does require the resolution settings of the DC103H to be at 1080 x 720 pixels for smooth operation when using the HV110 receiver. Any higher resolution causes the HV110 to drop out intermittently. The DC103 H's settings at Higher resolution (1920 x 1080 pixels) at 2 MHz works fine when viewing the video on the UT100. (No dropouts). It is a tight squeeze (but not too difficult) getting the PCB boards out of the DC103H camera case (due to cabling). I am definitely satisfied with the way the DC103H operates, especially with the firmware update changes that have occurred when viewing its video on an HV110. There appears to be no way to set the PAT Version (The PAT Version is set to the default "0" on the camera). Dave P.

There you have it folks. Below is a table of the DATV receivers and transmitters available at this time. If you are in the market for some DATV equipment, check out the specs carefully to get the most "bang for your buck". Happy DATVing. WA8RMC

Comparison of DATV Models from BATC / DATV-Express / HiDes / SR-Systems Page 1 of 2

by Ken Konechy W6HHC

Company MODEL	TYPE	Standalone	Price	Frequency Range	DVB-T Channel BW	Encoding	Average RF Power Output	Protocol
BATC DigiLite (kit)	Transmitter	USB	~ 120 BP with soldering components	420 - 450 MHz or 1200 - 1350 MHz	N/A	MPEG-2 with Hauppauge	-10 dBm to -15 dBm	DVB-S
BATC DTX-1	Transmitter	Y	459 BP 585 euro	70 - 1350 MHz	N/A	MPEG-2	-5 dBm	DVB-S
DATV-Express (w/ 4-core i7 PC)	Transmitter	USB	USD300 215 BP	70 - 2450 MHz	1 MHz -thru- 8 MHz	MPEG-2 with Hauppauge	DVB-S 10 dBm DVB-T -5 dBm	DVB-S DVB-T
DATV-Express (w/ ODROID U3)	Transmitter	USB	USD300 215 BP	70 - 2450 MHz	1 MHz	MPEG-2 with Hauppauge	DVB-S 10 dBm DVB-T -5 dBm	DVB-S DVB-T
HiDes HV-100E	Transmitter	Y	414 euro USD669	50 - 950 MHz	2 MHz -thru- 8 MHz	MPEG-2 & H.264	-3 dBm	DVB-T
HiDes HV-100EH	Transmitter	Y	414 euro	1200 - 1350 MHz	2 MHz -thru- 8 MHz	MPEG-2 & H.264	-18 dBm	DVB-T
HiDes HV-110E	Receiver	Y	125 euro	170 MHz to 950 MHz	2 MHz -thru- 8 MHz	MPEG-2 & H.264	N/A	DVB-T
HiDes HV-200E	Transmitter	Y	492 euro	100 MHz to 2500 MHz	1 MHz -thru- 8 MHz	MPEG-2 & H.264	between -3 and -18 dBm depending on frequency	DVB-T
HiDes HV-310E v02	Transmitter	Y	USD349	50 - 950 MHz & 1200 - 1350 MHz	1 MHz -thru- 8 MHz	H.264	15 dBm at 430 MHz 0.5 dBm at 1275 MHz	DVB-T
HiDes UT-100A	TX/RX	USB	USD199	70 - 950 MHz & 1200 - 1350 MHz	5, 6, 7, 8 MHz	MPEG-2 & H.264	0 dBm	DVB-T
HiDes UT-100B	TX/RX	USB	125 euro	70 - 950 MHz & 1200 - 1350 MHz	2, 3, 4 MHz	MPEG-2 & H.264	0 dBm	DVB-T
HiDes UT-100C	TX only	USB	170 euro	70 - 950 MHz & 1200 - 1350 MHz	1 MHz -thru- 8 MHz	MPEG-2 & H.264	0 dBm	DVB-T
HiDes UT-100D	TX only	USB	USD84	170 - 950 MHz	2, 3, 4 MHz	MPEG-2 & H.264	0 dBm	DVB-T

Comparison of DATV Models from BATC / DATV-Express / HiDes / SR-Systems Page 2 of 2

by Ken Konechy W6HHC

Company MODEL	TYPE	Standalone	Price	Frequency Range	DVB-T Channel BW	Encoding	Average RF Power Output	Protocol
HiDes UT-130	RX only	USB	USD199	100 - 950 MHz & 1200 - 1350 MHz & 2350 - 2500 MHz	2 MHz -thru- 8 MHz	MPEG-2 & H.264	N/A	DVB-T
HiDes UT-200AJ	TX/RX	USB	USD239	50 - 950 MHz 1200 - 1350 MHz	TX - 6,7,8 MHz RX - 6, 7 MHz	MPEG-2 & H.264	between -3 and -14 dBm depending on band	ISDB-T/Tb
HiDes UT-210	TX only	USB	USD269	100 - 950 MHz & 1200 - 1350 MHz & 2350 - 2500 MHz	1 MHz -thru- 8 MHz	MPEG-2 & H.264	between -3 and -18 dBm depending on band	DVB-T
SR-Systems e.K MiniMOD4	Transmitter board	Y	350 euro ---- 550 euro (to HAMs only)	70 - 2500 MHz	N/A	MPEG-2 with encoder board	0 dBm	DVB-S ---- DVB-S DVB-S2
SR-Systems e.K MiniMOD5	Transmitter board	Y	500 euro (to HAMs only)	10 - 1100 MHz	1 MHz -thru- 8 MHz	MPEG-2 with encoder board	0 dBm	DVB-T
SR-Systems e.K MiniMOD5/A	Transmitter board	Y	900 euro (to HAMs only)	10 - 1100 MHz	1 MHz -thru- 8 MHz	MPEG-2 or H.264 with encoder board	0 dBm	DVB-T DVB-T2
SR-Systems e.K HD-MOD	Transmitter board	Y	550 euro (to HAMs only)	10 - 1100 MHz	1 MHz -thru- 8 MHz	H.264 encoder is onboard	3 dBm	DVB-T
SR-Systems e.K MPEG2 Encoder	Encoder board	Y	175 euro (to HAMs only)	N/A	N/A	Use with exciter boards	N/A	N/A
SR-Systems e.K H.264 Encoder	Encoder board	Y	400 euro (to HAMs only)	N/A	N/A	H.264 use with DVB-T exciter boards	N/A	N/A
SR-Systems e.K Hamset3 (MiniMOD3 obsolete)	Transmitter	Y	500 euro (to HAMs only)	70 - 2200 MHz	2 MHz -thru- 8 MHz	MPEG-2	0 dBm	DVB-S DVB-T ATSC
SR-Systems e.K nim DVB-S (TS out)	Receiver Tuner (use with modulator)	Y	50 euro (to HAMs only)	950 – 2150 MHz	N/A	MPEG-2	N/A	DVB-S
SR-Systems e.K nim DVB-S2 (TS out)	Receiver Tuner	Y	100 euro (to HAMs only)	950 – 2150 MHz	N/A	MPEG-2 H.264	N/A	DVB-S DVB-S2
SR-Systems e.K nim DVB-T (TS out)	Receiver Tuner	Y	75 euro (to HAMs only)	50.5 - 858 MHz	1 MHz -thru- 8 MHz	MPEG-2	N/A	DVB-T

Mind Bender Questions

Problem: When Carl Friedrich Gauss was six years old (back in 1783), his schoolteacher asked the students to add up all the numbers from 1 to 100. Unfortunately for the teacher, who was hoping to keep the class occupied, it took young Gauss only a few seconds to work out the answer. Can you figure out what Gauss did to come up with the answer?

Problem: I am the owner of a pet store. If I put in one canary per cage, I have one bird too many. If I put in two canaries per cage, I have one cage too many. How many cages and canaries do I have? This one takes a little more than average math skills.
Solution: Search for them. They're in this Newsletter.

PACKET IDENTIFICATION (PID) DETAILS FOR DVB-S and DVB-T

The PID information tables in the DVB-S and DVB-T data stream remain a mystery for most of us (me included). Attempts to understand the meaning of this data is usually met with considerable confusion and frustration because of some conflicting and just wrong explanations about it. Below is my interpretation of what this data is all about.

First, this data information is for **information only** as to the specifics about the data in the transmitted Digital television transport stream. It doesn't actually alter the stream in any way. It only serves as a data stream identifier so the receiver knows what stream is being sent and to display only the transport stream that matches the PID values stored in the receiver memory. That's why it is necessary to "scan" the receiver for an incoming transmitted signal for a PID match.

