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AMATEUR TELEVISION QUARTERLY

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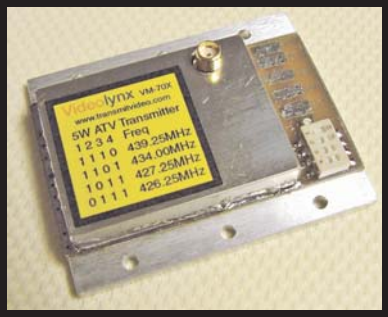

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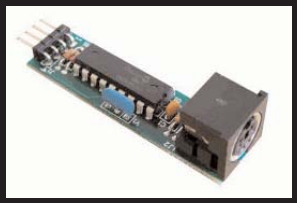

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P. C. Electronics 2522 Paxson Lane Arcadia CA 91007-8537 USA

Tel: **1-*626*-447-4565** m-th 8am-5:30pm pst (UTC - 8) Tom (W6ORG) & Mary Ann (WB6YSS)

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Homebrew antennas, construction articles, ARES/RACES app notes, repeater design, and more on page 3.

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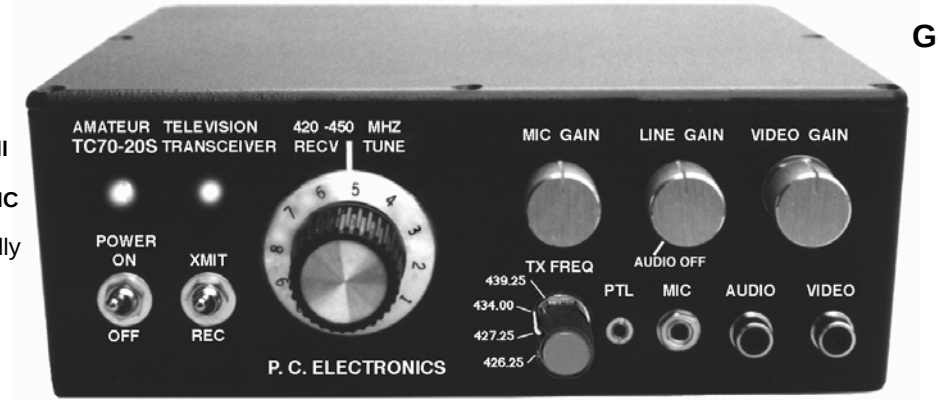

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Amateur Television Quarterly

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Editors Notes

Time for the Dayton Hamvention again. This year we will be in booth 207 and selling not only our product, but also items from P.C. Electronics, Intuitive Circuits, Multilabs, and others, so the booth will be full this year!

Make sure and stop by to say “Hi” and pick up your favorite items, including renewing your subscription to ATVQ, of course!

Items from Intuitive Circuits will include ATV controllers (ATVC-4 Plus), DTMF decoders (DTMF-8), ID overlay (OSD-IDSA), and GPS overlay (OSD-GPS(ID)).

From P.C. Electronics we will have the TC70-20S transceiver, TVC-4G and TXA5RCb transmitter boards, and LB-1000 color cameras.

We will also have the ezVID from Multilabs to demo and sell for those wanting a video display to use with microprocessor projects. It is an easy way to add video in place of an LCD display, and for us into video, that makes sense. I will be looking forward to someone writing an article about how they use this display for ATV!

The ATV Contest for 2005 is around the corner. I will have information posted on our web site (**www.hampubs.com**), so point it out to everyone that you “see” on the air that their contacts can count. They do not have to be a subscriber to enter the contest (or WIN the contest!). There are many that are making contacts for the people that do enter, and not sending in logs. Encourage them to send them in and challenge them to make more contacts. What a better way to promote ATV!

Oh, ya, let’s hope for some band openings this summer!

The ATV repeater here in Rockford, IL has gone through it’s trials and tribulations, but it is UP AND RUNNING! A couple times when I brought the repeater home to work on it, I found that the problem was on my “transmitting” end, and not the repeaters problem at all. So, we all learn by doing. Well, I hope, anyway. Now we need to get a few others to get their transmitters with the correct xtal and/or get their amps built for the 1.2 GHz. I have found that a repeater is definitely an on-going project. As with most, we have many ideas of things we want to do in the future.

In this issue, we cover what I get most requests for, ATV repeaters and Digital ATV. So, let me know what you think. I have more articles than space, even though I increased the size by 8 pages. Help us get more advertisers and we can make it even bigger and better.

Gene - WB9MMM

ATVQ

Midwest ATV DX Report

By: Bob Delaney - KA9UVY - Email KA9UVY@hotmail.com
10630 N. Delaney Lane
Mt. Vernon, IL 62864
DX Hotline 618-242-7063

01/08/05
20:00z First Tropo of the season begins with UHF TV out of Oklahoma, City coming in up to P-3. Attempt made with K9KK in Norman, OK with no luck.

01/09/05
01:00z Opening moves slowly southward with Houston, TX UHF coming in P-2. East TX and Shreveport, LA area was P-5 for hours. No ATV operators known in that area.

01/09/05
09:00z Opening has moved into the southland with super big signals from Huntsville, Birmingham, Tuscaloosa, AL and Atlanta, Athens, Rome, GA broadcast stations. Still no activity on ATV (what a shame).

01/10/05
00:00z Opening finally dies out with the last big signals from Birmingham, AL. Tried with WB8ELK in Huntsville but he was no longer in the path. Best opening I have seen in a year or more. Good way to start 2005!

01/30/01
23:36z Worked Ron, WB0LXV, of Winfield, MO, at a distance of 112 miles. Signals were P-1 and P-2.

Summary, DX'ing News

Even though the new year came in looking promising from a DX standpoint, conditions went traditionally flat through the months of February and March.

Tropo conditions are already picking up in the Gulf Coast areas and starting to move north into the Midwest. The annual ATV DX contest is around the corner and many operators have been planning improvements for their stations and I will report on some of them here:

KD0LO, John, in Wildwood, MO, has begun construction of a cavity GS35B water cooled ATV amp. John is concentrating on making it easier to build one of these power house amps and employing an off the shelf switching HV supply and other innovations that will make it easier for all of us to get QRO!

N9TWH, Matt, in Johnston City, IL, has gathered all of his guying hardware over the winter months to erect his 100 ft ATV tower this Spring. The project should be completed before the contest is over.

Yours truly, KA9UVY, is on schedule to compete my 120 ft. tower this spring before the contest starts. It will be home to a stack of 4 DSFO25ATV Yagis, Loopers for 33cm and 23cm and stacked 13B2's for 144.340 talkback.

N5XNQ, Craig Clark, reports that his repeater is on air and functioning from Birmingham, Alabama! It should be a great DX target from the Midwest since the output is operating on 421.250 with horizontal polarity and has a constant ID output. Craig also plans on boosting the output (presently 50 watts) in the near future to about 150 watts!

Bryan, KC8LMI, reports that his father Bruce, KA8ZXX, of Pleasant Lake, MI, has also begun construction of a GS35B amp for ATV and passed along some photos of the early construction.

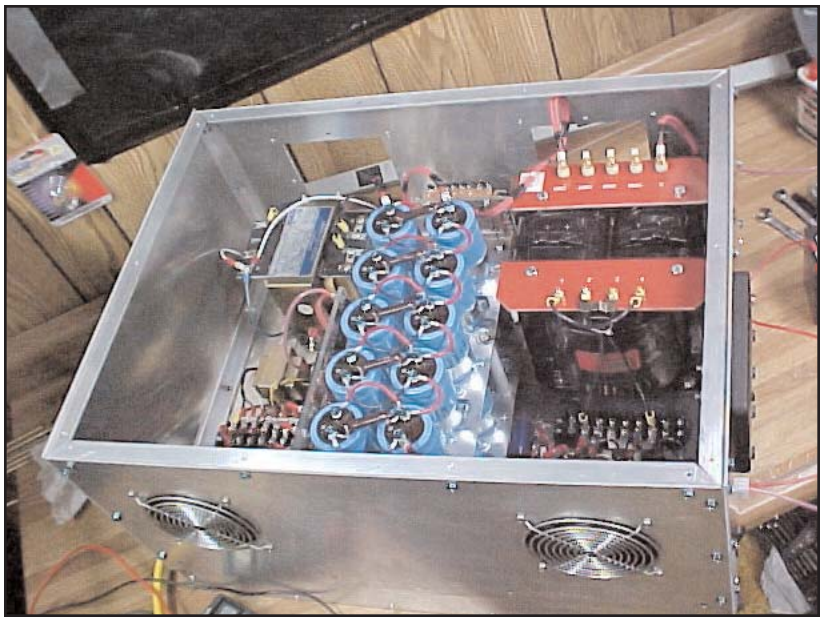
The first photo shows the obvious size difference between the 4CX250B and the GS35B. The 4CX250B has been the favorite workhorse of ATV amps for the last 20 years and the GS35B appears to be the new tube of choice for QRO ATV.

The next shots show Bruce's excellent construction of the linear power supply that will power the BIG tube!

right monitor or TV - Part #2

Another good way of receiving ATV video is to demodulate the signal from the downconverter for display on a video monitor. There are endless ways of doing this but one of my favorite ways is to use one of the older VCR's that had 10 or 15 channels that could be set up or programmed with thumb wheels. These units had the little band switch and thumb wheel for each channel. Once programmed or set you could use a remote control to switch through your 10 or 15 selections. The reason I like this type of demodulator is that it allows you to set up 3 or 4 IF's to demodulate with a push of a button. The first could be adjusted to the low end of

Looking Ahead:

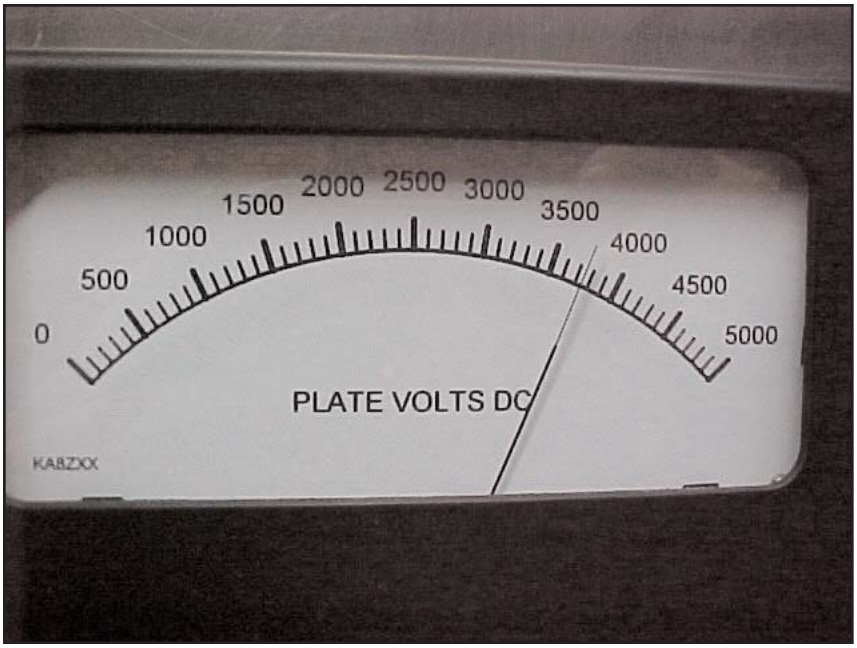


Now just a little about Digital ATV and DX'ing in the future. I was very excited to read in the last issue of ATVQ that the ATCO group has taken a great step into the digital realm. Though I do not have complete information about their technique, I have read that QPSK modulation of video could require as little as 2 Mhz of bandwidth! If indeed this is true the possibilities of ATV DX have just been greatly expanded! Not only would a reduced bandwidth allow for a tighter RX with a lower noise floor on our present ATV bands but this might even allow ATV to be used on the amateur 6 meter band! Could you imagine working ATV with other ATV operators all over the world! ATV operators in those Tropo starved areas of the USA could finally experience the thrill of working simplex ATV with stations hundreds of miles away during the E-Skip season and all of us might even experience an ATV contact with Europe when the F2 skip returns with the next sunspot cycle.

Who knows maybe as soon as next year the ATV contest scoring system may be revised to reward Amateurs using Digital ATV!

ATVers are always looking for better ways to do what we do and the ATCO group has taken a huge step for the future of ATV and ATV DX'ing. I'd like to personally thank them for their technical contributions to this hobby and I look forward to working them on Digital ATV DX soon!

DX Tip: Choosing the



The benefits of demodulating your downconverter output are many. You can run the video line to a good distribution system and then send a separate line to capture for recording devices or several monitors at the same time with no real losses involved. You could even send a video line to other transmitters for a real time video relay employing 70cm, 33cm, 23cm, 13cm, etc. You can also send a video line to a cable modulator and then insert it into your main home antenna or cable system for whole house viewing of what's on ATV!

Many monitors, like TV's yield different results on weak DX video. I like to use the 5" panasonic B/W broadcast monitors. They have front panel controls for adjusting V-hold & H-hold for those signals you might encounter that don't have proper sync or have other stability issues. Another monitor, of larger size can be used at the same time for color reception when available.

the video signal away from the color and sound for better clarity on DX, the next a little higher up to allow color and sound at P-3 and the next tuned up high for full bandwidth RX of color and sound on P-5's.

You could even set some of the other channels up for different uses like one to 439.250 MHz to monitor your own signal, etc.

If you choose to employ a surplus military IF bandpass filter or build one that is on an odd frequency such as I do (70 Mhz) or any other non standard TV channel frequency within the band it can be tuned in and set with these old VCR's.

Important DX Info:

The Hepburn tropo forecast page has a new URL and is now at:
http://home.cogeco.ca/~dxinfo/tropo.html

If you are online you can post ATV CQ's and reports to the VHF QSO page:

http://dxworld.com/vhfqso.html

ATVQ

FCC May Prohibit Satellite Analog Video Transmissions

The FCC released its Sixth Report and Order and Third Further Notice of Proposed Rulemaking regarding streaming and revising its rules for satellite systems in Part 25. In reviewing the lengthy document, most of the changes involved specific changes to antenna performance requirements and contention protocol rules, which are too specific and technical to easily summarize here. I did, however, notice an interesting comment in the Third Further Notice of Proposed Rulemaking. In the section on Off-Axis ERP, under the item "Development of Off-Axis EIRP Envelope for FSS Earth Stations," paragraphs 84-88 relate specifically to analog video services. One of the options analyzed is prohibiting analog video transmissions rather than developing new off-axis EIRP envelopes for C-band and Ku-band analog video transmissions.

The FCC notes that "a prohibition on analog video transmissions may result in more efficient spectrum use" and that "analog satellite transmissions are declining." It concludes, "Technical rules for analog video use may no longer be necessary."

In Paragraph 88, the Third Further Notice of Proposed Rulemaking states that the commission wants to prohibit analog video transmissions unless a convincing case is made that the transmissions are necessary and a technical study provides a basis for an analog off-axis EIPR envelope; also the transition should take no more than a year. "Commenters supporting continued use of analog video transmissions should specify the extent to which they currently use analog technology to transmit video, and the extent to which they plan to continue doing so. They should also indicate whether and to what extent converting from analog to digital transmissions will cause them any particular hardship, in terms of equipment costs or for any other reason, and how those costs compare to any benefits that might result from such a transition."

It will be interesting to see how much interest there is in maintaining the option to transmit analog video over satellite!

For more information the proposed end to analog video over satellite and for the specifics on the new antenna radiation pattern regulations, refer to the Sixth Report and Order and Third Further Notice of Proposed Rulemaking.

Submitted by Henry, AA9XW - **A9xw@cs.com**

ATVQ

Antenna Mounted 20W PEP 70cm ATV Power - Cheap

By: Lee R. Kelly - K6ZVA - Email leebobk@earthlink.net
570 park Terrace Dr.
Twin Falls, ID 83301
(208) 734-7785

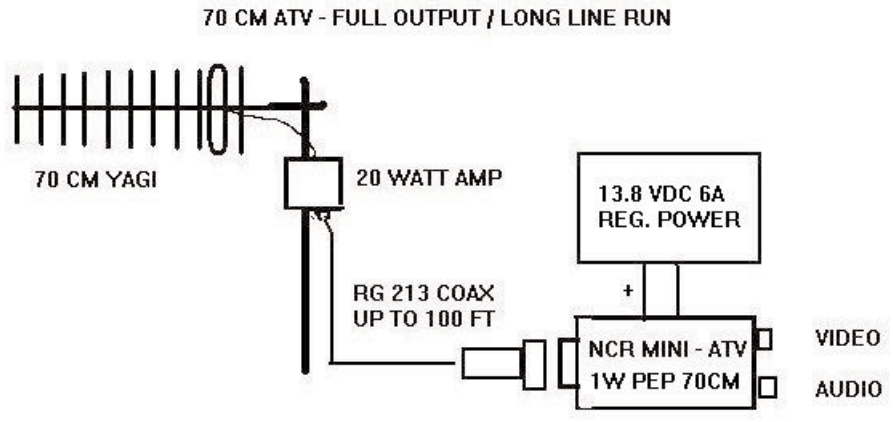
Do think you could break for a really good 70cm complete ATV transmitter system for about 250 bucks? Here in this part of Idaho, numbers like this are a necessity to get any hams active on ATV. After the downconvert receive cost is over, sticker shock sets in for the transmitter needs.

Moving here from Anaheim, CA, I brought all my ATV stuff which was used for the great So. Cal. ATN cross-band repeaters. I then proceeded to establish a very good repeater on a 10k ft. mountain near Burley, Idaho. Just like ATN, the input is on 434 and out on 1253.250, AM of course. 85 + mile P3-4 signals have been reported!

I have had to take a hard look at the tight budgets here and think this recently designed and tested station is a winner. It sure doesn't take up room in the shack!.

If you can take the time and have reasonable ability to construct the project including the antenna, you too could save a bundle. It's great fun to build your own!

By mounting the power amp directly on the antenna support, several advantages are found. Exceptionally long transmission lines to tower or remote masts, can be accommodated. There is no line loss to the antenna as the short coax from the PA is connected directly to the balun and impedance mismatch is negligible. Low cost cable and connectors, using the measured needed loss and adjusting transmit power, provides ideal input power to the PA. Very low RF on the coax. According to Tom, you should see a 6 dB change for one P number. A dB here, a dB there, pretty soon they can sure subtract out!



Although any .7 to 1 Watt transmitter can be used, the North Country Radio Mini ATV kit was chosen. The small board with audio retails at $83 with choice of a single crystal frequency. The housing, control pots and jacks are up to you. The module and pc board are obtainable from RF Parts for about $80. Some other parts are available from Mouser. Don't you have some great junk stuff to use? I decided to build the antenna from local hardware store copper pipe and brazing rod from a welding shop. Any good yagi antenna available or design should work well.