(**PID**) - The packet identification is 13 bits of data at the start of each packet in the 188 byte Program Allocation Table (PAT) in the transport packet header. It takes 8192 packets to complete one transport stream frame. The **PID** contains the following identifiers:

PMT – Program Map Table. This defines the type of program in the transport stream. Default is 4095 Decimal. It contains elementary stream PID numbers associated with the program & information about the type of these elementary streams (video, audio, etc.).

PCR – Program Clock Reference. Separate stream helps synchronize audio & video. It's usually same as the video PID. Default is 256. The main job of the PCR PID is to phase lock the 27MHz oscillator in the receiver to the reference oscillator in the transmitter.

NIT – Network information table – Optional program specific information table. Default is 16. It is the Packet ID associated with the Network Information Table (NIT). The Network Information Table is specified in the MPEG-2 standard as an optional Program Specific Information (PSI) table, but the syntax of the NIT is left for others to specify. The default value is 16.

Video – Video elementary stream identifier. Video and PCR are normally equal. Default is 256.

Audio – Audio elementary stream identifier. Default is 257.

Network ID – MPEG2 transport stream multiplexes collection on a single system. It's part of service info. table (DVB-SI) Default = 1.

Stream ID – Used inside NIT and EIT packets. It's the same as "program" field. Must be same as program NR field. Default = 4095.

Program NR – Same as stream ID but with different names. Must be same value as stream ID. Default = 4095.

PID Data table of various products for DVB-S and DVB-T: Red HiDES numbers should change to the Green Numbers in ( )

	Express Default	Digilite	ATCO Dutch Tx DVB-S	ATCO AGAF Rx DVB-S	ATCO HiDes Tx/Rx DVB-T	
PMT	**4095**	**4095**	**32**		**256 (4095)**	
PCR	**256**	**256**	**133**	**33**	**4097 (256)**	
NIT	**16**					
Video	**256**	**256**	**162**	**33**	**4113 (256)**	
Audio	**257**	**257**	**88**	**49**	**4352 (257)**	
Service			**5004**			
(optional PIDS)						
Network	**1**					
Stream	**4095**					
Program NR	**4095**					

Dale, WB8CJW says, "Here is my take on a DVB digital video broadcast"

I try to visualize the transport stream as train cars with no engine where the cars have been individually loaded with audio or video of two digital TV programs. The cars (packets) have been inserted and organized to reach their destination in a timely manner and labeled with a packet ID (PID) so each of the cars contents can be rejoined to its proper program. This transport stream of cars is headed down the tracks on an RF wave at a steady pace. It is being sent to a decoder station bit by bit where someone at the receiver has tuned to and is viewing one of the programs (channel) they selected.

Each car represents a packet that contains a total of 188 bytes of which there are 184 bytes of data (the payload). The payload in each car contains only one kind of information which could be video, audio, data, PSI - program specific data, etc. Up front in each car the first 4 bytes (32 bits that are in 4 sections of 8 bits each) called the header describes what is contained in each car and what channel (program stream) it belongs to. The first byte in the header is sync.

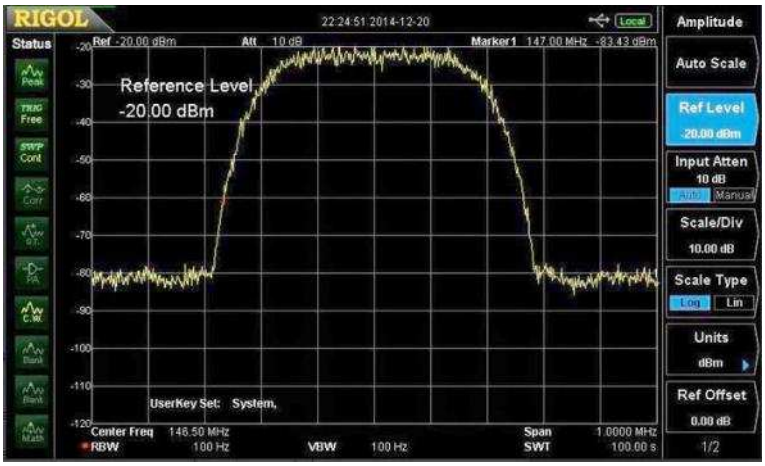
The decoder starts searching through each car (packet) for the sync byte which is 0x47. Once three sync bytes in a row have been found the decoder knows where the packet boundaries are and is said to be in "sync lock" with them. If a packet arrives with a wrong sync byte the decoder starts all over again looking for three 0x47 bytes in a row.

So now that we are synchronized with the packets in the bit stream being received it is necessary to locate which cars contain the video and audio for the channel selected. A packet labeled PID 0 is located and contains the program association table, PAT, for the channel entry. There is only one PAT for the whole transport stream and it provides the PID number in order to find the correct program map table PMT. There is one PMT for each program, in this example with two programs there would be two PMT entries listed, and it identifies the elementary streams in the program and gives the types - audio, video, etc. with their associated PID's. Now the original program can be reassembled and viewed.

DATV-Express BOARD UPDATE

Charles G4GUO has been working on adding a new mode for the DATV-Express software, a Reduced-Bandwidth DVB-S Digital-ATV (RB-DATV) signal for the new 146 MHz band in UK. The goal is to start up some DATV activity on the UK's newly opened 146 MHz band using very low Symbol Rates around 0.300 MSymb/sec to 0.333 MSymb/sec to produce a small bandwidth around 0.5 MHz centered on 146.5 MHz

Narrow-BW DVB-S signal produced by DATV-Express board on 146.5 MHz with SR = 333 KSymb/s.
The frequency span on the Spectrum Analyzer is 1 MHz wide



The DATV-Express software is being experimentally modified to produce a clean signal spectrum with NO alias images being produced when using very low SR. This is not as easy as it sounds….but, by using SDR and some FPGA coding changes, Charles was able to add x64 frequency interpolators coding simply to get the aliases to go to frequencies outside of the 5 MHz analogue Nyquist filters cutoff (for example 0.2 MSymb/s SR x64 = 12.8 MHz and alias filtering is achieved). The current plans are to use DVB-S with H.264 video compression to produce a video frame rate that is as fast as possible. G4GUO first tried to use a Mitsubishi 2M RF amplifier brick RA06H1317M (I believe rated at 60W FM at 150 MHz) and obtained terrible spectrum-distortion results. Charles could only obtain 750 mW average power output before excessive spectrum-distortion set in. Charles is now exploring the use of a "RF amplifier distortion correction" approach (sometimes called "pre-distortion" or "pure signal") to reduce the spectrum distortion. I hope the reader will realize that these "narrow-bandwidth" techniques could also be used on any crowded DATV band to insert a narrow 0.5 MHz BW DATV signal into a crowded band-plan spectrum.

Ken W6HHC has started to investigate software changes needed using the Logitech C920 web cameras to produce H.264 directly for the DATV-Express board and eliminate the need for Hauppauge video-capture units. Not an easy task…looks like Ken will need to do some software coding and learn how to compile in a Linux world. Fortunately, Alex OZ9AEC has been working with the C920 web camera on a Raspberry PI and has supplied plenty of direction and suggestions.

NEW DATV RECORD USING <500K SAMPLES/SEC

Reported by Charles, G4GUO, Rob MØDTS and Terry G1LPS successfully completed their first 2-way DATV QSO on 146.5 MHz on Sunday January 11, 2015. This 28 KM (17 miles) distance is the longest 2M DATV narrowband QSO we are aware of. They used experimental DATV-Express transmitters running about 1 watt and Tutioune receivers with up-converters at both ends. They sent and received H.264 video using 333KSymbol DVB-S.

Rob MØDTS says, "Well I got my NoV in October to allow me to use the 146-147MHz band. Until December I had not made any progress with this until Charles G4GUO released a new program for sending transport streams to DATV-Express. Before this it was not easy to send a low bit rate DVB rate signal but now it's possible. Charles also created a modified firmware file for the Express FPGA to adjust filter settings allowing clean output at low symbol rate DVB-S". See https://github.com/G4GUO/express_server

See the web site at http://www.m0dts.co.uk/index.php?tag=146MHz&item=141 which reports the details:
My current TX system:
PVR350 capture card or webcam as the AV source. ffmpeg re-encodes the video to MPEG4 video then encapsulates in a transport stream. Express_server software is used to set up and send the transport stream to the DATV-Express hardware.
The DATV-Express board sends a -10dBm DVB-S signal, amplifies it to 1W, -5dB cable loss to 9 element yagi for a few Watts ERP.

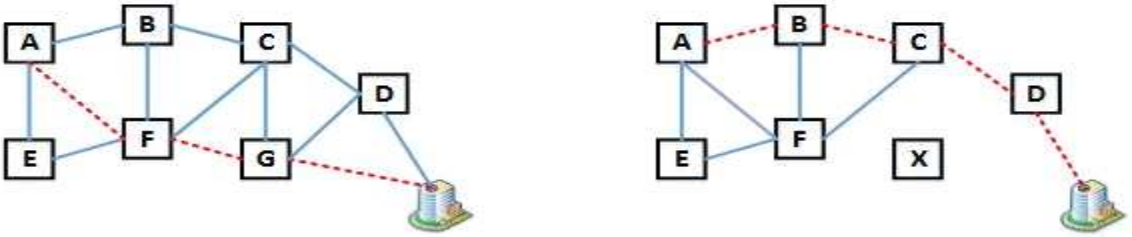
Script for re-encoding a PVR's MPEG2 video into lower bit rate MPEG2 or MPEG4 is rb.sh

I am using to two amplification stages comprising of an RD06HVF1 and RD15HVF1 to get from the -10dBm input signal to around 1 Watt level with near enough -60dBc IMD products as per the recommendations. The amp stages are not pretty but they work fairly well. After some tweaking for the best IMD result, initial tests only gave around 200mW clean signal but I found that I had 1nF caps in place of 100pf - wrong value put in parts cabinet... oops! It shows that we need very high power amplifier devices to generate any real 'clean' power on 146MHz with the tight spectrum the signal has to fit in unless pre-distortion methods are found...
Charles has come across the SC1894 PA Linearizer chip....more on that later.

MESH NET…What is it??????????

What is Broadband-Hamnet? From their website: "Broadband-Hamnet™ (formerly called HSMM-Mesh™) is a high speed, self discovering, self configuring, fault tolerant, wireless computer network that can run for days from a fully charged car battery, or indefinitely with the addition of a modest solar array or other supplemental power source. The focus is on emergency communications." That really describes it, but what does it all mean and how can it be helpful to Hams?

Let's first talk about the general setup of a mesh network. You probably have a wireless access point in your home that allows you to access the internet (or other wired devices in your home) from a laptop with a wireless card. In the mesh network it's the opposite; the wireless (RF) signal is used to connect between nodes - like houses or buildings. Computers and peripherals are connected to the wired side of the mesh network. This allows you to "publish" services that can be accessed by other node(s) connected to the RF mesh network. When the next person sets up a mesh node, it broadcasts a specific SSID with information such as the person's call sign. If the new node is within range of another mesh node, the two nodes "self discover" each other and are added to a list of resources. If the new node happens to be in range of two or more other nodes, they all self discover. At this point, all of the nodes on the mesh share their resource lists with each other. Now a node that can't reach the new node directly, knows it can be reached via the node(s) in between. This "self configurating" makes managing resources seamless and if there are multiple paths (or nodes) to a given resource, the network automatically becomes "fault tolerant". This is illustrated in the drawing below.



Node “A” doesn't have direct access to the camera on the building, but by routing through nodes “F”&“G” it becomes possible. In the second drawing, node “G” has gone offline. The Optimized Link State Routing (OLSR) immediately detects the missing node and re-routes the connection through nodes “B”, “C” & “D”. The user didn't need to change anything and probably never knew it happened. Here is a link to a great FAQ resource: http://www.broadband-hamnet.org/just-starting-read-this.html

Hardware:
There are a number of hardware choices available for use in Broadband-Hamnet™. The least expensive way to start out is to re-purpose Linksys WRT54G wifi routers. You simply load the custom Broadband-Hamnet™ firmware into the router, login, configure your call sign and you’re ready to join the mesh network. I always recommend that you try to find two Linksys routers and set them up in your shack. If you have a couple computers (old ones are fine) to connect to your nodes, you can have hours of fun experimenting with the more advanced options and learn what is possible. If you have an IP based camera for instance, you can connect it to one node and "publish" a link to access it. Then you can go to your second node and see the video from the camera. I have purchased compatible Linsys routers from eBay for $10-15. Remember, there are specific versions of the WRT54G that are compatible - many are not. There is a list of which models to look for on the Broadband-Hamnet.org website.

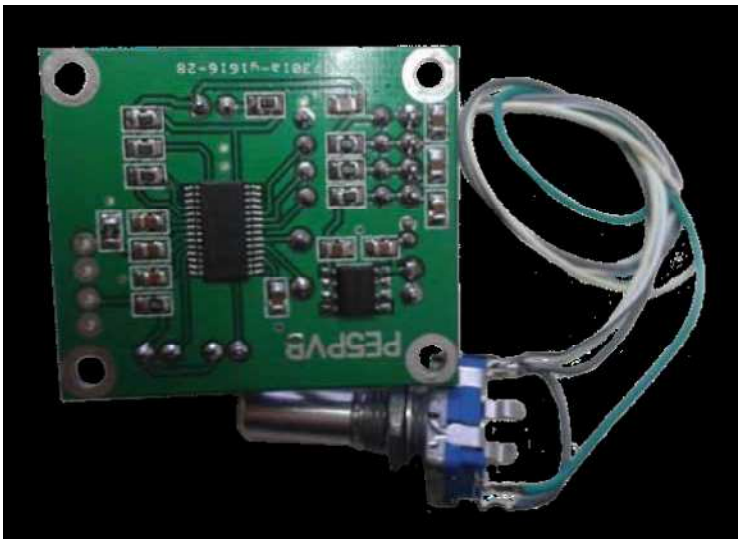
In the past year, Broadband-Hamnet™ firmware has been ported to hardware manufactured by Ubiquiti. These devices offer greater flexibility for Hams. They are already outdoor rated and are available in the 33cm, 13cm and 5cm bands. Some models, such as their Bullet series terminate with an N connector. This allows them to be connected directly to the antenna with minimum cable loss. All of the devices (including the Linksys) can be powered over the Ethernet cable. You simply run one (outdoor rated) CAT5 cable up your tower, all of the electronics is mounted with the antenna. Everything is managed by loading a web page from the computer.

Portable nodes are another possibility. Firefighters in the western states have started using mesh networks in a very creative way. They load up a truck with portable nodes and drive the perimeter of the fire. As they drive down the road, they monitor the strength of the previous node. When the signal starts to weaken, they drop off a new node and continue driving and dropping nodes. The nodes all self configure and can run for days on a small gel cell battery. Eventually, they have a ring mesh network that surrounds the fire. With small cameras and basic weather stations mounted with the portable nodes, they can monitor conditions and see if the fire is spreading. Any device that uses TCP/IP can be shared across the mesh. Computers, File Servers, Web Servers, Commercial IP video cameras, IP telephones, email - the list can go on and on. John Montgomery (N8PVC), Tom Taft (KA8ZNY) and I have been working on a mesh network to support Amateur Radio Emergency Services such as the Central Ohio Severe Weather Net. I have also been building long distance point to point links between repeater sites which will allow the repeaters to be linked together as well as command and control of the devices. I have links that span 15-20 miles.