I used the WUYAGI GW Basic program allowing for just about any available material. I liked the fully soldered elements for simplicity and ruggedness. The gain for my design centered at 435 MHz was calculated at 12.5 dB using a 6 ft boom length. If that can be believed the ERP should be between 300 - 400 Watts.

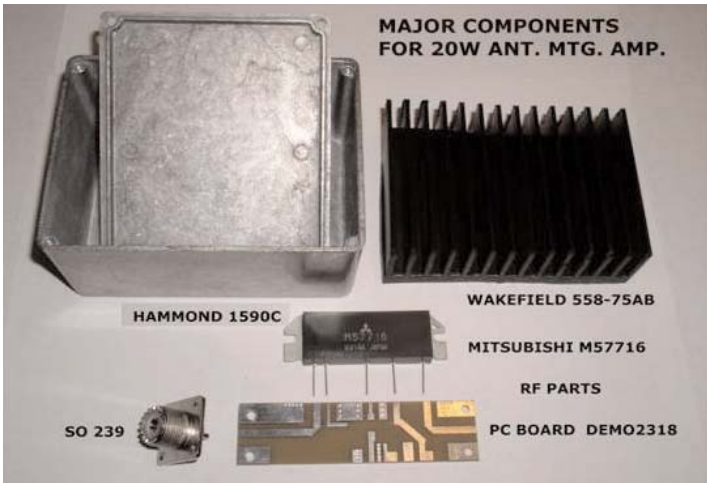
POWER MODULE ASSEMBLY

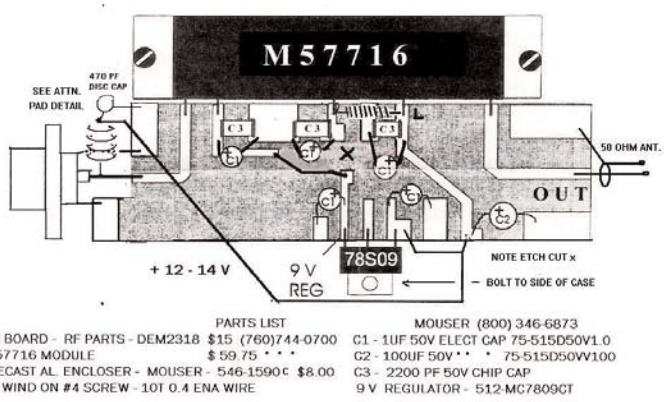
A Mitsubishi M57716 linear power module (brick) is the output element. It is housed in an aluminum case as shown. The assembly techniques are the normal practice of using flush mounting screws to allow for heat transfer from the case bottom to the heat sink. Use thermal grease. Mount sink as needed. The pc board is mounted with # 4 FH flat head) screws and spaced up with # 4 nuts. The pc board should be shortened at the input end 1/4 " and re-drilled. The power module is mounted with # 6 FH screws.

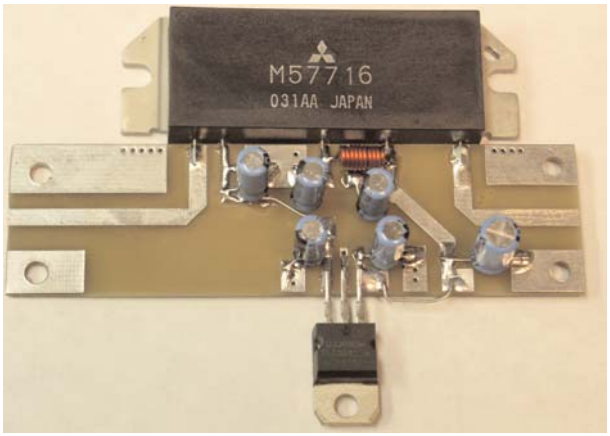
NOTE: The etch cut and re-routed conductor.

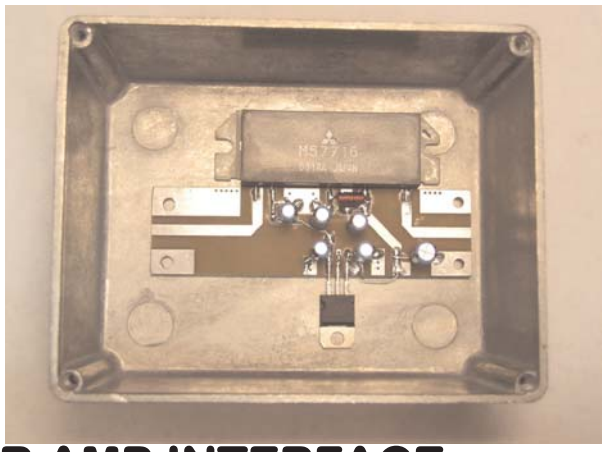
The finished unit should be coated for weather and a bracket for mounting close to the antenna designed.

THE COMPONENT PARTS

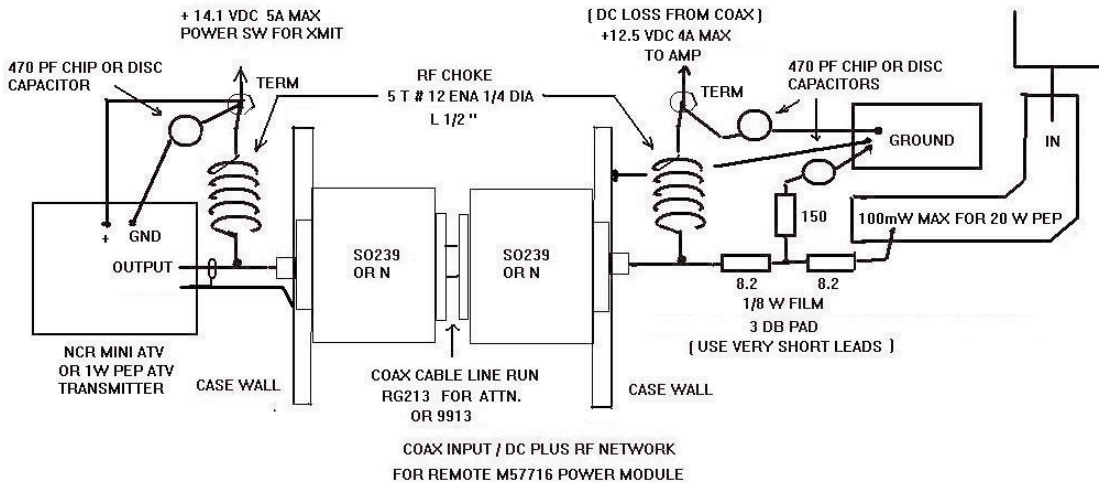








TRANSMITTER TO POWER AMP INTERFACE



CABLE AND TRANSMITTER

The required input level at the PA is 100 mW max. or 50—60 mW average. For a 1 Watt PEP transmitter output the total attenuation needed will be about 10 dB. A fixed 3 dB pad is shown at the PA input for improved SWR.

The availability of a spectrum analyzer and power attenuator is highly desirable for setting all levels.

I had the need for a 65 ft cable run. Using RG213/PL258 as a complete assembly, the loss at 434 MHz was 2.1dB.

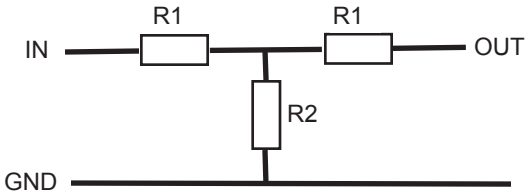
100 ft of RG213 at 434 MHz is about 5dB. All finished cable assemblies should be loss tested from 420 - 440 MHz.

FIXED ATTN. PADS AT THE TRANSMITTER OUTPUT :

3 dB R1 = 8.2 R2 = 150

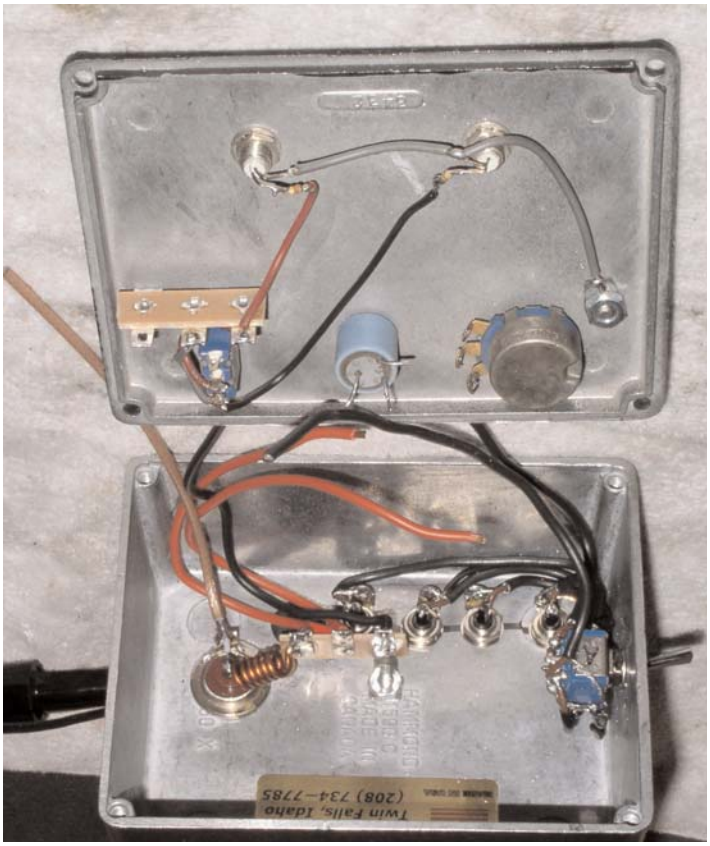
5 dB R1 = 13 R2 = 82

7 dB R1 = 20 R2 = 56



Some minor level changes may be obtained by slight detuning of the output amplifier trimmer capacitor. Final level adjustments using pedestal or linearity controls vs. video power output will be the normal TV monitoring procedure.

SUGGESTED LAYOUT



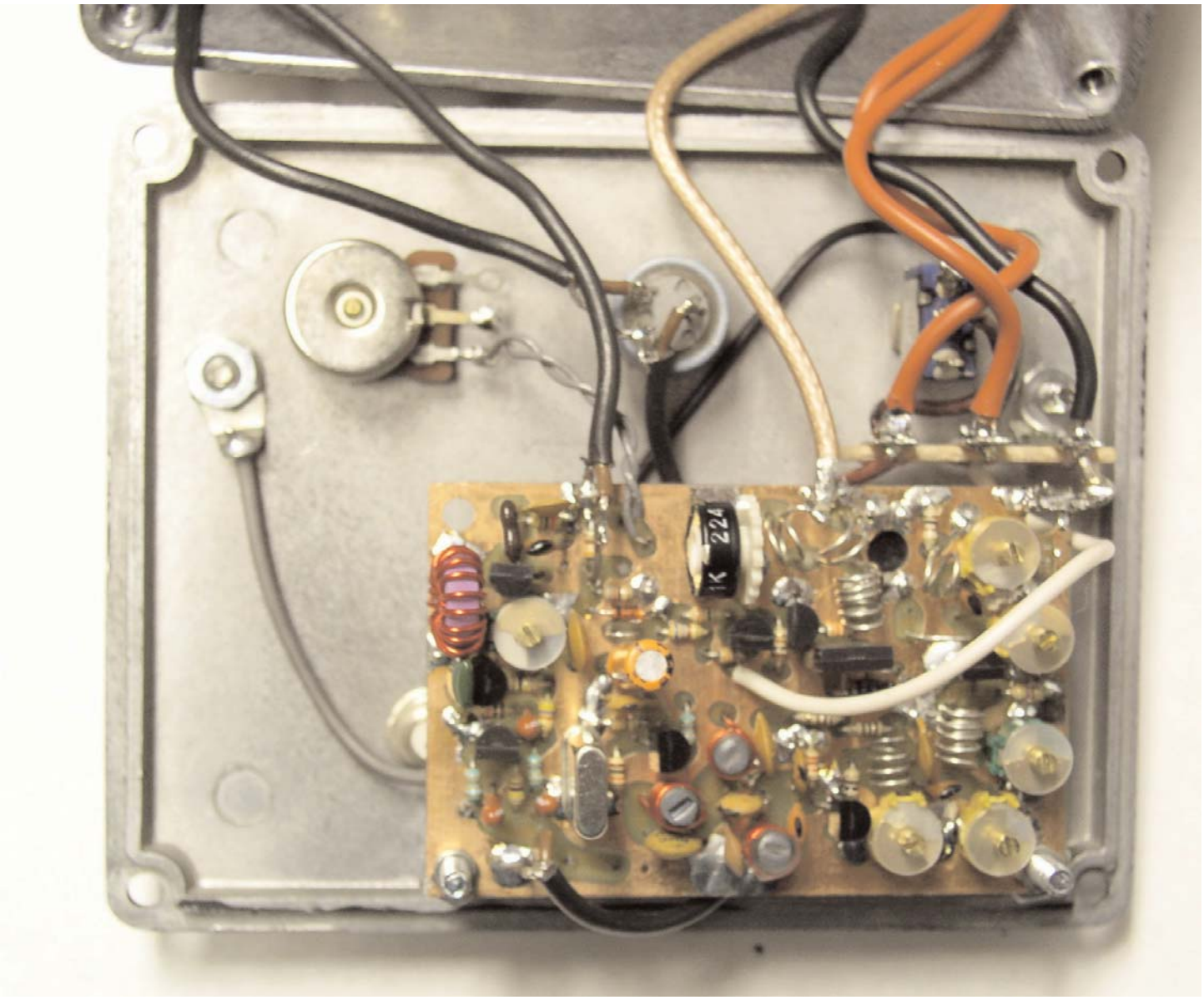
TRANSMITTER

The enclosure used for my project shown above is the same as used for the PA.

I will not go into detail except for the photo aids.

North Country Radio Kit Mounted in Hammond 1590C

ATVQ



Great Britain ATV Streaming On The Internet

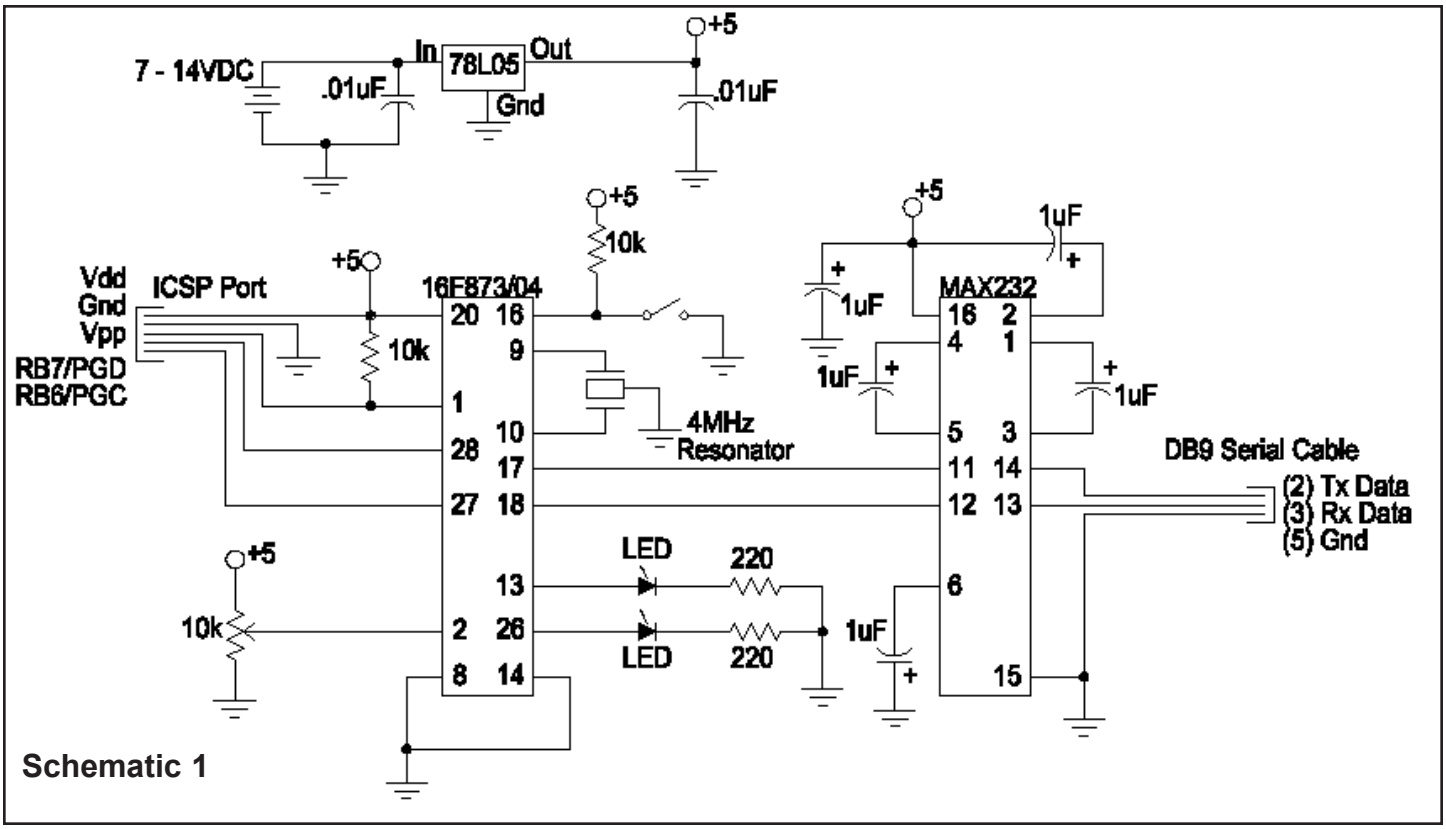
One of our 23cm TV repeaters, GB3HV (High Wycombe, about 30 miles W of London), now has high-definition full-motion Internet streaming. In order to save bandwidth, the stream is not on 24/7 but automatically comes up when the repeater is in use. The peak usage time is Wednesday from abut 2030 UTC to 0000 UTC. The stream is in Windows Media format and runs at 192kb/s so a broadband connection is highly recommended. Dial-ups will still get a flavor of what's happening.

The streaming page is located at: **http://www.gb3hv.com/gb3hv/streaming.htm** and also includes an ICQ Chat application so you can join in the activity, albeit only on a text basis.

Giles Read - G1MFG - **giles@read.net**

Microcontrollers
Part 2 - Real World Applications

By Zack Clobes, W0ZC - Email: zclobes@swbell.net
1710 N. Admas
Hutchinson, KS 67502



Schematic 1

If you've been following along, you *should* have a fully functional Microchip PIC Processor test environment. At minimum, you should have an assembler, a programmer, and the test board made. In this article, we'll take a look at various circuits and code that will let you interface your processor with the real-world.

As we saw last time, using the C programming language with CCS's C compiler made it easier to read, write, and maintain the code. Consequently, all of the source code shown here has been written in C but could be re-written in assembly if so desired.