So how does ATCO fit into all of this? Frankly, once you set up your mesh node you can do experimentation, but there isn't a real day to day use. Art Towslee saw the value in ATCO members being able to share their video on the mesh and I have to agree. This provides purpose and practice for Amateurs in preparation for emergencies AND mesh users learn about ATV - it's a win-win. Several of our neighboring counties are also perusing mesh networks also.
…W8KHW

MAX On-Screen-Display Generator

Sjef Verhoeven – PE5PVB

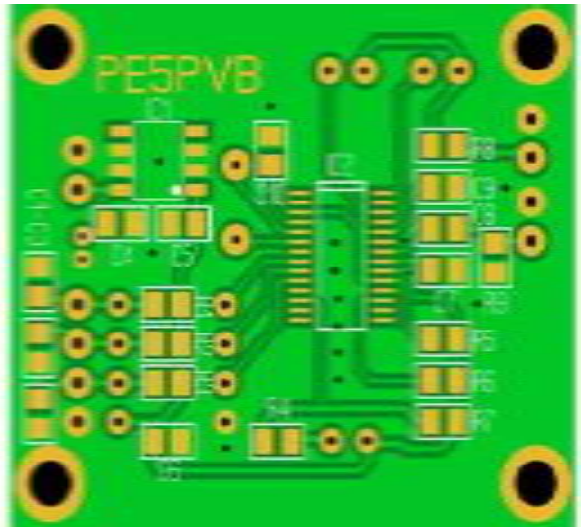


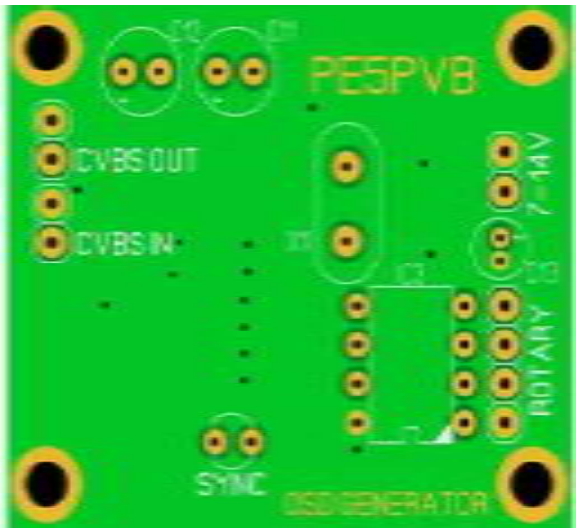
Introduction

During my ATV transmissions I always ran into a problem: how to add text to the screen in a simple and effective way. Before this project I used several OSD generators. Often they had a very fancy menu, but in practice it was a lot of work to change the text. They used several push buttons and you needed a manual to use it. Sometimes those buttons had double functions, so frustration all the time.

In my search for a good OSD chip I found some famous IC's like the STV series. Unfortunately those STV's have been out of production for years now and prices are rising. Then my eye was caught by an IC from Maxim. It's a monochrome OSD generator. Unfortunately in TSSOP casing, for less experienced home brewers, this can give problems. This chip has exactly what I was looking for: easy to control by the SPI-bus, built-in sync detector and as a bonus, a small amount of free programmable memory (eeprom), where you can put your own drawn characters. Unfortunately the possibility for a larger character set is missing and when no video is applied you have a grey background instead of the nice blue one.

For some time now I have used rotary encoders in my projects. They're much easier to use than push buttons (for example, see the iPod), and you only have to drill one hole in your case. The idea was born and in a few days I ended up with this PCB and a nice result.





Software

I wanted to create a simple project with as few components as possible. I choose not to use an external eeprom for the memory of the programmed texts. For this reason I had to limit the number of characters. With the current design you can show 8 lines of 30 characters on the screen (8x30 = 240 bytes). This is nicely in line with the internal eeprom of the 12F683 (256 bytes). Just choose the place on the screen with a turn on the rotary encoder (you'll see a flashing cursor on the point on the screen). Push the rotary encoder on the place you want to edit and turn it to choose a character. Push again to store the character. The cursor will now go automatically to the next position.

Do you want to erase the whole screen? Just push and hold the rotary encoder while applying power to the circuit. As an extra feature I added some characters so you can add a border around a text.

Hardware

The OSD generator is built around the MAX7456 OSD generator. This is a 28-way TSSOP IC. You can easily order this part at your local hardware store or for example via eBay. Price varies a lot. If you don't have any moral objections, you can also sample the IC's for free at the Maxim Free Sample Service.

The MAX7456 is controlled by a 12F683 from Microchip. This is a small 8-way microcontroller. Of course you have to program this microcontroller with the right software. If you want to use the extra functionality of adding borders

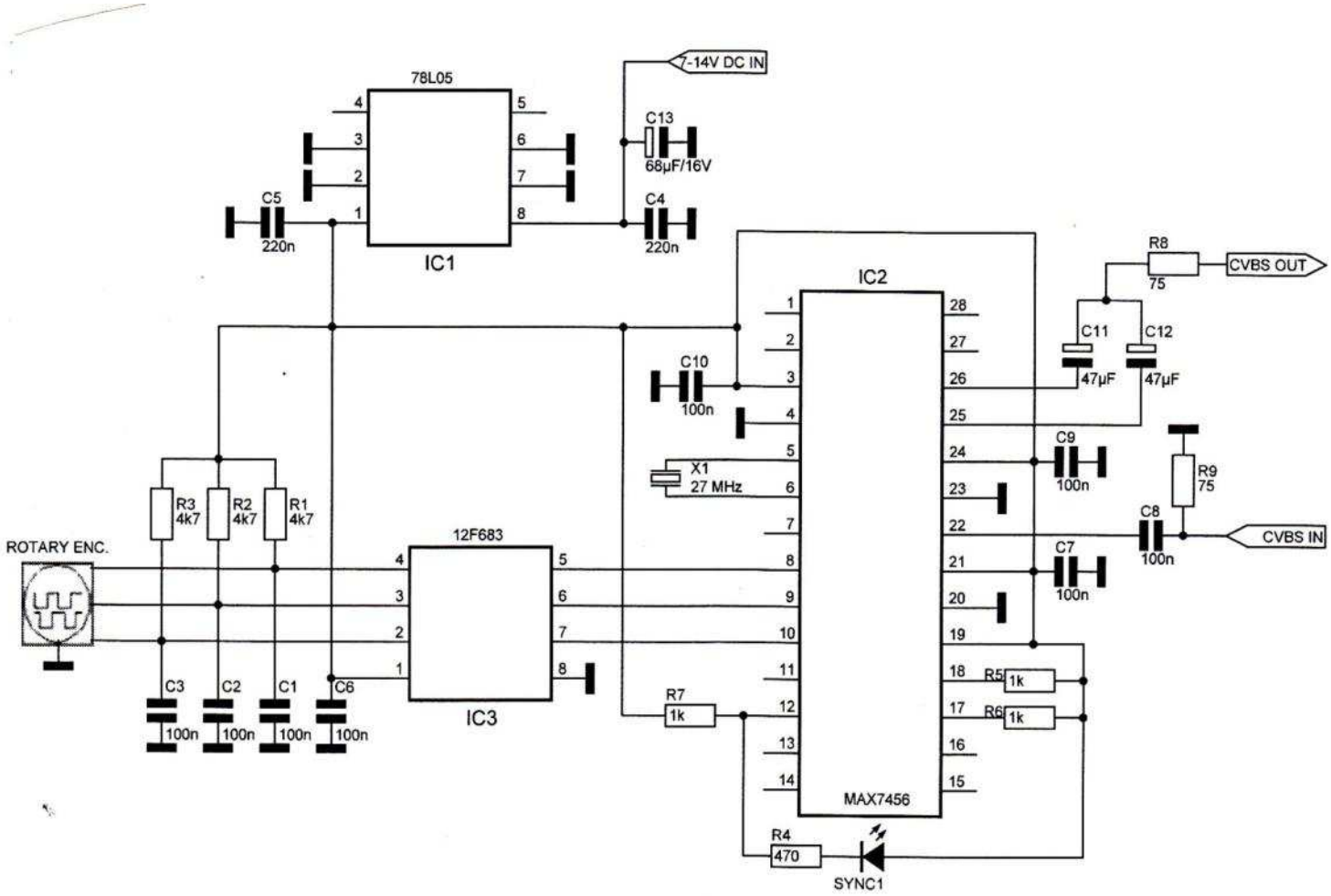
around texts you have to program this first. There are separate .hex files for this functionality, which you have to load once. The 78L05 (SOIC8) is used for the 5V power. An extra LED is added for the sync detector. Due the easy setup the PCB is small, 40x34mm.

Home brewing

Of course it's a lot of fun to build the circuit yourself. If you etch your PCB's yourself, make sure you create all the via's. I also have some factory PCB's in stock with silkscreen and via's (see photo). If you would like such a PCB with or without a presoldered MAX7456, or a complete build kit, please contact me: pe5pvb@het-bar.net Have fun with this nice OSD generator and see you on ATV!

All the files for this project can be downloaded from:
http://www.batc.org.uk/cq-tv/software/index.html
(The software at BATC.org is for a PAL system. I have software for the NTSC system. Let me know and I'll Email it to you. WA8RMC)

E *Circuit*



ATV DX RECORDS UPDATE

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Charles has also created a modified firmware file for the DATV Express FPGA to adjust filter settings allowing clean output at low symbol rate DVB-S.
https://github.com/G4GUO/express_server

My current TX system:
PVR350 capture card or webcam as the AV source.
ffmpeg re-encodes the video to MPEG4 video then encapsulates in a transport stream.
express server software is used to setup and send the transport stream to the DATV Express Hardware.
The DATV Express board sends a -10dBm DVB-S signal.
Amplifiers to 1W, down 5dB cable loss to 9el yagi so a few Watts ERP.