Digital Input

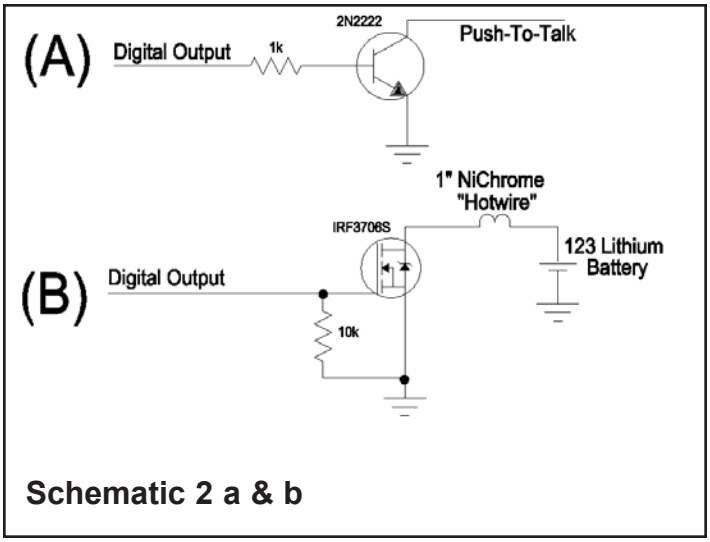
In the most basic sense, digital I/O (Input/Output) is the building block for everything that a processor does. Digital, by its nature, is either on or off. For the processor to read an input, you need to supply either 0.0V or 5.0V to any of the pins configured as inputs. This can be accomplished by a switch, a transistor, another digital IC, or a variety of sensors which have digital outputs.

Schematic 1 shows the revised test board which uses a toggle switch to generate a digital input. One side of the switch is attached to ground, and a pull-up resistor is used to bring the input to 5.0V, which signals a logic level of 1 to the processor.

You may recognize the code in **Listing 1** from the first part of this article as the code used to blink an LED on and off. I added an "if" statement that causes the blink code to only run when the input to pin 16 (RC5) is high. The "while" loop causes the processor to check the input pin.

Compile the code and burn it into the Flash ROM. When you apply power, the LED will blink whenever the switch is opened. This seems to work just fine, and it actually does in this application. The problem with mechanical switches is that they don't just go from open to closed in a clean and orderly manner – they actually "*bounce*" back and forth between open and closed during the transition process, lasting about half of a millisecond.

This may seem like an insignificant time to you and I, but for a microprocessor scanning an input every microsecond, half of a millisecond seems like eternity (remember, 1 millisecond is equal to 1000 microseconds).



Schematic 2 a & b

To debounce a switch, add a delay_ms(10) statement in the code once a change of state is detected. This will cause the microprocessor to ignore the switches bouncing until it's settled. The value of 10ms is arbitrary, but should be close enough to handle most debouncing needs. Depending on the type of switch and the application, it may be desirable to have this value much larger.

Digital Output

We've already digital outputs in the first example when we use the output_high(PIN_B5) to blink the LED on and off. The only problem is the PIC processor is only capable of sourcing (or sinking) 25mA of current from any output pin. This is sufficient to drive another IC or LED, but to energize a relay or other high-current load, you'll need to use a transistor.

Schematic 2a shows an interface circuit where the processor's digital output drives an NPN transistor into saturation. Assuming an h_{fe} gain of 100 this circuit is capable of switching 430mA which is more than enough to key the Push-To-Talk pin on any modern transceiver's mic jack.

$$I_{base} = (E_{out} - E_{base}) / R_{base} = (5.0 - 0.7) / 1000 = 4.3mA$$

$$I_{load} = I_{base} * h_{fe} = 4.3mA * 100 = 430mA$$

As you can see from the math above, a 1k resistor in series with the base of a transistor will provide about 4.3mA of drive. Most switching transistors like the 2N3904 and 2N2222 will amplify that current by about 100 times (h_{fe}) to provide 430mA to a load.

One of my recent ballooning projects uses an IRF3706S which is a MOSFET (Metal Oxide Semiconductor Field Effect Transistor) instead of the bipolar used in the example above. Conceptually, the FET works about the same as the NPN transistor, except that current flow between the source and drain, is regulated by how much *voltage* is present on the gate, rather than how much *current* is flowing through the base.

Schematic 2b shows my output circuit. I'm using a PIC processor running at 3.0V from a Lithium coin cell which drives the gate of the MOSFET with 3.0V. The MOSFET switches a secondary power source (123 Lithium camera battery) to dump its full current across a short length of NiChrome wire about one inch long. The NiChrome "hotwire" melts a nylon rope in two releasing the balloon from the payload.

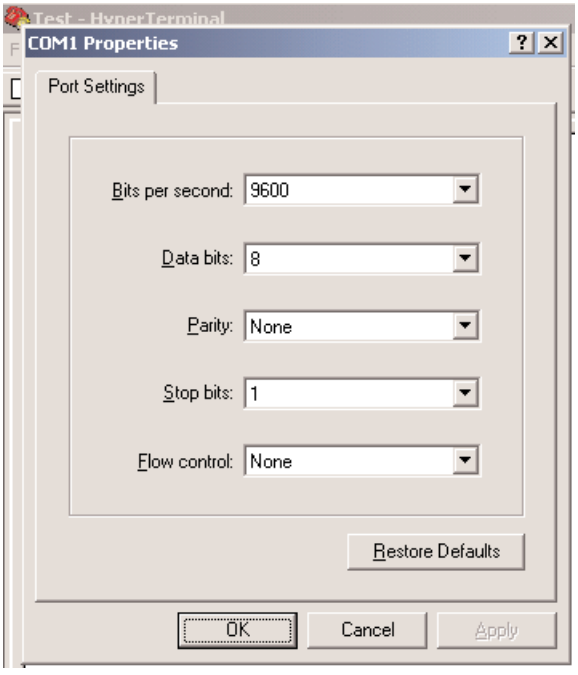
RS-232 I/O

RS-232 is, for many applications, the ultimate in digital interfacing. For those of you not familiar with '232, it is a hardware specification where data is serially transmitted bi-directionally using three wires. By specification, data must be transmitted at one of a variety of standard data rates (bauds), using voltages of no less than ±5V (±8V is normal). The data is sent down the line in Little Endian (least-significant bit first) format and the voltages are reversed – a logic 1 has a voltage of -8V, and a logic 0 has a voltage of +8V.

Because of its relative simplicity, it has become very popular for devices of all types to talk using '232. Any type of balloon application will most certainly use RS-232 to interface with the on-board GPS, and possibly with a stand-alone TNC's (Terminal Node Controller). Note, RS-232 should not be confused with the much newer and more complex USB (Universal Serial Bus) found on any PC manufactured within the past five years.

The new IC introduced in **Schematic 1** is the MAX232 which does some cool things for us when we need to transmit RS-232 at ±8V. Because -8V is somewhat hard to come by in most battery-powered devices, specialized chips have cropped up that include built in charge pumps to generate its own 10V supplies using only a few external capacitors. The chip also takes care of inverting the voltages going to and from the processor, and making sure they're at 0 and 5V.

Figure 1



Fortunately for us the PIC processor and the CSS complier take care of all of the complexities of reading and writing to a serial port.

Listing 2 shows how simple it can be to setup an RS-232 device to communicate with a PC, TNC, GPS, or whatever else you can dream up. In this example, the PIC is intended to be connected to a personal computer running a terminal emulator program such as HyperTerminal. Configure your emulator as shown in **Figure 1**.

Connect the DB9 plug coming from the MAX232 IC into the serial port of the PC and apply power to the circuit. You should see something similar to **Figure 2** after you press a few keys on the keyboard.

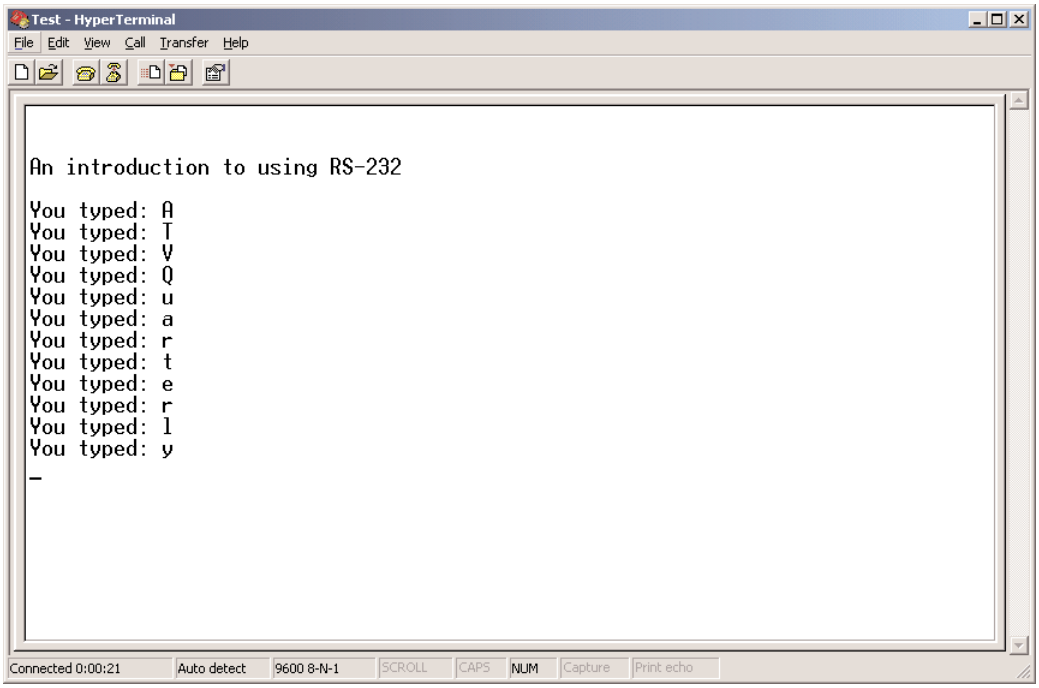


Figure 2

Analog Input

More often than not it seems that the microcontrollers need to be interfaced to sensors that don't run on just 0 or 5 volts, but instead a variable voltage to convey some information.

On balloons, I've used analog inputs to measure battery voltages, temperatures, and barometric pressure, although the possibilities are endless. Getting back to the test board, this time we'll make use of the 10k potentiometer that is attached to pin 2 (AN0) to represent our analog sensor (see **Schematic 1**).

Listing 3 contains the code needed to read an analog input from the pot and return the results numerically using the RS-232 port and a PC. If you've been following along thus far the code should be pretty straight forward. The RS-232 interface is configured just as before, using the #use rs232 directive.

There are three additional lines in this code to configure the analog input pin. See the online help for the CCS complier for further explanation of what's and why's of these three lines, and for now just accept them as being necessary.

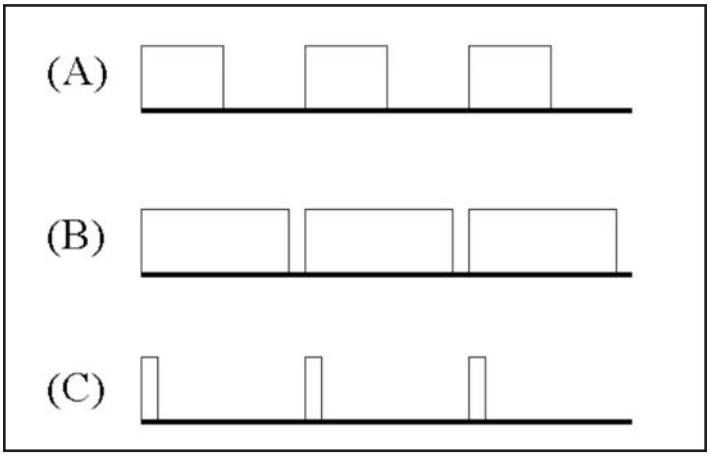
Again connect the DB9 plug to the PC and start HyperTerminal. Apply power to the PIC circuit, and with luck you'll see values streaming down the screen, once per second. These numeric values correspond to the voltage appearing at pin 2 (AN0) of the PIC.

The analog values are on a scale from 0-255 (eight bits), and the analog input is configured to read voltages between 0.0 and 5.0V. It can therefore be deduced that 0.0V will read a value of 0, and 5.0 volts will read a value of 255. A voltage of 2.5 volts will ready a value of about 127.

The approximate value of an analog input can be summarized with this equation.

$$Value = \frac{Voltage}{5.00} \times 255$$

Figure 3



Analog Output

The final listing shows how to get an analog signal directly from a microprocessor. The 16F873 can produce a varying analog voltage using a trick known as Pulse Width Modulation (PWM).

PWM uses a digital output to simulate an analog output by varying not the actual voltage, but instead the ratio between how long the output is turned on versus turned off. **Figure 3a** illustrates the

concept of a 50% duty cycle – the output is on the same amount of time that it's off. If the duty cycle increases towards 90% (**Figure 3b**) more power is being delivered to the load. As power is decreased to 10% (**Figure 3c**) less power is being transferred. Normally, an R-C filter, or in our case, an LED is used to filter the output. The frequency of the PWM signal occurs at a high enough frequency that the pulses cannot be seen by the human eye. That frequency can be determined with the equation:

$$PWMFreq = \frac{ClockFreq}{(4 \quad \times (Period + \ ) \times Postscale}$$

Where Mode, Period, and Postscale are defined on the line:

setup_timer_2(Mode, Period, Postscale);

Now for the circuit. Again use the pot connected to pin 2 (AN0) to read in an analog value, but this time we'll use the LED attached to pin 13 (RC2) as an "analog" output. As you can see in **Listing 4**, the source code has not changed greatly from the **Listing 3**, except instead of using the RS-232 as an output, we're reading the analog input and feeding it into the set_pwm1_duty() function.

As the pot is adjusted, a sample is read using the read_adc() function. The value is then set on the PWM using the set_pwm1_duty() function which sets the duty cycle on a 0 to 255 scale. This cycle repeats indefinitely every second. By changing the "voltage" to the LED the brightness varies between off and full brightness.

If you plug the numbers from **Listing 4** into the equation above, you find that our PWM is running at a frequency just shy of 1kHz, which is why we cannot detect the individual pulses by using the LED, although we can certainly see them using an oscilloscope.

$$PWMFreq = 976 \quad = \frac{(4{,}000{,}000Hz}{(4 \times \ \times (256 \times 1)}$$

Onwards and Upwards

This concludes the two part series on using microcontrollers in the real-world. Hopefully I've given you a few nugget's of information to help you adapt the PIC chips into your application. Just as last time, additional resources and the source code will be posted on a website available for download at **http://www.rckara.org/atvq/**.

```
/************************************************************
*                  Listing1.c                      *
*                                                  *
* Blinks an LED connected to pin B5 on and off approximately  *
* three times per second whenever pin C5 goes high.          *
*                                                  *
************************************************************/
//pulls in some predefined constants specific to this chip
#include <16f873.h>
//enables the following functions on the chip:
//  HS - High Speed oscillator
//  NOWDT - Disables the Watchdog Timer
//  NOLVP - Disables low-voltage programming on the chip
#fuses HS,NOWDT,NOLVP

//Tell the complier how fast the chip is running for the timing functions
#use delay(clock=4000000)

//The main function where C/C++ programs always begin execution
void main(void) {
      do {
            if (input(PIN_C5)) {
                  output_high(PIN_B5);      //set the output pin high (+5V)
                  delay_ms(150);            //wait 150ms
                  output_low(PIN_B5);       //turn the output pin off (0V)
                  delay_ms(150);            //wait another 150ms
            }
      } while(1);       //repeat forever
}
/************************************************************
*                  Listing2.c                      *
*                                                  *
* Transmits and receives data on a RS-232 bus.  The host      *
* program should be set to operate at 9600 baud, 8 bits, no   *
* parity, and 1 stop-bit.                          *
*                                                  *
************************************************************/

//pulls in some predefined constants specific to this chip
#include <16f873.h>

//enables the following functions on the chip:
//  HS - High Speed oscillator
//  NOWDT - Disables the Watchdog Timer
//  NOLVP - Disables low-voltage programming on the chip
```

```
#fuses HS,NOWDT,NOLVP

//Tell the complier how fast the chip is running for the timing functions
#use delay(clock=4000000)

//configure the PIC's UART to send and receive RS-232
#use rs232(baud=9600, xmit=PIN_C6, rcv=PIN_C7, ERRORS)

void main(void) {
      int c;
      c = 0;       //initialize the temporary variable
      delay_ms(2000);              //wait for power to stabilize
      printf("\r\n\r\nAn introduction to using RS-232\r\n\r\n");
      do {
            c = getc(); //get a character from the 232 port
            printf("You typed: %C\r\n", c);    //spit it back out
      } while(1);        //repeat forever
}

/************************************************************
*                  Listing3.c                        *
*                                                    *
* Reads the analog inputs and Transmits their values via     *
* RS-232.  The host program should be set to operate at 9600  *
* baud, 8 bits, no parity, and 1 stop-bit.                   *
*                                                    *
************************************************************/
//pulls in some predefined constants specific to this chip
#include <16f873.h>

//enables the following functions on the chip:
//  HS - High Speed oscillator
//  NOWDT - Disables the Watchdog Timer
//  NOLVP - Disables low-voltage programming on the chip
#fuses HS,NOWDT,NOLVP

//Tell the complier how fast the chip is running for the timing functions
#use delay(clock=4000000)
//configure the PIC's UART to send and receive RS-232
#use rs232(baud=9600, xmit=PIN_C6, rcv=PIN_C7, ERRORS)
void main(void) {
      int iValue;
      iValue = 0;//initialize the temporary variable
      delay_ms(2000);              //wait for power to stabilize
      printf("\r\n\r\nAn introduction to analog inputs\r\n\r\n");

      //configure the analog port
      setup_adc_ports(RA0_ANALOG);
      setup_adc(ADC_CLOCK_INTERNAL);
      set_adc_channel(0);
      do {
            iValue = read_adc();   //read the value from pin 2
            //output the value to the RS-232 port
            printf("The analog value read was: %U\r\n", iValue);
            delay_ms(1000);                  //wait one second
      } while(1);        //repeat forever
}

/************************************************************
*                  Listing4.c                        *
*                                                    *
* Reads an analog value from AN0 every second and sets the    *
* PWM output to that value.                          *
*                                                    *
************************************************************/
//pulls in some predefined constants specific to this chip
#include <16f873.h>

//enables the following functions on the chip:
//  HS - High Speed oscillator
//  NOWDT - Disables the Watchdog Timer
//  NOLVP - Disables low-voltage programming on the chip
#fuses HS,NOWDT,NOLVP

//Tell the complier how fast the chip is running for the timing functions
#use delay(clock=4000000)

void main(void) {
      int iValue;
      iValue = 0;//initialize the temporary variable
      //configure the analog input port
      setup_adc_ports(RA0_ANALOG);
      setup_adc(ADC_CLOCK_INTERNAL);
      set_adc_channel(0);

      //configure the analog output port
      //set the ccp1 pin to function in PWM mode
      setup_ccp1(CCP_PWM);
      //configure timer2 (the timer used by the PWM)
      //T2_DIV_BY_4 tells the timer2 to increment every 4th clock tick
      //The 255 tells the counter how many times to count up before overflowing
      //  This effectively sets the range for the duty cycle values (i.e. 0-255)
      //The 1 tells the timer to trigger every time it counts up to 255
      setup_timer_2(T2_DIV_BY_4, 255, 1);

      do {
            iValue = read_adc();   //read the value from pin 2
            //set the duty-cycle for the output pin based on the input's value
            set_pwm1_duty(iValue);
            delay_ms(1000);                  //wait one second
      } while(1);        //repeat forever
}
```

ATVQ

Needed, A Better Filter For Maley One-Antenna ATV Repeater

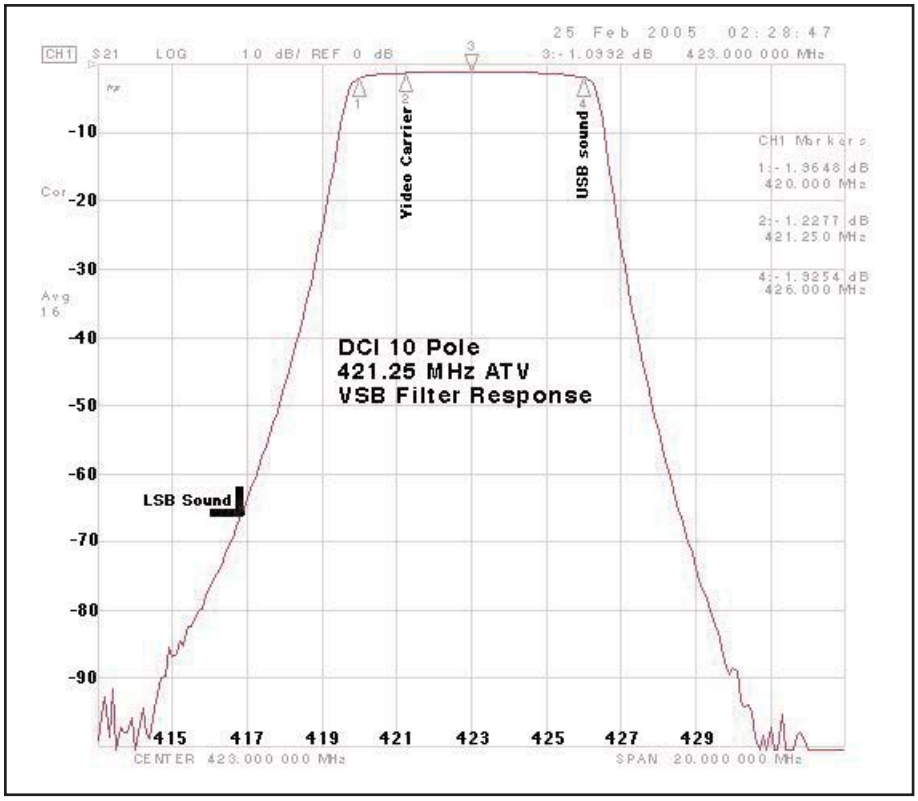
By: Robert F. Stone - W3EFG - Email rfstonew3efg@juno.com
ATV Coordinator and Net Control
63 Fairway Circle
New Smyrna Beach, FL 32168

DBARA needs a sharper passband filter at the Maley ATV repeater site to enhance and improve it's present one-site, one-antenna, in-band ATV repeater....believed to be the world's first with a vertical gain antenna. A suitable filter from DCI has been identified and we are asking for a source of funding to buy this filter. A few background pictures and information about our progress to date is described. Better ATV repeater performance from a single site, less subject to present QRM or interference, will provide the area with a useful tool for public service and emergencies.

Filter manufacturer contact and e-mail sent (with some modifications and additions):

Att: Mr. Ralph Olds, President,
Ham calls: VA5RO and AA7GY
DCI Digital Communications, Inc.
Canada S4L 1B7

Thanks, Ralph, for the revised ATV filter response curve (slightly modified by an X and Y scale by Tom O'Hare at PC Electronics) that I, and the ATV'ers, can read and understand. I am including it below in this article for information and evaluation.



It looks like the 10 pole filter with the ATV video carrier at 421.25 (US cable channel 57) will provide us with the necessary low insertion loss (about 1 db) and the attenuation loss with sharp shirt drop-offs to give us an ATV "average" power output, with video, from now about 15 watts to about 40 watts with the required out-of-band attenuation from our one-vertical 10 db gain antenna, single site ATV repeater.

DBARA is believed to have the world's FIRST in-band ATV repeater using vertical polarization! Our input ATV frequency is on 434 (roughly US cable channel 59) with a double sideband video signal, of which the 434-440 mHz. is actually used. The ATV'ers do not attempt to attenuate the lower side band (LSB), like we have to do on our ATV transmitter's 421.25 output to stay in the band.

These 10 pole filters, on higher ATV frequency bands, have been successfully used by a fellow ham and active ATV'er Dave, KC3AM, who indicate they fully meet your specifications and "work extremely well". He recommended your filters to us.

Since we are a small ham club with minimum resources, as I said over the phone, we will be "hard pressed" to come up with the $399 USD selling price. But we are going to try "somehow" to raise the funds to buy and install this filter between the ATV transmitter exciter output and the Rx-Tx ATV Duplexer to replace the old 6 pole (?) Spectrum International 421.25 pass band interdigital filter which has much wider shirts and an insertion loss of about 3 db!

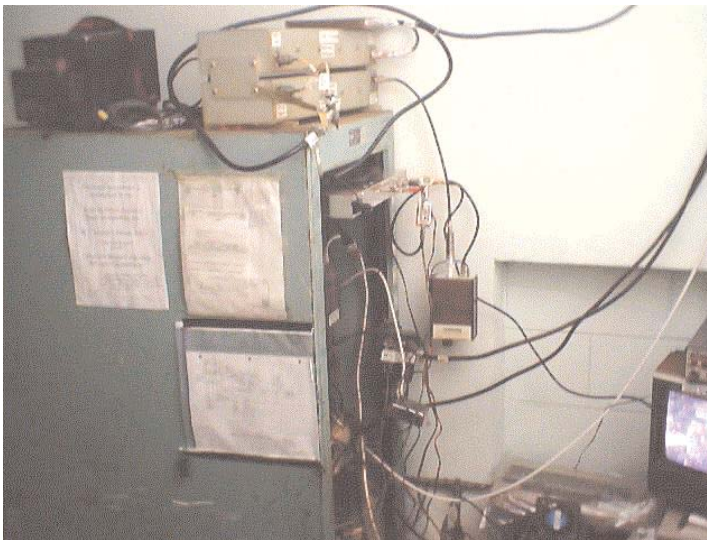
Thanks, Ralph, for this information and I will keep you advised how we are doing to raise the money to buy this filter. Nevertheless, our one antenna ATV repeater is now marginally working "pretty well", but weak ATV signals don't get in very well with our desense problems, we cannot run the video's (with sync) gain up to where it should be for a bright contrasty picture. Also we get some "desense" (horizontal white streaks and sparkles in the picture) plus QRM or interference from a number or sources (not identified) that appear to be around 433 MHz +/- 200 KHz, plus perhaps some lessor QRM in our 434 passband. We hope to identify and eliminate this QRM soon!

I plan to write an article soon describing our successful performance to date and publish it on our DBARA web site and perhaps the ATVQ magazine. Two photos of our early tests with KC3AM and W3EFG and a later test of the Maley DBARA one-site ATV repeater rack equipment and one-site 434 input repeat experiments are shown here.

I feel confident that your DCI 10 pole band pass filter will "significantly increase" the received signal at far locations, permit the weaker in-band 434 signals to be re-transmitted better without desense, and allow us to raise the video level up to where our picture will be "less dark and with minimal desense streaks and sparkles" in the transmitted signal. Most of our ATV'ers, who have the technical knowledge, will agree that a better filter should greatly improve our ATV operation as explained above. Comments will be appreciated.

Having an "improved" one-antenna, one-site ATV repeater will allow DBARA to offer a better emergency and public service facility. It will provide better or improved performance, a greater range for mobile ATV, aeronautical ATV, and point-to-point service with less QRM and interference. An improved ATV Repeater will likely attract new ATV'ers and encourage old ATV'ers to return to operation, following the severe hurricane damage we sustained last year at both the receive and transmit sites and among the ATV'ers equipment!

Maley DBARA
Early Repeater Tests- KC3AM & W3EFG



Maley DBARA- Later One Site Repeater Tests

Any ideas, ATV'ers and club members, on how we can raise the $400, or so, for this bandpass filter? With the expected big improvement this filter will make to our Maley one-site ATV repeater, I wonder if VARECS, DBARA, or DAB police and emergency authority supporters would care to make a donation towards buying this filter? Larry, N4URS, made this suggestion and I think it's a good idea.

We are also asking that the ATV'ers contribute as much as they care or able to towards this filter. Please send these ATV filter (so marked) contributions to Mitch, N1XBG, DBARA treasurer, or bring them to a monthly DBARA meeting.

This year for the DAB 500 race Fred, KF4VRS, and his helpers gave an impressive live ATV demonstration of what ATV might do for special events, local emergencies, weather pictures from Maley, etc. With improved performance, better coverage, and mobile ATV transmitters, DBARA can provide a unique service supplemented by FM communications from our local voice repeaters. A picture of Fred, KF4VRS, on the roof of the South grandstand area of the race track is shown at the right. The picture seen at the Command Center helped the police coordinate the traffic flow in the track areas. Note the edge of the ATV J-Beam pointed East in the upper left of the picture and its shadow: Great job, Fred, with the support of other hams at the Command Center!

ATVQ

KF4VRS and his ATV gear in action at the Daytona 500

Welcome New Advertisers!

I would like to extend a warm welcome to two new advertisers. Last issue Mann's Rotor Service joined our rank of prestigious advertisers (page 3). We all know that our rotors get tired after years of operation, and now we have a place to have them repaired. Maybe some have already used Gene's services. Thanks, Gene, for your support!

And this month, we have Multilabs (to the left). They make a video card that will work with PIC processors, Basic Stamp, or any other micro that you might be developing with. By itself, it does not display your call sign, but for those that work with micros, it is easy to use as there are many examples of code on their web site.

Harlan Technologies has also become a distributor and will have a few units at the Dayton Hamvention in addition to a working demo so you can see what it does.

This video card is specifically designed for microcontrollers, and gives them the ability to generate text and graphic images on monitors, televisions, and similar-type equipment that accepts composite video signals. The ezVID 2.0 gives microcontrollers the ability to break free from visual indicators such as LED's and LCD's. It provides for professional applications such as text messaging, diagnostics and status indication, but is also useful to the enthusiast user for applications in simple video games and graphics.

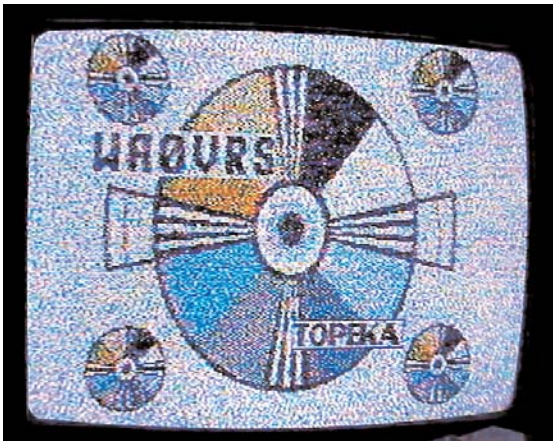
For the $59.95 price, it will be great for video ID and other applications that can use a video, NTSC, output. It has the ability of graphics as well as text, so start dreaming up your applications now!

See the DEMO at booth 207 at the Dayton Hamvention!

ATVQ

ATV Repeater
WAØVRS - Topeka Kansas

By Steve Carriger - WAØVRS
8243 SW 33rd
Topeka, KS 66614

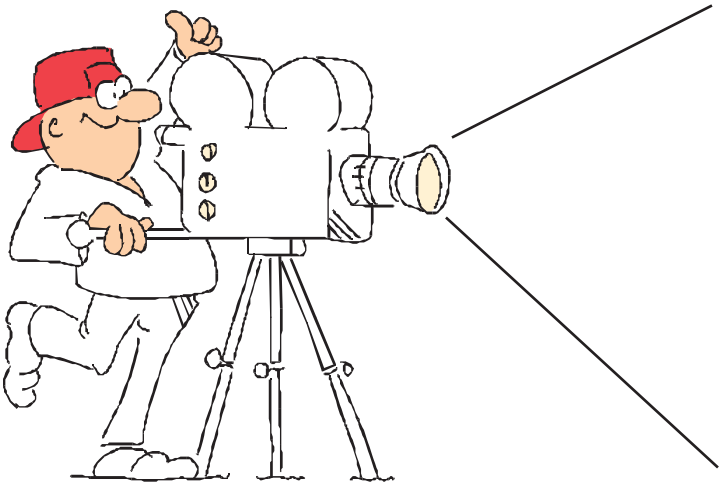


Several Hams started off in the late 60's and early 70's using old RCA two-way radios with a 2C39 for the final output on the 430 MHz band. These radios were modified for ATV and black & white cameras were added. It all seemed high tech at the time. As time went on in the middle 70's we installed a GLB 1 watt solid-state transmitter with wire line control at a local TV station. Its purpose was to give live weather radar to the local EOC during our ARES weather watches. Improvements were made over the years, filters to roll off lower sidebands, KLM power amp, better video ID. Well, needless to say the TV station moved into a new building and guess where? It was the biggest RF hole in the city. That started the project to build a new ATV repeater. 2.4 GHz FM was chosen for a link frequency from the TV studio (weather radar) and the repeater tower. 1.2 GHz FM was chosen for the main input to the repeater and 427.25 MHz AM was chosen for the output. The main repeater uses a commercial modulator with saw filter for lower sideband roll off that drives a mid-level power tray that gives up to 10 watts out. This drives the main amp, which is a 10/100 Mirage ATV repeater amp. A DCI 10 pole filter was added to the output to clean up any unwanted sidebands. For the video side we are using a Grass Valley video processor, DATATEK leading/trailing edge corrector, and DVD player for standby video ID. The 10 minute ID is an Intuitive Circuits overlay call type and a Scientific Atlanta Sat. receiver was used for the 1.2 GHz side of the system. We added a Chyron Codi video crawl that is fed using EMWIN weather information for weather updates. A closed caption unit was added to give information about the ATV system to its users. Two Intuitive Circuits DTMF control units were added for on-off functions and video switching. The DTMF control is on a UHF channel and uses a small Motorola Maxtrac for its receiver. We also had a Leitch insertion test generator. It was added to the rack and gives us the ability to check the system from a test bench without going to the remote site. As for the transmitting antenna we could not find anything we liked, so of course we built one. It uses folded dipoles made out of 3/8 solid aluminum rod stacked on a 20 foot pole using vertical mode of operation. We have burned in the whole system for sometime and are waiting for the final approval to install on a local TV tower. As you can tell the crew that put this together had too much time on their hands. The theory is that if the cabinet is not full, add another unit, it must be needed. A typical ham project that got bigger and bigger.


Steve WAØVRS

Submitted by Michael L. Bogard - KDØFW
kd0fw@crcwireless.net

ATVQ



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ATV'ers are hams that build projects more than other hams. They have a varied background ranging from technicial to engineer, and just might see a need for your product in their regular job as well as in their hobby. I hope to hear from you soon.

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Gene Harlan - WB9MMM - Editor/Publisher

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FALL	October 1	October 15	November 1

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Amateur Television Quarterly

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Amateur Television Contest 2005

Contest period 00:00z 06/01/05 to 00:00z 09/01/05

Contest goal: To raise activity and promote *long haul* contacts on ATV. **This year encourage everyone you see to enter!**

Participants must hold at least a Technician class license and be within the boundaries of North America, Alaska or Hawaii.

In case of multiple Ham occupants, they may share equipment during the contest so long as the intent is not merely to manufacture points. All occupants who enter must submit their own log.

Schedules: The use of schedules is allowed, and can be made by any means available. The use of 144.340 mhz national ATV calling frequency is also allowed and encouraged.

REPEATER CONTACTS DO NOT COUNT. Distance calculations will be between both stations in the QSO with no relay allowed.

Exchange: Callsign with at least P-1 video on any amateur band 70cm and above.

MOBILE or **PORTABLE** stations must exchange their location at the time of contact as determined by portable GPS or other verifiable means.

VIEWER: Station does not have to exchange any video but must be a licensed amateur and confirm at least a P-1 reception report to the transmitting station via 2 meters or another amateur band.

CLASSES: There will be 4 classes for participants:

HOME: Primary location of residence with Fixed Antenna structure. Minimum distance for repeat contacts (75 Miles)

PORTABLE: Station can be set up just for the contest and may not operate from any other location during the contest period. Minimum distance for repeat contacts (50 Miles)

MOBILE: Station can operate stopped or while moving but all antennas must be affixed to the mobile unit and capable of transmit while in motion. Minimum distance for repeat contacts (25 Miles)

VIEWER: Station must be able to receive video at P-1 signal level and relay report to the transmitting station. Minimum distance for repeat contacts with this class is determined by the transmitting stations type or class.

Scoring System: Each valid contact will be awarded points for the mileage between the two stations on an ever-increasing difficulty per frequency basis as follows:

70cm = 2 points per mile

33cm = 4 points per mile

23cm = 6 points per mile

13cm and above gets 10 points per mile!

A station can be worked for points only once unless they are a minimum distance apart as specified by the class of entry. (See CLASSES) and then they may be worked once in a calendar month through the contest period.

The distance between stations will be calculated by the Maidenhead Grid and sub grid identifier coordinates listed on QRZ.com and rounded down to the nearest mile. Every effort should be made by entrants to verify or update their information before the contest starts. If you do not have Internet to look up a stations coordinates please ask the other station, if they do not know then leave the mileage column blank and it will be determined by the verifier. No changes can be made to coordinates once the contest starts unless you move.

Distance will be calculated with the (Bearing and Distance) DOS program by W9IP that is used by the ARRL for distance records.

LOG's: All logs must be in a standard format as specified below:

STATION WORKED RPT REC RPT SENT UTC DATE FREQUENCY GRID SQ DISTANCE POINTS

Your log information should also include your Name, Address, your Maidenhead Grid and sub grid identifier coordinates, and a list of equipment used. Sample Log is below and a full page Log sheets will be available on www.hampubs.com .