Script for re-encoding a PVR's MPEG2 video into lower bit rate MPEG2 or MPEG4 is rb.sh

I am using to two amplification stages comprising of an RD06HVF1 and RD15HVF1 to get from the -10dBm input signal to around 1 Watt level with near enough -60dBc IMD products as per the recommendations.

The amp stages are not pretty but they work fairly well after some tweaking for the best IMD result, initial tests only gave around 200mW clean signal but I found that I had 1nF caps in place of 100pf - wrong value put in parts cabinet... oops!
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Charles has come across the SC1894 PA Linearizer chip....

Known Digital-ATV DX Records

updated 2015-01-15

by Ken W6HHC

24 GHz		
124 KM	JA6DME & JA6EES	2011-11-12
Locations Mont Ten-Zan and Mont Ge-Zan		
10 GHz		
450 KM	HB9JBC & F4CXQ	2005-06-21
Locations JN40CT (Sardinia) and JN12OH (Spain)		
5.7 GHz		
341 KM	JL1BLF & JH1GED	2011-08-06
Locations Mont Chokai-san and Mont Kashimayari-gatake)		
2.4 GHz		
252 KM	JA6SPI & JA5MFY	2009-11-03
Locations ??		
1.2 GHz		
440 KM	G4KLB to G1LPS	2010-10-11
Locations IO90BR and IO94EQ		
(tropospheric ducting - one-way DATV)		
419 KM	G4KLB & MØDTS	2010-10-11
Locations Bournemouth, England and Yarm, England		
(tropospheric ducting)		
379 KM	VK3RTV(RPTR) & VK7EM	2011-02-23
Locations Mount Dandenong, Victoria and Penguin, Tasmania		
(operators VK3BFG, VK3DQ , VK3WWW and VK3TRX)		
252 KM	JA5GYU & JA6JNR	2009-11-03
(1 Watt)		
70 CM		
696 KM	F1FY to G8GTZ	2013-09-24
(DVB-S 2MS/sec FEC=1/2 - - one way reception)		
696 KM	G8GTZ to F1FY	2013-09-25
(DVB-S 2MS/sec FEC=1/2 - - one way reception reported by FM)		
Locations IO91KH (near Basingstoke) and JN16VB (near Roanne, France)		
528 KM	G3PYB & F5AGO	2013-09-24
(DVB-S 2MS/sec)		
Locations near W YORKSHIRE and JN06DP (near Poitiers, France)		
501 KM	W4HTB & WB8LGA	2014-07-26
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting		
Locations Bowling Green, KY and Marengo, OH		
373 KM	G8GTZ & F3YX	2013-09-25
(DVB-S 2MS/sec FEC=1/2)		
Locations IO91KH (near Basingstoke) and JN18AP (near Limours, France)		
290 KM	W4HTB & W8ZCF	2014-04-12
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting		
Locations Bowling Green, KY and Cincinnati, OH		
121 KM	KH6HTV to KØRZ	2011-11-21
(video resolution HDTV 1080i - protocol ITU-T/J.83B QAM-64 - one-way DATV)		
Locations Cheyenne, Wyoming and Boulder, Colorado		
144 MHz		
237 KM	F3YX to F9ZG	2011-11-09
DVB-S protocol at 1000 KSymb/s using modified SR-Sys MiniMOD (one-way)		
on 145.0 MHz experimental license 5-Minute max		
Locations JN18AP (near Limours, France) to IN99KC		
28 KM	MØDTS & G1LPS	2015-01-11
H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express		
on 146.5 MHz - UK temporary band allocation		
Locations Yarm, England and Spennymoor (County Durham), England		

See more details at **www.von-info.ch/hb9afo/records/recordse.htm**

ATCO FALL EVENT DETAILS…October 26, 2014

First order of business for the ATCO fall event was -- lunch! Attendees enjoyed nice selections from City Barbecue along with drinks and dessert. It was very good, and no one should have left hungry! Thanks as always to Art, for ordering and picking up the food!

After eating, Art kicked things off with a welcome, and each person around the room introduced themselves. There were 18 in attendance. Art brought up the subject of encouraging participation in the events. A brief discussion followed. Thanks were given to Ken, W8RUT, for use of the facilities at ABB. In addition, thanks were given to Ken for donating the Baofeng HT to be raffled at the end of the meeting, before the other door prizes. Thanks were also given to Dale, WB8CJW, for maintaining the Bulletin Board.

Art congratulated Charles, WB8LGA, on setting a record land distance and winning an ATV digital contest sponsored by BATC! Congratulations Charles! While speaking of Charles, Art reminded all that Charles has a web site, WB8LGA.tv, where one can note their station position and also access a number of links to streaming video, etc.

Dues: It's that time of year again! Art had the list of members and dues status, and a number of members went ahead and paid their dues. The downtown repeater now has operational a DVB-T input and output – receive is on 438MHz, 2MHz bandwidth and transmit on 434, 4 MHz bandwidth. Just a mention that the digital receiver holds the last image received – some other issues to be worked but overall a successful roll out of the 70cm system. Seems that things are standardizing on DVB-T digital mode for 70cm – right now, main options are HiDes equipment or DATV-Express board.

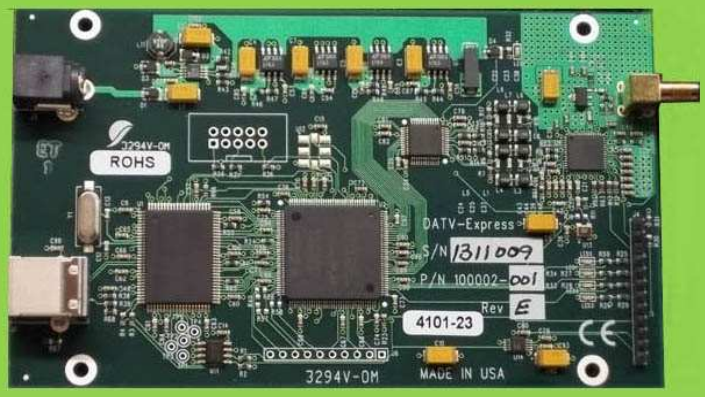
Art mentioned we still need to replace the 70cm antennas as the radomes are deteriorating – a couple of people mentioned they could help. Jones Rd (between Dayton and Columbus) – going to replace/repair antenna in South Vienna. This is 439 analog in and 1280 out when it gets fixed. Other discussion ensued regarding a few technical topics and further discussion of the possible future of analog and digital (on 70cm).

After the main part of the meeting, the Baofeng radio was raffled off, and Phil Morrison, W8MA, was the winner. Congratulations Phil! After the main prize, the remaining door prize tickets were drawn and everyone got to go home with “something” of their choosing...as always, thanks to the donors for giving to the club and fellow members!
…C. Mark Cring, N8COO ATCO Club Secretary

Digital Amateur TeleVision
Exciter/Transmitter

now available from

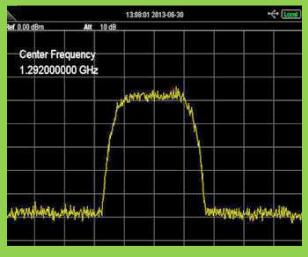
DATV-Express



- A more affordable DATV exciter can now be ordered
- Fully assembled and tested PCBA
- DVB-S protocol for DATV (using QPSK modulation)
- Can operate all ham bands from 70 MHz-to-2450 MHz
- RF output level up to 10 dBm (min) all bands (DVB-S)
- Software Defined Radio (SDR) architecture allows many variations of IQ modulations
- “Software-Defined” allows new features to be added over the next few years, without changing the hardware board
- As extra bonus, the team has been able to get the board to transmit DVB-T 2K mode, however we cannot guarantee the performance of that protocol. Caveat Emptor!
- Requires PC running Ubuntu linux (see User Guide)
- Price is US$300 + shipping – order using PayPal

For more details and ordering
www.DATV-Express.com

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



CONSTRUCTION ARTICLE INDEX

The following list is an index of all construction related material that has appeared in the ATCO Newsletter since its inception in the early '80's. This is a handy reference for that particular construction article that you knew existed but didn't want to wade through each issue to find it. All Newsletters below are also listed in order in the ATCO homepage under "Newsletters". CTRL Click on www.atco.tv. Once you locate the Newsletter section, the displayed list can then be re-sorted as needed by clicking on the "date" in the header.