Logs can be submitted by email or regular mail and must be received by September 15th to be eligible for contest Awards. Send the logs to:

ATVQ Contest - 5931 Alma Dr. - Rockford, IL 61108 - or to: **ATVQ@hampubs.com**

AWARDS:

All Scores will be published in ATVQ and certificates will be awarded for the top three scores in each class. The highest overall score of the contest (The one who covers the most points on ATV) will receive the OVERALL WINNER PLAQUE

ATVQ

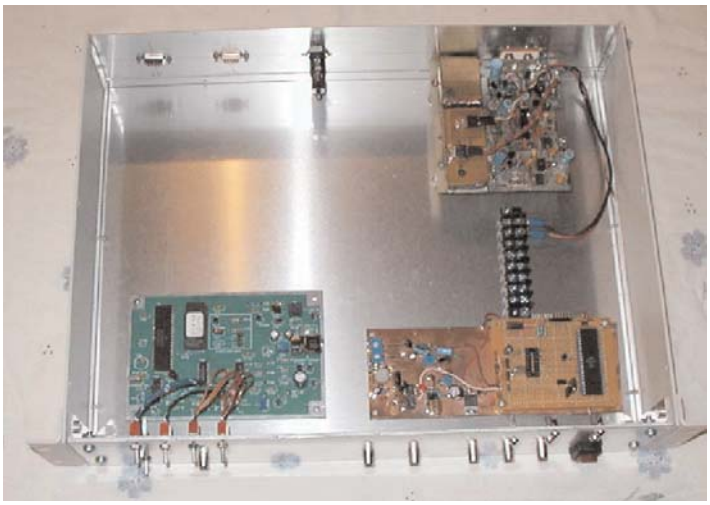
CALL			GRID SQ.			CLASS		
STATION WORKED	REPORT SENT	REPORT RECEIVED	UTC	DATE	FREQUENCY	Grid Sq.	MILES	POINTS
TOTAL MILES					TOTAL POINTS			
NUMBER OF DIFFERENT STATES WORKED								

ATV Repeater
N5XNQ - Birmingham, Alabama

By Craig Clark - N5XNQ - Email: N5XNQ@bellsouth.net
1312 Chester St.
Hoover, AL 35216

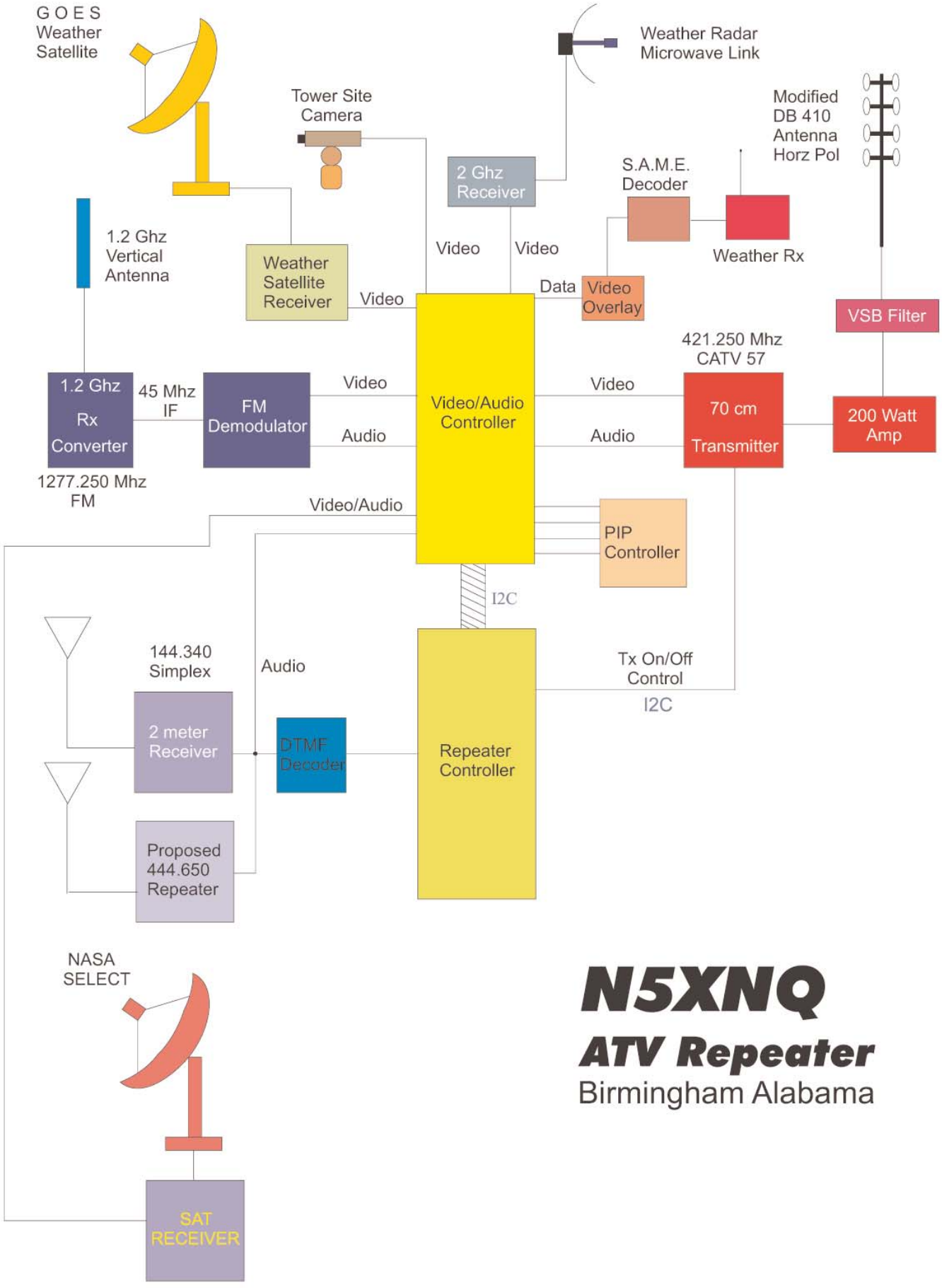
I am pleased to announce that the Birmingham, Alabama, ATV repeater is on the air. The repeater is transmitting on 421.250 Mhz and receive is 1277.250 Mhz FM. The 2 meter intercom frequency is 144.340 Mhz. The system is transmitting 24 / 7 and has four separate ID pictures changing every 10 seconds. I would be very interested in any reports from folks that are able to see the repeater. The repeater is located in Pelham, Alabama, which is approximately 10 miles south of downtown Birmingham. The lat and long of the site is 33-19-58N / 86-47-55W. The output power is 50 watts horizontally polarized. Pictures of the equipment and today's activities will be posted on my web site later this evening.

http://home.bellsouth.net/p/PWP-n5xnq



ATV Controller - not complete

Craid, N5XNQ (left) and Greg, KA5GET (right)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Decoder
1.2 Ghz
Vertical
Antenna
Weather
Satellite
Receiver
Video
Video
Weather Rx
Data
Video
Overlay
VSB Filter
421.250 Mhz
CATV 57
1.2 Ghz
Rx
Converter
45 Mhz
IF
FM
Demodulator
Video
Audio
Video/Audio
Controller
Video
Audio
70 cm
Transmitter
200 Watt
Amp
1277.250 Mhz
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PIP
Controller
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Receiver
DTMF
Decoder
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ATV Repeater
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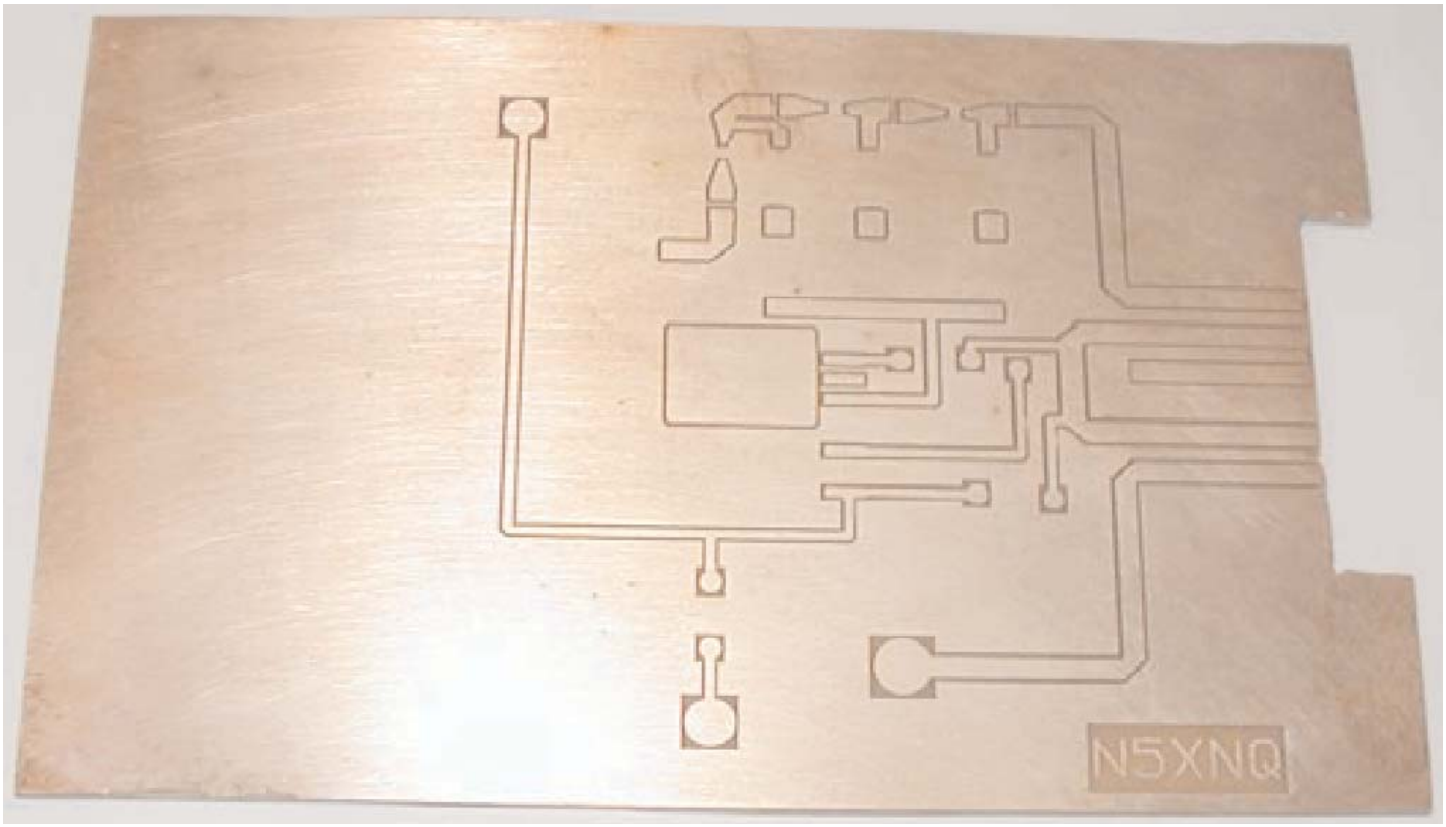


Exciter power amp board (homebrewed)

DCI 10 pole VSB filter

Repeater Installed

Starting at bottom
24 volt power supply
12 volt power supply
12 volt distribution panel
Power amplifier
Exciter (left) 1.2 GHz downconverter (right)
10 pole VSB filter
Repeater controller
2 meter receiver

AGAF e.V. DATV-Boards

developed at the
Bergische University of Wuppertal

Translation By Klaus Kramer, DL4KCK - Email: DL4KCK@t-online.de

supported by
AGAF e.V. and DARC e.V.

Instructions for starting-up

Autumn 2004

Version 1

1. Introduction and basic concept

The AGAF e. V. DATV boards are delivered as a kit. They are intended to enable an amateur to get operational quickly on DATV. Just a few things need to be done to get started. The boards use the European standard dimensions of 160 mm x 100 mm and fit into a 19" rack. They can also be mounted using standoffs from a chassis.

The boards provide the basic equipment necessary for a DATV station. The RF signal output, in the 70 cm band (434 MHz), is digitally modulated with compressed vision and sound. For experimental purposes it is possible to choose several digital modulation schemes and data rates. All modulation schemes are available except OFDM (DVB-T). Currently QPSK and GMSK are most appropriate for amateur use.

The 70 cm output can be fed to a power amplifier and transmitted directly in that band provided that the total RF bandwidth is within agreed limits. Up-converters can be used to enable transmission in the GHz bands.

The **QPSK** (Quadrature Phase Shift Keying) modulation is in accordance with DVB-S standards. This enables inexpensive free to air DVB-S set top boxes to be used for reception. They can be tuned directly to frequencies in the 23 cm band and then carry out error correction and MPEG decoding. DVB-S transmissions on other amateur bands may be received using a frequency converter in front of the set top box.

A significant disadvantage of QPSK modulation for amateur use is the need for linear amplification. Additional amplitude modulation introduced by amplifiers having inadequate linearity causes broadening of the signal spectrum which can cause interference to services on adjacent channels. This problem may be reduced by derating amplifiers to operate well below their maximum output.

As digital satellite set top boxes have no echo-equalizers, multipath propagation on terrestrial paths could, in theory, cause problems. Intensive field tests by DB0KO and test transmissions during HAM-Radio in hilly terrain have however shown that this problem can be overcome in most cases by using antennas with high directivity.

GMSK (Gausian Minimum Shift Keying) performs very well. As it uses a constant modulation envelope the spectrum does not become broader with non-linear amplification (similar to FM). This enables non-linear amplifiers as are used for FM ATV to be employed for DATV. The disadvantage of GMSK is the need for a special receiver. Such a receiver has been developed and is working as a prototype. The first DX field tests (> 100 km) have clearly shown the advantages of GMSK.

2. Getting started

The kit as delivered consists of two boards, the MPEG-encoder and the exciter. It is recommended that the user read all instructions before connecting any signals or power.

2.1 DATV-MPEG Encoder Board (Fig. 1)

analogue signal inputs:

- CVBS: PAL / NTSC
- Y / C
- audio right
- audio left

digital signal outputs:

- MPEG transport stream: connector JP1 (PECL)
- MPEG transport stream: connector JP2 (PECL)

supply voltage: 12 V DC (ca. 11 V to 14 V), stabilized and decoupled from impulse noise

- + 12 V at JP1
- GND at JP2

Wires may be soldered to the delivered connectors; a built-in protection circuit prevents the board from damage due to accidentaly applied inverse voltage polarity.

- lower operating voltages are derived from 12 V by voltage regulators and are connected to the related circuit parts via jumpers.

  - + 5 V (linear regulator): JP4
  - + 1,8 V (switch mode) : JP3
  - + 3,3 V (switch mode) : JP10

The current values given in the diagram are standard values; the actual currents depend on the operating mode chosen. As delivered these jumpers have standard settings.

Jumper settings:

The choice of the video input signal (PAL or NTSC, CVBS or Y/C) and the presets of the Bit rate of the elementary stream and of the Bit rate of the transport stream are set by jumpers. These jumpers might be replaced by suitable plugs, connected to toggle switches by twisted lines thus enabling the adjustments from the front panel of a cabinet.

The given positions of the jumpers are valid for the software version 1, which is loaded to the board when delivered. The positions of the jumpers when delivered are marked with (standard). For operation a jumper must be set to position 3 of the connector JP6.

The choice of the analogue video signal and the adjustment of the Bit rate of the elementary stream

Jumper connector JP5 X = jumper in position
0 = jumper not in position

position	jumper	function	remarks
8	0	NTSC	
8	X	PAL	(standard)
7	0	Y/C	
7	X	CVBS	
		Data rate of the elementary stream	
6	0	1,5 MBit/s	
5	0		
6	0	3,0 MBit/s	
5	X		
6	X	4,5 MBit/s	
5	0		
6	X	6,0 MBit/s	(standard)
5	X		

Adjustment of the data rate of the transport stream

Jumper connector JP9: one jumper set only

Position:	1	2	3	4	5	6
						optional external Clock (right pin)
Data rate of transport stream: MBit/s	27	13.5	6.75 (standard)	3.375	1.6875	

The data rate of the transport stream has to be chosen to be higher than the data rate of the elementary stream; the difference is filled with zero packets in the transport stream.

Having switched on the supply voltage the MPEG-encoder IC MB86391 is programmed by the micro controller MB90F591 according to the jumper settings (power on initialization). With the software version 1 this procedure lasts about 10 seconds, the red LED1 flashes 10 times and then goes out. Depending on the choice of the analogue input signal the green LED2 (Y/C) or the green LED3 (PAL/NTSC) are switched-on permanently. This indicates that the MPEG encoder is ready for operation.

With software version 1 the start procedure may fail occasionally; in this case the red LED1 lights up permanently. This problem can be solved by restarting the initialization procedure by switching off the 12 V power supply and on again after a few seconds.

After every change of the jumper settings a new initialization must be initiated by switching the 12 V supply off and on again.

2.2 DATV – Exciter (Fig. 2)

signal input: MPEG transport stream via connector J2 (PECL)

signal outputs: SMA - connector

- RF out 434 MHz
- IF out 44 MHz
- LO out 478 MHz

The transmission of the MPEG transport stream from the MPEG encoder (e.g. from connector J1) to the exciter (connector J2) is carried out via the flat cable supplied. Pin 1 (black square) of the MPEG encoder output connector corresponds to pin one of the exciter input connector (black square). The connection of the flat cable has to be made so that the colored line on both sides is connected to pin 1.

Warning: the transport stream input of the exciter is voltage-sensitive, higher voltages than 3.3 V could destroy the FPGA; therefore please do not connect standard TTL signals and PC outputs. The amplifier connected to the RF output must not oscillate; the output amplifier of the exciter could be destroyed.

Supply voltage: 12 V DC (about 11 V to 14 V), stabilized and decoupled from impulse noise

- + 12 V at JP1
- GND at JP2

- wires may be soldered to the delivered connectors; a built-in protection circuit prevents the board from damage due to accidentaly applied inverse voltage polarity.
- lower supply voltages will are derived from 12 V by voltage regulators and are connected to the respective circuit parts via jumpers.

- + 7,5 V (linear regulator) : JP3
- + 3,3 V (switch mode) : JP4
- + 1,5 V (switch mode) : JP5

The current values given in the diagram are standard values, the actual current depend on the operating mode chosen depend each on the operating state adjusted. As delivered these jumpers have standard settings.

Jumper settings:

The choice of the digital modulation scheme, the data rate and the symbol rate, respectively, as well as the FEC (forward error correction) is set by jumpers or by respectively connected switches on the front panel.

The positions of the jumpers apply to the software version 1 loaded with delivery.

For the adjustment of the various transmis sion modes connector JP7 is used only

X = jumper in position; 0 = jumper not in position; (standard) marks the settings with delivery.

Position	jumper	function
1	0	GMSK 2 MBit/s, QPSK 4,167 MSymb/s (standard)
1	X	GMSK 5 MBit/s, QPSK 7,5 MSymb/s
2	0	GMSK
2	X	QPSK (standard)

	Forward Error Correction					
	1/2	2/3	3/4	5/6	6/7	7/8 (standard)
3	0	X	0	0	X	0
4	0	0	X	0	0	X
5	0	0	0	X	X	X

The data rate of the exciter must always be set to be higher than the data rate of the transport stream of the MPEG encoder. In the FPGA the MPEG transport stream first is split up again and zero packets are inserted according to the higher transmission data rate and the FEC chosen. The digital modulation, with software version 1 both GMSK and QPSK, are digitally generated at 44 MHz with a 125 MHz clock and 14 Bit resolution.

The D/A-converter delivers the analogue IF signal as two push-pull currents, which are lead to a transformer in the IF/RF processing unit (fig. 3). The RF-power adjust potentiometer controls the analogue output of the D/A converter. With delivery the RF output on 434 MHz is adjusted to about 0 dBm in QPSK - and about 10 dBm in GMSK-mode.

The IF-signal and the LO-signal are both available in an attenuated form for experiments.

The optional connectors, shaded parts in Fig.2, are used for additional features of further developments.

2.3 Explanation of the settings of the data rates of the MPEG encoder and the exciter as delivered (standard settings):

The data rate of the elementary stream defines the maximum possible image quality at the receiver. The image quality with 6,0 MBit/s is approximately equal to the image quality of digital broadcast television. The data rate of the transport stream is set to 6,75 MBit/s; the difference to the data rate of the elementary stream is increased by the data rate of the mono and the stereo sound signal, respectively and by zero packets. The exciter accepts the transport stream of the MPEG encoder in an asynchronous mode, adds the FEC (standard 7/8) and inserts more zero packets; this results in a total data rate of 8,334 MBit/s. In QPSK 2 bits form one symbol; thus the symbol rate is 4,167 MSymb/s (in GMSK one Bit is one symbol; accordingly in this case symbol- and bit rate are equal).

3. Adjustments of a DVB-S Set-Top Box for standard operation, as delivered

The DVB-S Set-Top Box receives the QPSK modulated DATV-Signal directly in 23 cm band between 1240 MHz and 1300 MHz on the frequencies agreed for ATV or the DATV-signal is converted from another amateur bands to 23 cm.
Frequency programming of the DVB-S set top box:
Frequency in the 23 cm band + 10600 MHz (LO frequency of LNB) (for example: 1255 MHz + 10600 MHz = 11855 MHz (Frequency to be programmed))

Symbol rate: 4167
Video-PID : 33 (decimal)
Audio-PID : 49 (decimal)

4. Further developments

4.1 70cm/23cm Up-Converter

- The development is finished
- 50 Boards with SMD RLC components, semiconductors and mixer have been produced, for information about delivery contact AGAF e.V.
- common ordering of Helical-filters, tinplate boxes and SMA connectors: look at DATV forum of DD1KU
- circuit and print information is available at **www.datv-agaf.de**

4.2 70cm/13cm up-converter

- The development is finished, prototype works
- low volume production of boards is in preparation
- circuit and print information is available at **www.datv-agaf.de**

4.3 70 cm GMSK-receiver consisting of

- An RF/IF board (2.5 MHz and 6 MHz IF-bandwidth)
- A board for digital GMSK decoding and re-modulation in DVB-Son 1100 MHz to connect o a DVB-S Set-Top Box and a parallel, digital MPEG transport stream output to connect a MPEG decoder
- A prototype is working, DATV DX experiments over more than 100 km have been carried out
- low volume production is in preparation

4.4 MPEG Decoder board

- A first prototype is finished, but has to be tested

4.5 70cm front-end for DVB-S Set-Top Box

- For reception of narrow band DATV QPSK-signals on 70 cm
- A prototype is working
- low volume production is in preparation

4.6 23cm/70cm Down-Converter

- The first prototype is ready for test

4.7 Hard disk recorder for connection to the DATV-Exciter

- standard PC hard disk connected to optional HDD Interface
- controlled by PC user interface via PC parallel port
- recording and play back (transmission from hard disk) is working
- further developments for user-friendly operation are in progress.

4.8 Byte-Blaster II

-Hardware for downloading the system software from the PC to the DATV-exciter
-The prototype is working
-low volume production in preparation

4.9 Software Version 2 for MPEG-Encoder

- initialization phase shorter than 5 seconds
- Watchdog, which starts the initialization again in case of a malfunction in the start-up phase or in case of a malfunction during operation due to external distortions
- adjustments of the elementary and the transport stream data rates in 0,5 MBit/s) steps
- automatic detection and connection of the analogue input which has a valid video signal
- transmission of the software version 2 via internet and downloading to the MPEG-encoder has been achieved.
- Software Version 2 will be downloadable from **www.datv-agaf.de**
- description with new settings of the jumper positions is in preparation

4.10 Software Version 2 for DATV-Exciter

- this software contains more tables, so that practically all Set-Top boxes could be used for QPSK-reception.
- the software version 2 has also been sent via the internet and has been downloaded with the byte-blaster II to the exciter board.
- download of software version 2 will be possible from **www.datv-agaf.de**
- the description is in preparation

4.11 Software for reduced transmission bandwidth

Software for a lower data rate is in development, in particular aiming at RF-bandwidths of 1 MHz and 2 MHz for QPSK to be used on 70 cm.

4.12 OFDM Exciter for DVB-T

An OFDM exciter has been built and tested successfully in field tests
(see **www.datv-agaf.de**)
A cheaper version for DATV will be developed.

Notes:

- the finishing of the projects strongly depends on the available time of the participating amateurs and other assistants.
- the realization of a low volume production depends also on the financing

5. Development work and OM involved

The development of the DATV kit, the production, adjustments and shipping as well as further projects mentioned in 4., was and will be carried out by students and scientific assistants of the Department of Communications Technology at the University of Wuppertal and some amateurs, which are ideally connected to the Department and the DATV-project. These are Hans, DJ8VR (sk); Rudolf, DJ3DY; Willi, DC5QC; Klaus, DL4KCK; Heinz, DC6MR; Stephan, DM1SM; Adnan El-Bardawil (still unlis); Uwe, DJ8DW

The DATV kit has been developed and produced under an official cooperation agreement between the Bergische University of Wuppertal and the AGAF e.V. with ideal support of the DARC e.V.

6. Help with problems

Thanks to Uli, DD1KU for arranging a DATV forum on the internet for questions **www.dd1ku.de/DATV/Forum/datv/forum.html** and exchange of experiences, this forum is also linked to: **www.datv-agaf.de**

Ordering information from the AGAF e.V.
Heinz **dc6mr@t-online.de**

Answers to special technical questions:
Klaus **dl4kck@t-online.de** and Uwe **krausue@uni-wuppertal.de**

Thanks for the invaluable help by Ian Waters, G3KKD in refining this translation into good English.

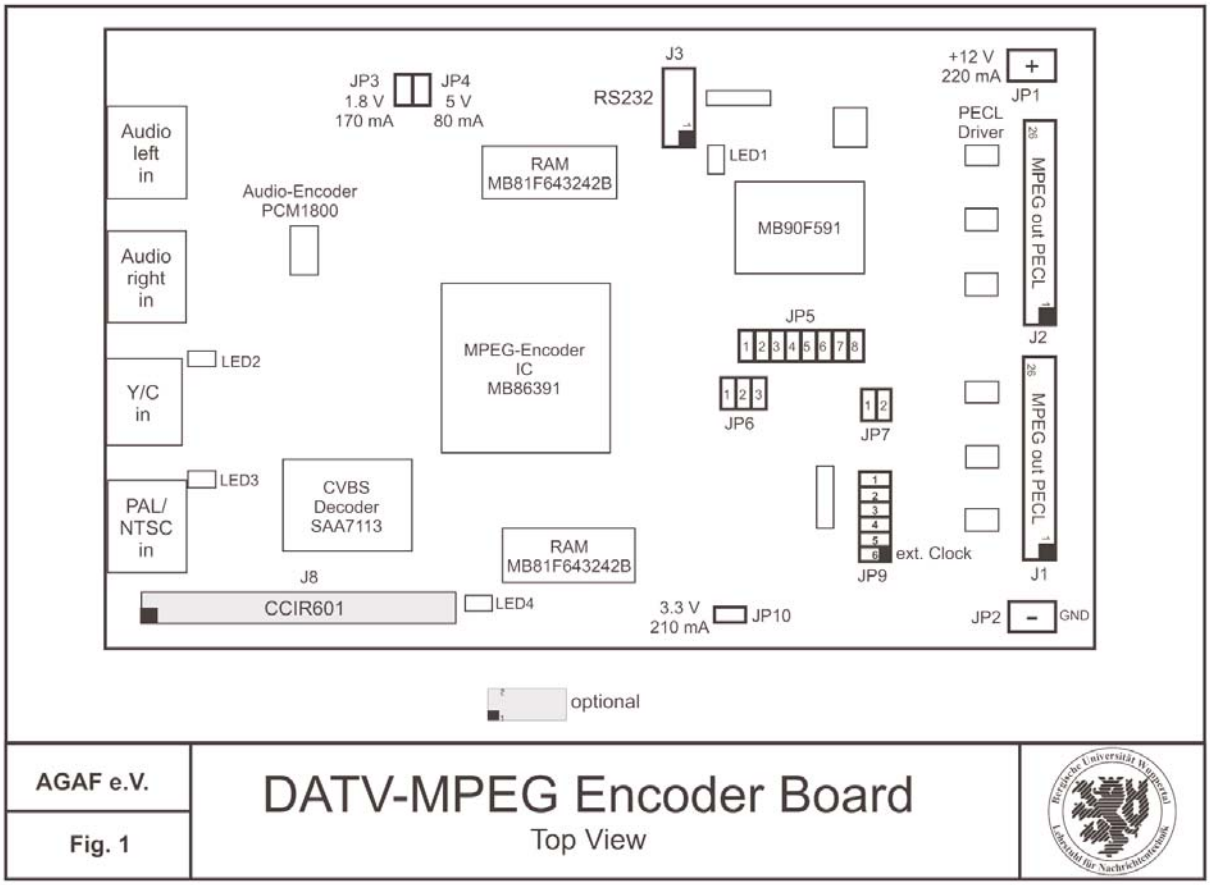
Autumn 2004

Uwe E. Kraus, DJ8DW / PA3ACY

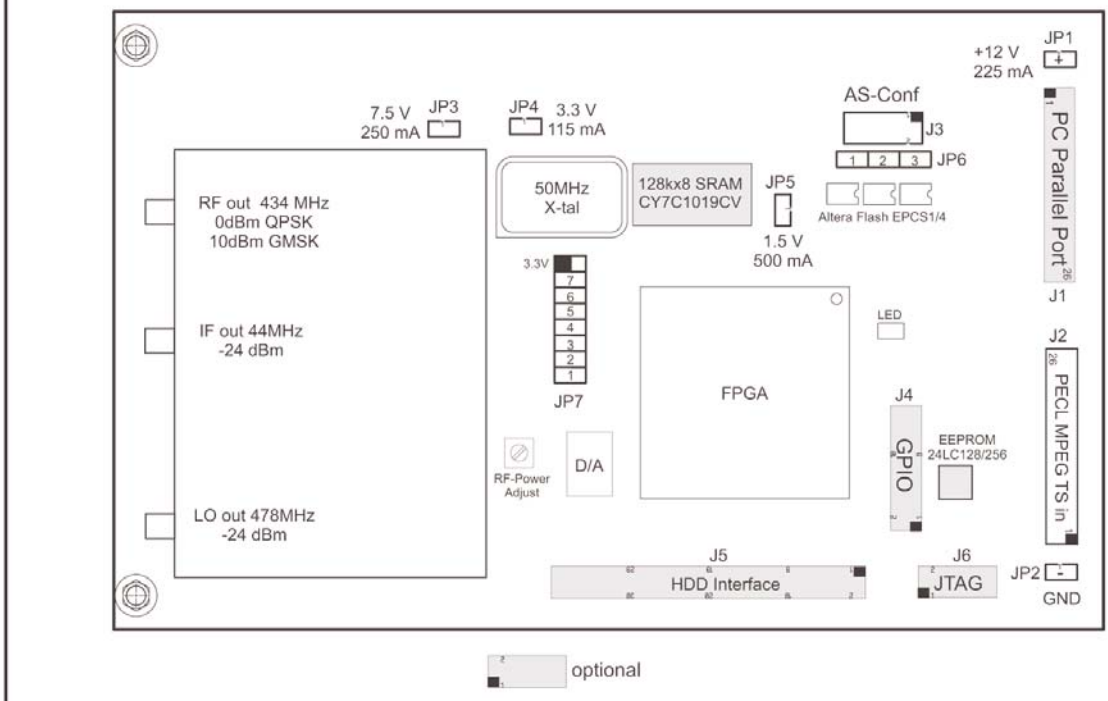
Addendum:
Top views of Encoder and Exciter Board with jumper locations take from:
http://www.datv-agaf.de/DATV_Baugruppen.pdf

Subject to change without notice

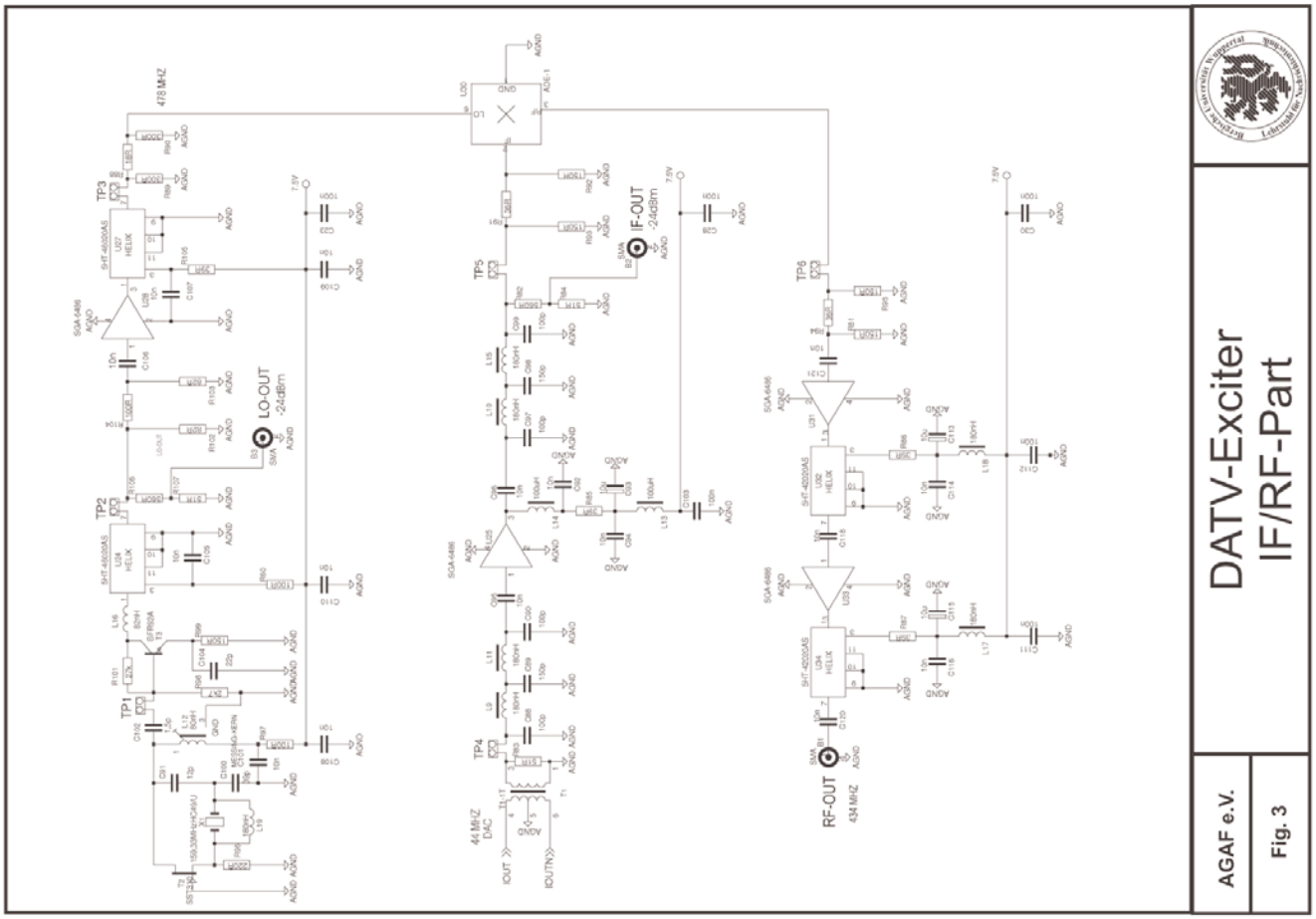
ATVQ

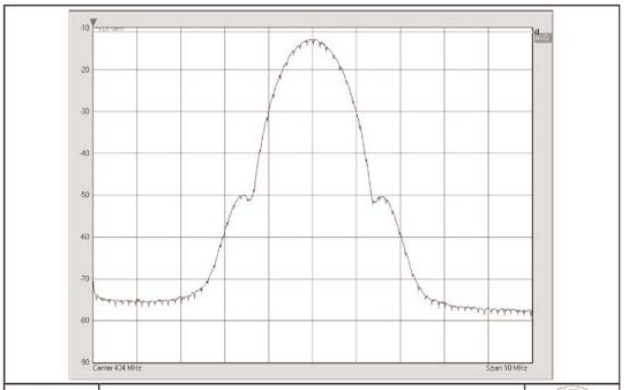


AGAF e.V.	DATV-MPEG Encoder Board Top View	
Fig. 1		

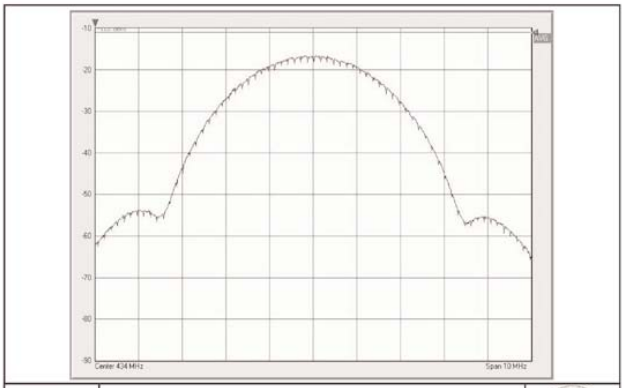


AGAF e.V.	DATV-Exciter Board Top View	
Fig. 2		

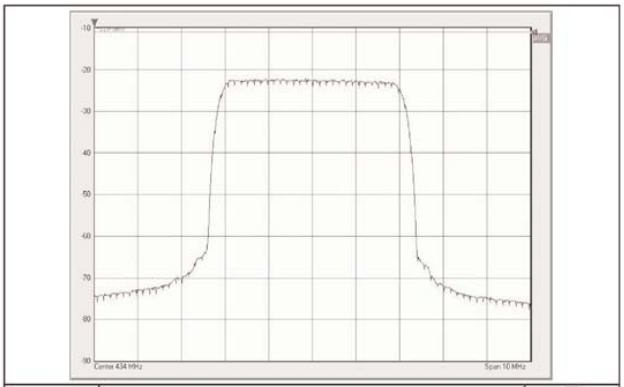




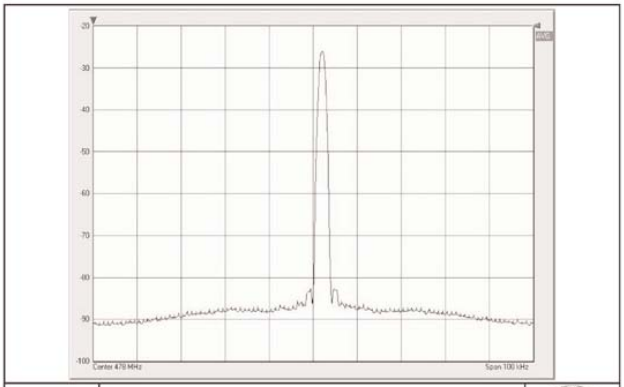
AGAF e.V. | Fig. 4 | Spectrum GMSK ca. 2MBit/s



AGAF e.V. | Fig. 5 | Spectrum GMSK ca. 5MBit/s



AGAF e.V. | Fig. 6 | Spectrum QPSK 4,167MSymb/s



AGAF e.V. | Fig. 7 | Spectrum LO 478 MHz

The ATCO ATV Repeater Goes Digital!