…Bob N8OCQ

Issue	Page(s)	Article
Vol 1 II	5	439 Beam
Vol 2 I	4	439 Beam
Vol 2 II	8,9	439 Parabolic Ant
Vol 2 II	9	Video Modulator
Vol 2 III	7	1296 Ant 45 Ele loop yagi
Vol 2 III	10	RF Power Indicator (in-line) for 1296 MHZ
Vol 2 SE	2,3	Diode Multiplier for 23 CM
Vol 2 SE	4,5	1296 MHZ 10 Watt Solid State Linear Amp
Vol 4 I	3	RF/Video Line Sampler
Vol 4 II	3	P-Unit Meter
Vol 4 II	7,10,11	UHF Gated Noise Source
Vol 4 II	12	420 – 450 Broom Handle Rhombic Ant
Vol 4 III	4,8	25 Element 1.26 Loop Yagi
Vol 4 IIII	6	Video Modulator (Tube Type)
Vol 5 I	3	Video Modulator One Transistor
Vol 5 II	4,7	900 MHZ Yagi Ant
Vol 5 II	6	Video Modulator for 2C39 Final
Vol 5 III	3	440 MHZ Hidden Transmitter Finder
Vol 6 I	3	Video Line Amp
Vol 6 I	8	25 Ele 910 MHz Loop Yagi
Vol 6 II	4,6,7	Microwave Oven ATV Xmiter
Vol 6 II	5	Matching a Quad Driven Ele
Vol 6 II	8	Power Divider for 33CM
Vol 9 IIII	5,7	16 Ele Loop Yagi for 439.25 MHz
Vol 10		No Articles
Vol 11 II	4,5,6	439 48 Ele Collinear Ant
Vol 11 IIII	7	1280 MHZ Cavity Filter
Vol 12 I	6,7,8	439 & 1200 Horz Polarized Mobile Ant
Vol 12 II	5,6,7	ATV Line Sampler
Vol 12 II	10	439 & 1280 Interdigital Filter(s)
Vol 12 III	6,7,8	439 Cheap Attic Ant
Vol 13 I	9, 10	High Level Modulator for ATV
Vol 13 II	5	VGA to NTSC Converter for Computer
Vol 13 III	9, 10	AM Video Modulator
Vol 13 IIII	4	1200 MHZ Transistor Linear Amp
Vol 13 IIII	6	900 & 1200 MHz Loop Yagis
Vol 14 IIII	8	439 31 EleYagi
Vol 14 IIII	12, 13	1250 MHZ FM ATV 3 Watt Xmiter
Vol 15 I	16	427.25 Horz J-Pole Ant
Vol 15 II	14	2400 MHZ Loop Yagi
Vol 15 III	8	Wavecom Modification
Vol 15 III	12,13,14	2.4 Gig Antenna's
Vol 16 II	20	2.4 Gig Helix Ant
Vol 16 IIII	4	1280 MHZ Loop Yagi
Vol 17 I	14, 15	Video Amp (Multi Output)
Vol 18		No Articles
Vol 19 IIII	4	Pwr Supply for 28 Volt Ant Relay
Vol 20 III	9, 10	Video Sampler
Vol 21 I	4	RF Pwr Amp for 900/1200 MHZ
Vol 21 II	14	10-14 Volt Doubler for 28 Volt Ant Relays
Vol 21 III	5	S-Video To Composite Adaptor
Vol 21 IIII	3,4	Video Noise Rejection Amp
Vol 21 IIII	14,15,16 ,17	"S" Meter For Comtech Boards
Vol 22 I		No Articles
Vol 22 II	10	1260 MHZ Cavity Filter
Vol 22 III		No Articles
Vol 22 IIII		No Articles
Vol 23 I		No Articles
Vol 23 II	5,6	Linear 60 Watt For 70CM
Vol 23 II	8,9	Video Modulator Update
Vol 23 III		No Articles
Vol 23 IIII		No Articles
Vol 24 I	13	RF Sniffer For 2.4 GIG
Vol 24 II		No Articles
Vol 24 III	3	Quantum 1500 Rec Tuner Mod
Vol 24 IIII	9	Battery Recharge Ckt
Vol 25 I		No Articles
Vol 25 II	6,7	Comtech TX Module Improvement
Vol 25 III	11	Comtech TX Module Improvement Correction
Vol 26 I	6	Isolator (Circulator) Mod. 850 To 1260 MHz
Vol 26 II	5,6	Comtech 1200 MHz rec. module improvements
Vol 26 III		No Articles
Vol 26 IIII	9	Remote Touch Tone Decoder For Your Shack
Vol 27 I	10	ATV Low Pass Filter (427 Mhz)
Vol 27 II	15	PictureTel Camera Data Cable Wiring
Vol 27 II	10	ATV Low Pass Filter (427 Mhz)
Vol 27 II	15	PictureTel Camera Data Cable Wiring
Vol 27 III		No articles
Vol 27 IIII		No articles
Vol 28 I	11	Super 1280 MHz amplifier
Vol 28 II		No articles
Vol 28 III		No articles
Vol 28 IIII		WB8LGA Antenna switching system
Vol 29 I		No articles
Vol 29 II		1280 MHz Hi Gain Panel Antenna
Vol 29 III		No articles
Vol 29 IIII		No articles
Vol 30 I		No articles
Vol 30 II		No articles
Vol 30 III		No articles
Vol 30 IIII		No articles

This is the complete list for construction articles shown in past ATCO newsletters. The page numbers listed may not match the actual page in the Newsletter. They are the numbers shown in the PDF file. Some early issues are missing. Art did not have a copy of every year. This list is complete through Volume 30 IIII.

…Bob N8OCQ

NEW MEMBER(S)

Let's welcome the new members to our group! If any of you know anyone who might be interested, let one of us know so we can flood them with information. New members are our group's lifeblood so it's important we aggressively recruit new faces.

…WA8RMC

LOCAL HAMFEST SCHEDULE

This section is reserved for upcoming Hamfests. They are limited to Ohio and vicinity easily accessible in one day. Anyone aware of an event incorrectly or not listed here; notify me so it can be corrected. This list will be amended, as further information becomes available. To see additional details for each Hamfest, Control Click on the blue title and the magic of the Internet will give you the details complete with a map! To search the ARRL Hamfest database for more details, CTL click ARRLWeb: Hamfest and Convention Calendar . …WA8RMC.

01/18/2015 | S.C.A.R.F Hamfest
Location: Nelsonville, OH
Type: ARRL Hamfest
Sponsor: Sunday Creek Amateur Radio Federation
Website: http://www.scarfarc.com

02/01/2015 | NOARS Winter Hamfest & Computer Show
Location: Elyria, OH
Type: ARRL Hamfest
Sponsor: Northern Ohio Amateur Radio Society
Website: http://www.noars.net/

02/15/2015 | Mansfield Mid-Winter Hamfest
Location: Mansfield, OH
Type: ARRL Hamfest
Sponsor: InterCity Amateur Radio Club
Website: http://www.W8WE.org

03/15/2015 | TMRA's Hamfest and Computer Fair
Location: Perrysburg, OH
Type: ARRL Hamfest
Sponsor: Toledo Mobile Radio Association
Website: http://www.tmrahamradio.org

03/28/2015 | MOVARC HamFest
Location: Gallipolis, OH
Type: ARRL Hamfest
Sponsor: Mid-Ohio Valley ARC
Website: https://sites.google.com/site/midohiovalleyarc/

04/11/2015 | Cuyahoga Falls ARC's 61st Annual Hamfest
Location: Cuyahoga Falls, OH
Type: ARRL Hamfest
Sponsor: Cuyahoga Falls Amateur Radio Club
Website: http://www.cfarc.org/hamfest.php

04/26/2015 | Athens Hamfest
Location: Athens, OH
Type: ARRL Hamfest
Sponsor: Athens County Amateur Radio Association
Website: http://ac-ara.org/

05/15/2015 | Dayton Hamvention
Location: Trotwood, OH
Type: ARRL Hamfest
Sponsor: Dayton Amateur Radio Association
Website: http://www.hamvention.org

07/19/2015 | Van Wert Amateur Radio Hamfest
Location: Van Wert, OH
Type: ARRL Hamfest
Sponsor: Van Wert Amateur Radio Club
Website: http://W8FY.org

ATCO SEMI!

Look what Dale, WA8KQQ saw while traveling the freeway. Watch it, Dale. I hope “Dr Art” is not holding up the wrong finger!

TUESDAY NITE NET ON 147.48 MHz SIMPLEX

Every Tuesday night @ 9:00PM WA8RMC hosts a net for the purpose of ATV topic discussion. There is no need to belong to the club to participate, only a genuine interest in ATV. All are invited. For those who check in, the general rules are as follows: Out-of-town and video check-ins have priority. A list of available check-ins is taken first then a roundtable discussion is hosted by WA8RMC. After all participants have been heard, WA8RMC will give status and news if any followed by late check-in requests or comments. We usually chat for about ½ hour so please join us locally or via internet at www.BATC.tv then ATV repeaters thenWR8ATV.

ATCO TREASURER'S REPORT - de N8NT

OPENING BALANCE (10/21/14)	$ 1962.13
RECEIPTS(dues)	$ 95.00
PayPal fees	$ (1.18)
Fall Event food	$ (155.10)
USPS postage	$ (14.00)
CLOSING BALANCE (01/15/15)	$ 1886.85

1st MINDBENDER ANSWER

Solution: The total is 5,050.

Gauss realized that the series 1+2+3+4...+97+98+99+100 could be written as (1+100)+(2+99)+(3+98)+(4+97)... or 101 times 50 to get the total 5,050. This trick works for any sum of sequential integers. The general formula is n(n+1)/2, which is the equation for triangular numbers.

ATCO REPEATER TECHNICAL DATA SUMMARY

Location: Downtown Columbus, Ohio
Coordinates: 82 degrees 59 minutes 53 seconds (longitude) 39 degrees 57 minutes 45 seconds (latitude)
Elevation: 630 feet above average street level (1460 feet above sea level)

TV Transmitters: 423.00 MHz DVB-T 10 watts continuous FEC=1/2, BW=4MHz, PMT=4095, PCR=256, Video=256, Audio=257
427.25 MHz Analog VSB AM, 50 watts average 100 watts sync tip (Analog ATV on cable channel 58)
1258 MHz 40 watts FM analog
1268 MHz DVB-S QPSK 20W continuous. SR=3.125MS FEC=3/4, PMT=32,Video=162,Teletext=304,PCR=133,Audio=88,Service =5004)
2433 MHz: 15 watts FM analog
10.350 GHz: 1 watt continuous analog FM
Link transmitter: 446.350 MHz: 5 watts NBFM 5 kHz audio for control signals.

Identification: 423, 427, 1258, 1268, 2433, 10.350 GHz transmitters video identify every 15 min. with ATCO & WR8ATV on 6 different screens.
423 MHz digital, 1268 MHz digital & 10.350 GHz analog - Continuous transmission of ATCO & WR8ATV with no input signal present.

Transmit antennas: 423.00 MHz – 8 element Lindsay horizontally polarized 6dBd gain "omni"
427.25 MHz - Dual slot horizontally polarized 7 dBd gain "omni" major lobe east/west, 5dBd gain north/south
1258 MHz - Diamond vertically polarized 12 dBd gain omni
1268 MHz - Diamond vertically polarized 12 dBd gain omni
2433 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni
10.350 GHz - Commercial 40 slot waveguide slot horizontally polarized 16 dBd gain omni

Receivers: 147.480 MHz - F1 audio input with touch tone control. (Input here = output on 446.350)
438.000 MHz - DVB-T QPSK digital 2K bandwidth, FEC=1/2, PIDs: PMT=256, PCR=4097, Video=4113, Audio=4352
(Present PID setting because of HiDes defaults but will change shortly).
439.250 MHz - A5 NTSC video with FM subcarrier audio, lower sideband. (Input here = output on all TV transmitters)
449.975 MHz - F1 audio input aux touch tone control. 131.8 Hz PL tone. (Input here = output on 446.350).
1288.00 MHz - F5 video analog NTSC. (Input here = output on all TV transmitters)
1288.00 MHz - DVB-S QPSK digital SR=4.167Msps, FEC=7/8. PIDs: PMT=133, PCR=33, Video=33, Audio=49
(This input feeds all transmitters and also goes directly to 1268 MHz DVB-S digital output channel 2.)
2398.00 MHz - F5 video analog NTSC. (Input here = output on all TV transmitters)
10.450 GHz - F5 video analog NTSC

Receive antennas: 147.480 MHz - Vert. polar. Diamond 6dBd dual band (also used for 446.350 MHz link output)
438.00/439.250 MHz - Horizontally polarized dual slot 7 dBd gain major lobe west (Shared with 438 & 439 receivers)
1288.00 MHz - Diamond vertically polarized 12 dBd gain omni (shared with analog and DVB-S receivers)
2398.00 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni
10.450 GHz - Commercial 40 slot waveguide horizontally polarized 16 dBd gain omni

Auto mode Input control:	Touch Tone	Result (if third digit is * function turns ON, if it is # function turns OFF)
	00*	turn transmitters **on** (enter manual mode-keeps transmitters on till 00# sequence is pressed)
	00#	turn transmitters **off** (exit manual mode and return to auto scan mode)
	264	Select Channel 4 Doppler radar. (Stays up for 5 minutes) Select # to shut down before timeout.
	697	Select Time Warner radar. (Stays up till turned off). Select # to shut down.
	003	Select room camera (**Always exit by selecting 001**)
	002	Select roof camera. Select room cam first then 002 for roof cam. (**Always exit by selecting 001**)
	001	Select 2398 MHz receiver for auto scan to continue

Manual mode Functions:		
	00* then 1 for Ch. 1	Select 439.25analog /438digital receiver (if video present on digital, it is selected. Otherwise analog)
	00* then 2 for Ch. 2	Select 1280 digital receiver
	00* then 3 for Ch. 3	Select 1280 analog receiver
	00* then 4 for Ch. 4	Select 2398 receiver
	00* then 5 for Ch. 5	Select video ID (6 identification screens)
	01* or 01#	Channel 1 439.25 MHz scan enable (hit 01* to scan this channel & 01# to disable it)
	02* or 02#	Channel 2 1280 MHz digital receiver scan enable
	03* or 03#	Channel 3 1280 MHz analog receiver scan enable
	04* or 04#	Channel 4 2398 MHz scan enable
	A1* or A1#	Manual mode select of 439.25 receiver audio
	A2* or A2#	Manual mode select of 1280 digital receiver audio
	A3* or A3#	Manual mode select of 1280 analog receiver audio
	A4* or A4#	Manual mode select of 2398 receiver audio
	C0* or C0#	Beacon mode – transmit ID for twenty seconds every ten minutes
	C1* or C1#	C1* to turn off 423 MHz DVB-T Tx, C1# to enable it (Must be in manual mode to enable this function).
	C2* or C2#	C2* to turn off 438 MHz DVB-T Rx, C2# to enable it (Must be in manual mode to enable this function).

Note: The DVB-T Tx and Rx units can lock up when they loose video or see bad video. When this happens, AC power must be cycled. To do this select manual mode then C1* or C2* to turn off AC power. A few seconds later select C1# or C2# whichever appropriate to restore AC power to the selected unit. Exit manual mode and wait about 15 to 30 seconds to see restored operation. (Example: To reset the DVB-T receiver enter 00*,C1*,C1#, 00#)