By Art Towslee - WA8RMC - Email: towslee1@ee.net
180 Fairdale Ave.
Westerville, OH 43081

The Amateur Television in Central Ohio Group (ATCO) has just installed the first digital ATV repeater output in the United States (to the best of our knowledge, we are the first, but I'm sure we will not be the last). I firmly believe we started what will become a fast transition to Digital Amateur Television in the United States in the very near future. Prices are falling and the complexity is getting simpler so I'm sure a number of US manufacturers will have digital offerings soon. There's been a great hesitation by many to venture into this technology because it has not been very stable until now. That is, there is a great deal of formats available and the selection of the wrong one for ATV would most certainly render the chosen scheme obsolete. That would be quite costly for most amateurs to shoulder so, quite naturally, most have been waiting for someone else to do the pioneer work and spare them the research expense. We too have been quietly watching various schemes appear and been rejected for one reason or the other. Quite notably, the groups in Europe are the ones on the cutting edge of this frontier so we now learn at their expense. I don't know why, but it seems that to date, the Germans and the Dutch ATV'ers are the most advanced and willing to experiment with various integrated circuit chip sets. Maybe they are willing to experiment more or perhaps they have more ATV'ers involved in digital TV professionally. I don't know for sure at this time but one thing is certain, we are very grateful for their efforts to keep the ball rolling. For if it were not for them, the ATCO group would still be watching for cost effective developments. They have chosen DTV-S over the DVB-T and DVB-C formats as best for ATV use and I agree. More is explained in the text below.

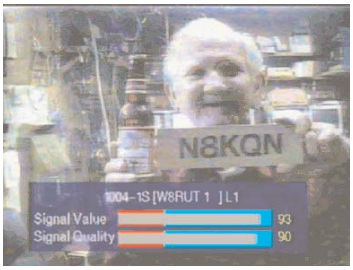
To my knowledge, there are at least two groups experimenting with digital television in Europe. In Germany, the German Amateur Radio Club associated with professor Uwe Kraus, DJ8DW, at Bergischen University of Wuppertal has designed and built 434 MHz 8-VSB transmitters (DVB-T) and receivers with the help of engineering students. We have had one of their units for a year now but have lacked sufficient documentation to properly configure it until now. We will test it in the very near future. In the meantime, a Dutch group in the Netherlands developed their own design with very good documentation so we zeroed in on their design for implementation here. Details can be seen on their web site at **http://www.d-atv.com**. We purchased that unit which is the DVB-S format, packaged it, installed it at our repeater on Sunday, January 9, 2005 and began experimenting (DVB-T, DVB-C and DVB-S will be discussed later in this text).

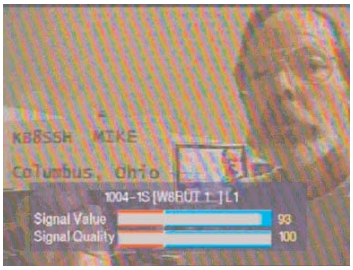
Our complete digital transmitter consists of an MPEG-2 encoder board approximately 4" square, a baseband board also 4" square, and an RF modulator board about 2.5 x 4". The 1260 MHz QPSK modulated RF output from the modulator board is about 1.8 milliwatts which drives a Downeast Microwave linear brick amplifier to the 1 watt level. It has been said that very linear RF amplifiers are needed here to minimize the error rate so we have a high linearity amplifier on order but not here yet. In the meantime the Downeast Microwave brick amp seems to perform just fine even though it is not classified as a "true high linear amplifier." The one watt output is finally fed to a Diamond 12 DBd gain omni antenna through 25 feet of 1/2 inch Heliax located 650 feet above street level. The result was reception by 5 people (2 of them mobile) up to 22 miles away on the first day of operation! They were anxiously waiting for Ken, W8RUT, and I to complete the installation.

The following D-ATV'ers had receive capabilities at that time and 15 more ATCO ATV'ers now have digital receivers operational. All involved are quite excited about this new mode of operation. Ken, W8RUT, 5.5 miles (also mobile), Art, WA8RMC, 11 miles, John, W8SJV, 22 miles, Mike, KB8SSH, 5.5 miles (also mobile) and Jay, KB8YMQ, 16 miles. Later Stan, AA8XA, joined the ranks of the mobile DATV'ers.

During our limited tests so far, we have noted some significant operational features. First, the mobile operators noticed the lack of fading as they drove around the city. The picture stayed crisp and steady. Second, the usual analog rolling from irregular sync signals sent to the repeater are now reconstructed as stable crisp signals. Also, color is constant. No more do we have to report, "perfect P5 picture but no color". The sometimes weak color burst is now regenerated to standard levels. At this time, we DO have some unusual pixilation effects that seem to come and go even though the receiver reports 90% + signal and 90% error free quality levels. My receiver, at times, powers up in a locked "signal capturing" mode for some strange reason. A power down and up sequence usually restores it. Another strange effect is that the received signal is delayed for up to 2 seconds after the analog signal arrives (we also have a 1250 MHz analog ATV output). When the monitors are side by side, I can wave at myself and see an instant response in the analog signal while the digital signal waves 2 seconds later. Strange! I commented that a number of us could check out their own head bald spot by turning quickly while staring into the camera! Much more fun is to come, I'm sure, with our new "play toy."

Below is a spectrum analyzer glimpse of the 1260 MHz signal received at W8SJV's QTH 22 miles away. Note that the repeater





1250 MHz 35 watt analog signal is the stronger waveform on the left portion of the spectrum analyzer. That compares to the 1 watt digital signal on the lower right. For the record, both antennas are the same gain, at the same height and located about 10 feet from each other. The bottom picture is what the signal looks like on his monitor. Note the signal bar graphs at the bottom, which is receiver selectable.

Ken and I will have much more to report at the Dayton Hamvention Saturday forum so stay tuned! Next is Ken's further analysis of our equipment followed by an attempt to explain in simple detail what D-ATV is, how it operates and the three basic standards in use today. Bear with us if we misspeak for we too are just in the learning process.

...Art, WA8RMC

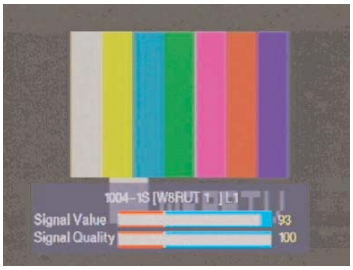
ATCO DIGITAL AMATEUR TELEVISION... ON THE AIR!

On January 9, 2005, the ATCO ATV Repeater, WR8ATV, was up-graded by W8RUT & WA8RMC with a Digital-ATV (D-ATV) output running QPSK (DVB-S) on 1260 MHz. Among the first to see the new D-ATV output as soon as it came on for the first time was KB8YMQ (16 Miles), W8SJV (22+ Miles) and KB8SSH (6 miles). Leaving the repeater site after installation, W8RUT/mobile watched the D-ATV output all the way home (route of 6 miles). All receiving stations were using Free to Air (FTA) satellite receivers.

We believe we're the first United States ATV repeater, and maybe all of the America's, to start-up D-ATV on an amateur repeater. In addition, it is reported that we may be the first in the world to have mobile D-ATV reception.

The addition of the D-ATV output comes after two and half years of planning and waiting for components. The new output, running only one (1) watt of power as of this writing is built from D-ATV modules supplied by Spectra BV in Holland.

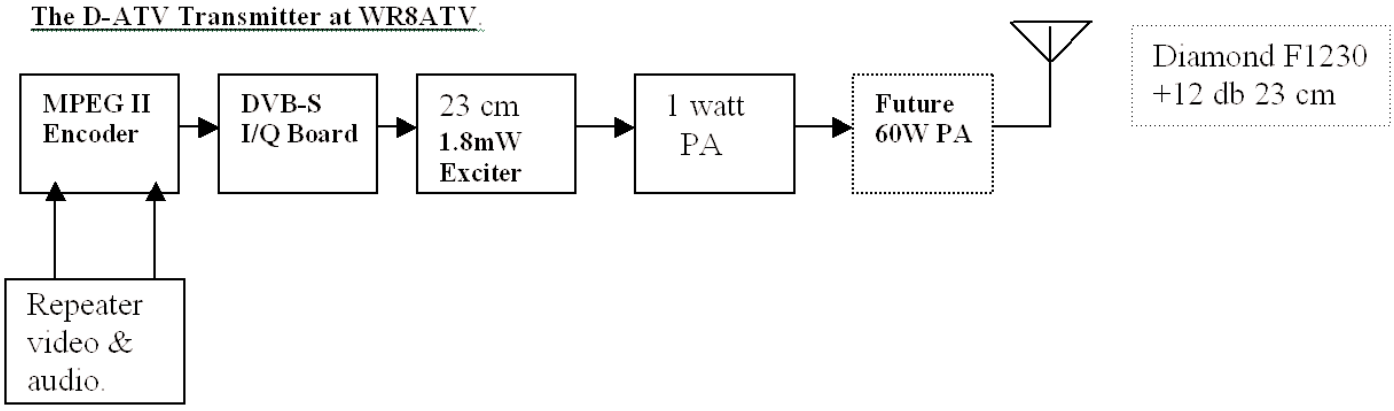
All of the reports received on that first day were P5+! Given the nature of D-ATV, we have since informally updated the signal reporting standard to "Yes and No!" meaning Yes, I see it!... or.... No, I don't! The P reporting system may soon be obsolete! For those stations that are already capable of receiving the 1250 MHz FMATV repeater output, they only need to add a "Free-To-Air" (FTA) DVB-S compliant satellite receiver to their existing 23-cm antenna to receive D-ATV from the repeater. In fact, some stations loop the antenna to both their analog satellite Rx and their DVB-S Rx to watch both outputs at the same time with one antenna. We now have about 20 stations in Central Ohio equipped to see the D-ATV output from the ATCO repeater, WR8ATV.



The D-ATV Transmitter at WR8ATV

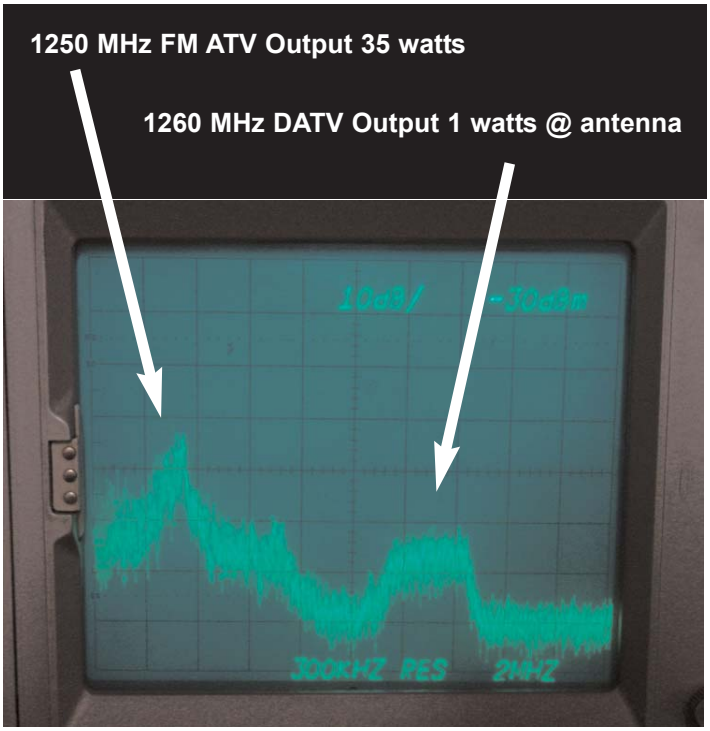
The current D-ATV exciter/PA was received from a European supplier in early December 2004. A number of point-to-point tests and configurations were explored by W8RUT while WA8RMC packaged the modules to be integrated with our existing repeater. Most of this work and learning (a lot new to learn with D-ATV!) took place over the Christmas holidays.

The basic exciter is a 3-board set including the MPEG 2 encoder, the DVB-S I/Q board and the



23-cm synthesized exciter which is capable of operating anywhere in the 23-cm band. The exciter set of PCB's is configured via an RS232 link to a PC with a very capable supplied configuration software application.

Given the complex waveform of QPSK, power amplifiers need to be very linear as not to distort the QPSK signal decoded by the digital receivers. The only PA available in my shack was a 10 mW in/3 watt out power amplifier using a M67715 hybrid brick from Downeast Microwave. Looking at the specs, this PA it appeared likely not linear enough for DVB-S service, but we tried it and it works! The secret is to operate it at very low output levels so it stays well inside the linear portion. The advice we're given is to stay 6-9 dB inside the 1 dB compression points of the device. Stations over 22 miles away from the repeater site report strong signals as shown on the spectrum analyzer picture from W8SJV. With 1.8mW from the exciter, the PA has an output of just over 1 Watt. We may have, by dumb luck, found the sweet spot of this PA to run in DVD-S service! More tests are required to confirm this.

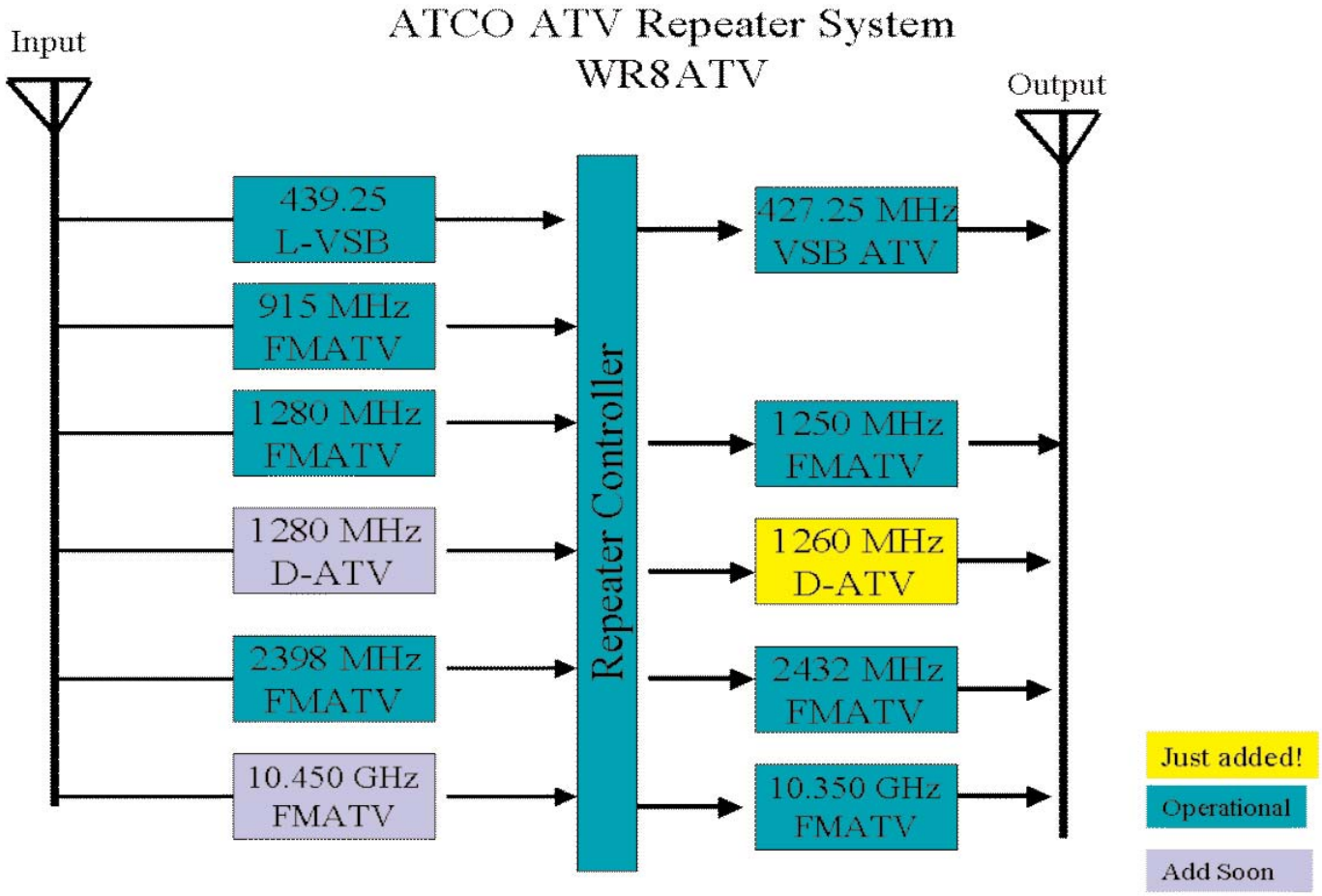


Our target level of power out is 60 watts of D-ATV on 23 cm. With a 10 dB gain antenna, located 650 feet above street level, the signal should cover most of central Ohio. Since all of our WR8ATV repeater transmitters 70 through 10 GHz cover central Ohio, we have confidence to expect our D-ATV signal to do as well.

Receiving D-ATV

One of the main reasons for selecting Quadrature Phase Shift Keying (QPSK, a.k.a. DVB-S) as our ATCO D-ATV standard was the relative inexpensive receiver availability. Selecting 8-VSB/ DVB-T (Terrestrial) or QAM (DVB-C) would have been more difficult and expensive for stations to acquire receiving equipment ready to use in the amateur service. We do have a transmitter capable of 8-VSB running on 70 cm, but that will be another project!