ATCO MEMBERS as of January 2015

Call	Name	Address	City	St	Zip	Phone
KD8ACU	Robert Vieth	3180 North Star Rd	Upper Arlington	OH	43221	614-457-9511
KC3AM	Dave Stepnowski	735 W Birchtree Ln	Claymont	DE	19703	
AH2AR	Dave Pelaez	1348 Leaf Tree Lane	Vandalia	OH	45377	937-264-9812
W8ARE	Larry Meredith III	6070 Langton Circle	Westerville	OH	43082-8964	
N8ASB	Daun Yeagley	1353 Gurneyville Road	Willmington	OH	45177	
NN8B	Don Kemp	6384 Camp Blvd.	Hanoverton	OH	44423	
K9BIF	Charlie Short	PO Box 554	Goshen	IN	46527-0554	
WB8CJW	Dale Elshoff	8904 Winoak Pl	Powell	OH	43065	614-210-0551
N8COO	C Mark Cring	2844 Sussex Place Dr.	Grove City	OH	43123	614-836-2521
N1CTF	John Chartkoff	2288 Notingham Road	Upper Arlington	OH	43221	
N3DC	William Thompson	6327 Kilmer St	Cheverly	MD	20785	301-772-7382
WA8DNI	John Busic	2700 Bixby Road	Groveport	OH	43125	614-491-8198
K8DMR	Ron Fredricks	8900 Stonepoint Ct	Jennison	MI	49428-8641	
K8DW	Dave Wagner	2045 Maginnis Rd	Oregon	OH	42616	419-691-1625
WB8DZW	Roger McEldowney	5420 Madison St	Hilliard	OH	43026	614-405-1710
KC8EVR	Lester Broadie	108 N Burgess	Columbus	OH	43204	
W8FTX	George Biundo	3675 Inverary Drive	Columbus	OH	43228	614-274-7261
W8FZ	Fred Stutske	8737 Ashford Lane	Pickerington	OH	43147	
WA8HFK,KC8HIP	Frank & Pat Amore	P.O. Box 2252	Helendale	CA	92342	614-777-4621
W6HHC	Ken Konechy	340 S. Craig Dr.	Orange	CA	92869	
WA8HNS	Mike Gray	5029 St Rt 41 NW	Washington Ct Hs	OH	43160-8740	740-335-5133
N8HRC	John Hempstead	1190 County Road 9	Brellefontaine	OH	43311	
W4HTB	Henry Cantrell	905 Wrenwood Dr.	Bowling Green	KY	42103	270-781-9624
WB2IIR	Michael Anthony	370 Georgia Drive	Brick	NJ	08723	
WA8KQQ	Dale Waymire	225 Riffle Ave	Greenville	OH	45331	937-548-2492
N8LRG	Phillip Humphries	30856 Coshocton Road	Walhonding	OH	43843	614-3543744
WB8LGA	Charles Beener	2540 State Route 61	Marengo	OH	43334	
W8MA	Phil Morrison	154 Llewellyn Ave	Westerville	OH	43081	
KA8MID	Bill Dean	2630 Green Ridge Rd	Peebles	OH	45660	
N8NT	Bob Tournoux	3569 Oarlock Ct	Hilliard	OH	43026	614-876-2127
N0OBG	Jim Conley	33 Meadowbrook C C Est	Ballwin	MO	63011	
N8OCQ	Bob Hodge Sr.	3750 Dort Place	Columbus	OH	43227-2022	
KE8PN	James Easley	1507 Michigan Ave	Columbus	OH	43201	614-421-1492
WA8RMC	Art Towslee	438 Maplebrooke Dr W	Westerville	OH	43082	614-891-9273
W8RRJ,W8WTB	John Hull	580 E. Walnut St.	Westerville	OH	43081	614-882-6527
W8RUT,N8KCB	Ken & Chris Morris	2895 Sunbury Rd	Galina	OH	43021	
W8RVH	Richard Goode	9 Master Street Apt A	Springfield	OH	45504	937-478-6488
KB8RVI	David Jenkins	1941 Red Forest Lane	Galloway	OH	43119	614-853-0679
W8RWR	Bob Rector	135 S. Algonquin Ave	Columbus	OH	43204-1904	614-276-1689
W8RXX,KA8IWB	John & Laura Perone	3477 Africa Road	Galena	OH	43021	614-579-0522
WA6RZW	Ed Mersich	34401 Columbine Trl West	Elizabeth	CO	80107	
KB8SSH	Mike Cotts	3424 Homecroft Dr	Columbus	OH	43224	614-371-7380
W3SST	John Shaffer	6706 Gilette Dr	Reynoldsburg	OH	43068	614-751-0029
WA6SVT	Mike Collis	PO Box 1594	Crestline	CA	92325	
W8TIP	Gene Hawkins	1720 Liberty Street	Toledo	OH	43605	
KD8TIZ	Bob Holden	5161 Goose Lane Rd	Alexandria	OH	43001-9730	614-562-8441
K8TPY, K8FRB	Jeff & Dianna Patton	3886 Agler Road	Columbus	OH	43219	
NR8TV	Dave Kibler	243 Dwyer Rd	Greenfield	OH	45123	937-981-1392
W8URI	William Heiden	5898 Township Rd #103	Mount Gilead	OH	43338	419-947-1121
KB8UWI	Milton McFarland	115 N. Walnut St.	New Castle	PA	16101	
WA8UZP	James R. Reed	818 Northwest Blvd	Columbus	OH	43212	614-297-1328
KC8WRI	Tom Bloomer	PO Box 595	Grove City	OH	43123	
AA8XA	Stan Diggs	2825 Southridge Dr	Columbus	OH	43224-3011	
KB8YMQ	Jay Caldwell	4740 Timmons Dr	Plain City	OH	43064	
KC8YPD	Joe Ebright	3497 Ontario St	Columbus	OH	43224	
N8YZ	DaveTkach	2063 Torchwood Loop S	Columbus	OH	43229	614-882-0771
W8ZCF	Ferrel Winder	6686 Hitching Post Ln.	Cincinnati	OH	45230	

ATCO MEMBERSHIP INFORMATION

Membership in ATCO (Amateur Television in Central Ohio) is open to any licensed radio amateur who has an interest in amateur television. The annual dues are $10 per person payable on January 1 of each year. Additional members within an immediate family and at the same address are included at no extra cost.

ATCO publishes this Newsletter quarterly in January, April, July, and October. It is sent to each member without additional cost. All Newsletters are sent via Email unless the member does not have an internet connection.

The membership period is from January 1ST to December 31ST. New members joining before August will receive all ATCO Newsletters published during the current year prior to the date they join ATCO. For example, a new member joining in June will receive the January and April issues in addition to the July and October issues. For those joining after August 1ST, they can elect to receive a complementary October issue with the membership commencing the following year or get the previous (3) Newsletters. Your support of ATCO is welcomed and encouraged.

Membership expiration notices will be sent out in January in lieu of Newsletters for those with an expired membership.

NOTE: Dues records on your individual portion of the ATCO website are listed as the date money is received and shows due one year from that date. The actual expiration is on January of the following year so we can keep the dues clock consistent with the beginning of each year.

ATCO CLUB OFFICERS

President:	Art Towslee WA8RMC	Repeater trustees:	Art Towslee WA8RMC
V. President:	Ken Morris W8RUT		Ken Morris W8RUT
Treasurer:	Bob Tournoux N8NT		Dale Elshoff WB8CJW
Secretary:	Mark Cring N8COO	Statutory agent:	Tom Bloomer KC8WRI
Corporate trustees:	Same as officers	Newsletter editor:	Art Towslee WA8RMC

ATCO MEMBERSHIP APPLICATION

RENEWAL ○ NEW MEMBER ○ DATE _____
CALL _____
OK TO PUBLISH PHONE # IN NEWSLETTER YES ○ NO ○
HOME PHONE _____
NAME_____
INTERNET Email ADDRESS_____
ADDRESS _____
CITY _____ STATE _____ ZIP _____-_____
FCC LICENSED OPERATORS IN THE IMMEDIATE FAMILY
_____
COMMENTS_____
_____
_____
ANNUAL DUES PAYMENT OF $10.00 ENCLOSED CHECK ○ MONEY ORDER ○

Make check payable to ATCO or Bob Tournoux & mail to: Bob Tournoux N8NT 3569 Oarlock CT Hilliard, Ohio 43026. Or, if you prefer, pay dues via the Internet with your credit card. Go to www.atco.tv and fill out the “pay ATCO dues” section. Alternately, you can use the ATCO web site www.atco.tv/PayDues.aspx directly. Credit card payment is made through "PayPal" but you DO NOT need to join PayPal to send your dues. Simply DO NOT fill out the password details and there will be no “PayPal” involvement.

2ND MINDBENDER ANSWER

Solution: 4 birds and 3 cages. Let x = the number of canaries and y = the number of cages. You can set up two equations using the two situations given. First, if there is one canary per cage, then there is 1 canary too many (in other words, there is one more bird than cages): x - y = 1. Second, if there are two canaries per cage, then there is 1 cage too many (in other words, there is one more cage than half the number of canaries): y - x/2 = 1. Solve the two equations to get x = 4 and y = 3.

ATCO Newsletter
c/o Art Towslee -WA8RMC
438 Maplebrooke Dr. W
Westerville, Ohio 43082

FIRST CLASS MAIL

REMEMBER...CLUB DUES ARE NEEDED.
CHECK THE
MEMBERS PAGE OF ATCO WEBSITE FOR THE EXPIRATION DATE.
SEND N8NT A CHECK OR USE PAYPAL IF EXPIRED.