Receivers for DVB-S are from the "Free to Air" service normally used in C and/or Ku band down links from satellites. THIS IS NOT TO BE CONFUSED WITH "DirecTV OR DISH NET-



WORK - they use another standard, not compatible with DVB-S. Receivers for DirecTV or DishNetwork will not work with our D-ATV repeater output. The most popular receiver in service by our ATCO members are used receivers purchased from a broker on eBay for $59 delivered. I understand this broker has well over 1,000 available for sale! N8IJ has been able to make a group purchase to get the price in the $50 range, delivered. The receiver comes with a power cord and a remote. The user manual can be down loaded from his website or his eBay listing.

Once the receiver has been acquired, connect the Sat-Rx to a monitor. If the picture is rolling or only in B/W, make sure the Sat-Rx output is NTSC - use the "next" button on the remote. Go to the set up menu via the remote: Enter the following numbers:

LNB L.O.	10750000	KHz
Down link Frequency	12010000	KHz
Symbol rate	3125	K/bits
LNB Power	None*	

* No preamp set to zero/or 14V if preamp
The other configuration choices set to off.

Our output frequency on the repeater is 1260 MHz. To set the receiver to receive 1260, you need to tell it it's connected to an LNB transponder with a frequency of 12.010 GHz. and a local oscillator of 10.750Ghz. (Or any L.O. and received frequency as long as the difference equals 1260 MHz)! These numbers are entered as KHz so that is why all of the extra zeros!

The symbol rate of the transmitter was set at 3.125 M/Bits, which is about a 4 MHz total bandwidth. I used a highly analytical approach to select this symbol rate that I will not repeat here. The other parameters such as FEC (Forward Error Correction) the Rx will automatically adjust for them.

After configuration, connect your 23-cm antenna via the "F" connector and look for the signal! Pressing the "info" on the remote will put an on-screen signal level and signal quality display as an overlay to the repeater output. Any values over 30% is OK for signal level. If you don't get a picture at first, select info anyway and it may give you a hint of the problem.

So what's next? We are early in the D-ATV game so there are only three main things;
1. Learn a great deal more about D-ATV!
2. Up-the power of the repeater D-ATV Tx to about 60 Watts.
3. Install the repeater's D-ATV receiver. At this point we are planning to put it on the same frequency as our FMATV input-1280 MHz and connect it to the same antenna system.

Items #2 & #3 are easy to do (we already have the Rx for the repeater); item #1 however, will take a lot more time!
...Ken, W8RUT

DIGITAL AMATEUR TELEVISION "SIMPLIFIED"?

The following material has been compiled and edited with the aid of the descriptions at the Dutch ATV web site along with my verbiage to hopefully make it easier for the beginner. The complete unedited text may be seen at the Dutch Amateur TV web site **http://d-atv.com**. WA8RMC

A New Standard For Amateur Television

Digital Amateur Television, formally known as D-ATV, is growing in popularity. D-ATV is based on the Digital Video Broadcast Satellite standard, developed by the DVB organization. The Dutch team has designed a digital modulator according to the DVB-S standard for amateur and professional purposes. The design and construction of a digital ATV transmitter is far too complex for most of us but many of us will now start exploring this new area of our hobby. More and more ready built D-ATV transmitters will be sold in the near future including the Dutch design. Therefore it is important to be aware of the advantages, disadvantages and inherent problems with this new digital modulation scheme.

The following should give you more insight with a more or less theoretical description of the different modulation techniques and the inherent problems. Some knowledge must be present among us when we use digital video transmissions in the future. Furthermore we will discuss some of the different professional standards that currently exist for digital video broadcasting (DVB-S, DVB-C and DVB-T) and the possibility for using these standards for amateur purposes.

DVB-T

The DVB-T standard was developed for terrestrial digital television communication and is presently in use by US broadcast television stations for digital and HDTV known best as 8VSB modulation (8 quadrant Vestigial Sideband). The aim is to overcome the destructive effects of multipath reflections from objects in the signal path such as buildings and towers, which produce "ghosts" in the picture of analog transmissions. In digital television transmission, the data rates are very high so multipath reflections will normally be even higher resulting in a partly distorted received signal. Also, the multipath reflections cause Inter Symbol Interference because reflections of the received signal interfere with the direct received path. Nevertheless, higher bit rates (symbol rate) produce higher negative effects so, to overcome these disturbances for DVB-T the effective bit rate is spread out over a large amount of digitally modulated carriers. The larger the amount of carriers produces lower effective bit rates for each carrier. The lower the effective bit rate per carrier, the lower the negative effects of multipath reflections which is the basic idea behind DVB-T. This produces a very complex signal so it is the hardest to reproduce and most expensive because it requires very high speed parts. It's necessary for broadcast TV but not practical for amateur purposes.

DVB-C

The DVB-C "standard" was developed for cable digital television transmission using QAM modulation. A cable environment is a relatively protected environment with respect to distortion and signal path attenuation so a higher signal to noise ratio can be achieved. Also, because there is no negative effect from multipath, it is able to implement higher order modulation schemes. DVB-C generally requires higher signal to noise ratios at the receiver side due to the higher order modulation schemes. Because of minimal error correction, it is more susceptible to multipath reflections. This is one reason why DVB-C is not preferred for Digital Amateur Television. It's too bad because it's the easiest and cheapest method. Also various cable companies that use 8VSB or QPSK implement DVB-C in a variety of forms so no one uses a common standard. No surprise here because each cable company wants you to use THEIR set top box and not the competition. Therefore a cable box for one cable company will not necessarily work for another. We wouldn't want to become a part of this fiasco!

DVB-S

The DVB-S standard is developed for satellite digital television transmission using QPSK modulation (Quadrature Phase Shift Keying), which is a type of FM modulation. Why do we recommend D-ATV use the commercial DVB-S standard? A DVB-S digital system has some distinct advantages and also some disadvantages.

One of the main advantages of a digital ATV system is the fact that picture quality is improved above that of most analog systems. We do not encounter the negative effects of noise. We do not encounter video group delay problems; an item on which much attention has been paid by lots of amateurs and audio quality is improved. With digital ATV we get high quality audio channels and these high quality audio channels don't disturb picture quality!

Another advantage is it does not extend the occupied bandwidth of our signal, something that is the case with analog where we need some FM modulated audio carriers above our video signal. Other main advantages are the fact that analog ATV systems occupy a lot of bandwidth. A wide occupied bandwidth means several disadvantages among which are less room for others to communicate and a higher noise bandwidth.

The first item is clear. We want to be as efficient as possible. If this can be done without throwing away any quality then this is good. If we can improve quality with less occupied bandwidth then we have even more benefit! The second item is also very interesting. The higher the bandwidth the higher the received noise level will be at the receiver because noise is integrated over bandwidth. Some digital modulation schemes are able to demodulate at lower threshold levels than possible with analog FM ATV systems. One of them is for example QPSK. With QPSK we are able to occupy less bandwidth and also make use of lower thresholds. This means that we can get more out of

Thanks!

It is with sadness and pleasure that I tell you that ATVQ had more articles submitted that we had room for, even after expanding by eight pages. So, in the next issue we will have, among other articles:

Science Projects for Kids by Heru Walmsley, W3WVV

More On Transmission Lines by Heru Walmsley, W3WVV

The Poor Man's Digital ATV Transmitter
by Jean-Francois Fourcadier, F4DAY
translation by John Jaminet, W3HMS

FCC Denies Station Request to Cease Analog Broadcasts
by Henry Ruhwiedel, AA9XW

DBs for the Math Challenged!
by Henry Ruhwiedel, AA9XW

And there are more. But don't stop writing! We always need new and fresh material. If we can get more advertisers, we can add more pages as needed.

Also, check out our newly designed web page. I hope you find it easy to move around and find what you need.

Thanks for your support!

Gene - WB9MMM

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such a system with less power, better quality and less bandwidth!

A satellite to earth system needs low threshold demodulation and a good signal to noise ratio so only QPSK can be used. QPSK is a very robust modulation scheme because it just has to make a decision in one of four quadrants. The low signal to noise ratio on the other hand will be a source for bit errors, both burst errors as single bit errors. To overcome this weakness, the DVB-S standard uses different layers of Forward Error Correction (FEC) for a very robust protection against any kind of errors. The FEC consists of a Reed Solomon coding that protects against burst errors and also additional convolutional interleaving to spread out the impact of burst errors. The convolutional encoding is better known among users of satellite television and is recognizable in a satellite receiver setup menu under the menu item FEC rate. The fact that satellite communication is basically line of sight communication without obstacles in the transmission path tells us that less attention is paid in this system on multipath effects. Therefore, the DVB-S standard will be moderate when it comes to robustness against multipath reflections.

Mathematically all these carriers are orthogonally spaced from each other with an Inverse Fast Fourier Transform (IFFT). It works like this: The incoming bitstream is encoded with Forward Error Correction blocks like Reed Solomon and convolutional interleaving and finally convolutional encoding. After the FEC the resulting bitstream is mapped on all the constellations for the separate carriers. The resulting constellations are the input for the IFFT processor block which performs the actual transformation from frequency to time domain. After the IFFT a cyclic extension is performed on the resulting OFDM symbol, which is used for the guard interval that gives additional protection against multipath reflections. The resultant complex output of the IFFT block can then be converted to RF with an I/Q modulator. There, did you get all of that? If not, don't be discouraged because you don't have to understand it to apply it.

There is still a large disadvantage left. QPSK using OFDM modulation requires very linear amplifiers surpassing the requirements of present SSB linear amplifiers. The large amplitude swings of the carrier will introduce very high intermodulation levels when the signal is non-linearly amplified. Although QPSK is quite robust and will still work correctly with quite high spectral re-growth levels, there is also a need to transmit a nicely shaped spectrum in order to be spectrally efficient. As stated before, D-ATV generally will need less power compared to FM TV techniques but this will not mean that the amplifiers need to be smaller! In fact, in order to keep spectral re-growth levels low enough, power amplifiers will need to be biased class A and the output drive levels need to be in the order of 7-10 dB below the 1dB compression point to keep spectral re-growth below -40 dBc. Commonly used class AB power brick modules will not work.

In summary, DVB-S has high error protection, uses very robust QPSK for modulation requiring low signal to noise ratios for proper demodulation and isn't the best choice against multipath. However, the fact that lot of foreign experiments ended with very positive results demonstrates that these negative effects are smaller then expected. Besides, a lot of cheap commercial satellite set-top boxes exist which is a major advantage so DVB-S is the best choice for D-ATV.

I hope I didn't bore you with the technical talk. I tried to simplify the process while giving an insight to the really complex nature of the overall process. No, you don't have to research the Inverse Fast Fourier Transform process to get a grip on what's going on but it's kind of nice to be able to say, "Yes, I've heard of that before. It's needed to encode and decode the digital TV process". End of story!
...WA8RMC

ATVQ

Digital Television 101 01010101 - FAQ's

By Henry B. Ruhwiedel, AA9XW - Email: A9XW@cs.com
Chief Engineer, WYIN TV
5317 W. 133rd Street
Crown Point, IN 46307

Thanks to K9KK for the questions and comments - k9kk@earthlink.net

1. What would you guess my real horizontal pixel resolution is on a 1080i signal.

A. The real vertical resolution is 1080i, as transmitted. The horizontal resolution would be 1820 pixels or less depending on everything between the source and you. The processors make pixels or delete them as mathematically necessary to achieve the desired pixel count. Resolution, however, depends on the actual original material. If it was not produced preserved and transmitted in 1080i it will be less. That also depends on if it was in 4:4:4 component format, or if they used a lower MPEG format such as 4:2:0 or 4:2:2 in the transport streams.

2. My satellite signal strength is a steady 95 to 100%. My local DTV over the air signal strength is a CONSTANTLY/RAPIDLY varying level and runs from 0 to 70%. Any idea why it is it is jumping around like that? My local over the air DTV reception is perfect. I'm just wondering why the signal strength jumps all over the place on ALL the local stations?

A. The number or bar graph on a DTV set is not signal strength, but signal quality. It is a rough mathematical representation of the BER (bit error rate)/1 (inverse). It is expressing the amount of equalization (ghost cancellation) it being used in any particular time period to compensate for fixed and mobile ghosts (such as from vehicles, air planes, air turbulence). 8VSB is still an AM signal! The Signal graph on your satellite receiver is actually a rough carrier to noise (C/N) number since it is an FM signal.

3. I'd swear that FOX's 720p (local over the air) airing of the Super Bowl was better than their airing of the previous playoff games.

Does this mean that the feed our local station was getting was better than normal?

Does it have anything to do with the amount of bandwidth that FOX and/or the local station is willing too pay for?

Are the networks/satellites/locals constantly playing with compression and does that have a noticeable effect on the picture quality?

My guess is that the above issues and others can have a considerable effect on the actual picture quality.

A. Most stations get their network and other programs via satellite, or local playback of tapes loaded on to tape machines or video servers for playout. Depending on the stations infrastructure, the signal could be well preserved from sat dish to transmitter, or it could go through any number of forms including analog along the way to insert local commercials, ID bugs, EAS crud, frame syncs, to time the signals, etc.

4. Can you direct me to any URLs dealing with HDTV and the issues I raised in question #3?

A. Subscribe to Randy Hofners HDTV column via TV Technology magazine. Also Doug Lung's **www.transmitter.com** (same source).

5. If something goes wrong at the station with HDTV are you as the Chief Engineer expected to fix it and/or do you request service help from the equipment manufacturer ?

A. Bits are bits. Being HD or not is inconsequential to equipment operation.

6. Do you determine & control how much bandwidth is allocated to the -1, -2, -3, etc., channels?

Do the -1, -2, -3 channels share the same antenna? Hmmm -- I bet that there is really only ONE transmitter for all the SUB channels, and that the digital information in the header or whatever you call it identifies what sub channel the digital info represents or goes to.

A. As they used to say on the original Outer Limits, "Do not attempt to adjust your TV set." We will control the horizontal, we will control the vertical, we can soften the image to a blur or sharpen it to crystal clarity." Each station decides what amount of the 19.3 mbits/sec to devote to each encoder (each encoder is for a channel). Which is then all used together to make one digital stream of 19.3 MBPS. Including all channel ID's program guides, and other data plus error correction. Standard def channels require 3 or more mbps each for a "NTSC" quality (using MPEG 2 encoding) and 11-18 mbps for HD.

8. I think,You mentioned in the article that the DTV transmitter is solid state, even the FINAL PA?

A. Yes, 24 parallel solid state amplifiers, each is rated at 1.5 KW but operates at 400 watts. each has 1 transistor pre-driver, feeding a two transistor driver, feeding 4, 4 transistor finals (16 devices), with 3 amps average per device. Provides up to 10 KW DTV average power which means 40 KW peak power (6 db). We run ours at just under 9 KW. It uses more power than a tube (IOT) of equal output, but is a lot more reliable!

720P vs 1080i. Yes each has different motion artifacts. The 1080i is an interlace picture, just like NTSC but with 540 lines per field, 60 fields per second. So motion is interfield vs. inter frame.720p is progressive scan, with 720 lines per picture and 30 field/frame per second. So you either get higher temporal resolution or higher spatial resolution, you pick. Typically the home HD display is only 1280 pixels wide, unless it is one of the really expensive models with full horizontal resolution. Also, while some think the flat screen (LCD etc) pictures are better than the tube pictures, it is because of the exaggerated black compression gamma. They actually have less resolution because the pixels have a nyquist effect to reduce the horizontal pixels by 30% while the tube can produce the full horizontal resolution, and has a more natural gamma (gray scale linearity). BTW, your sat signal is likely 1.5 mpbs or less on SD channels and typically 3-5 mbps on HD. They cheat on the number of gray scale levels, just look for the contours like we had in 8 level SSTV! I can often see another channel poke through in the blacks.

MISC COMMENTS

1. I agree with you that 1080i produces the best picture. Why there is a raging debate about 1080i Vs 720p mystifies me .

Technically 1080i has to be the best. During the NFL playoffs we watched and compared CBS-1080i to the FOX 720p from our local over the air stations They each have their own unique artifacts. CBS's grass seems to blur in fast action while FOX's grass creeps/moves under certain circumstances. As I sit here now and think about it, that sounds backwards, but that is my recollection. Both my wife and I felt that the CBS-1080i was better than FOX's 720p playoff game quality.

BUT that can be related to a ton of issues, I think.

2. My set top box has 3 F-connector inputs for Satellite, over the air, and cable.

3. Lived in a Chicago western suburb 23 years ago and worked WA9EUN and W9ZIH, and others on ATV. Sure was a lot of fun.

ATV here in Oklahoma is all but NON-existent. I really miss it.

ATV Secrets Volume I Closeout at Dayton

What? ATV Secrets has been the main books for the ATV community for years. Why would we close them out?

Because, ... drum roll ..... , we are working on replacement for ATV Secrets, both Volume I & II! The current sets are still available on CD and Volume I is still in paper form. But at Dayton, you can buy the Volume I for $3 (regularly $8.95). So, why not buy a bunch and take them back to your local club to hand out? Volume I still has good information about what is ATV about for those that are interested, or could be interested if pushed a little, and will give guidance as to how to get started.

ATV Secrets, Volume II, is being worked over, and while it still has great information (again, available on CD only as paper copies, yes ALL those that were printed, are gone), we are compiling new articles to be included. I will have plenty of help in deciding what goes in the new book, as several of you have agreed to assist. And I do thank you for that. ATV'ers really want a reference book that has the answers when you need it for the project that you are working on.

If you wrote articles for ATVQ, you may be asked, depending on what topics get chosen to be included, to review, rewrite, update, what you have written. I expect that this will take until the end of the year.

How else can you help, you ask? Send me an email stating you would like to reserve a copy when it is published. The response will help (along with advertising support) decide if it gets published on CD or paper. I would prefer paper, but I already have quotes and it is not cheap. So, send an email to **reserveSecrets@hampubs.com** and tell me that you will want a copy (est. $35 for paper). You will be contacted later when it is ready for final details. Thanks! Gene - WB9MMM

ATN Spring NEWSLETTER 2005

On the Air to Coast to Coast
W5ATN W6ATN W7ATN W9ATN K9ATN www.atn-tv.org
ATN Chapters & Presidents

ATN-AZ	ATN-CA	ATN-CAT	ATN-GA	ATN-IL	ATN-IN	ATN-NV	ATN-NM
Ron	Allan	Ron	Frank	John	Henry	Geoff	Earl
AE6QU	W6IST	K3ZKO	N4NFP	KA9SOG	AA9XW	KB7BY	N8TV

ATN NATIONAL MEETING:

Friday May 20th 6:30 PM at Tudy's Inn

Talk in is 144.34 MHz
If you would like to join ATN has a form available on line at **www.atn-tv.org** .

Come participate and meet your fellow ATV'ers from ATN chapters across the country.

Gene, WB9MMM, with the help of the contributing editors are still producing great articles in ATVQ magazine. ATVQ is a must read item for every ATV'er! Check it out at: **www.hampubs.com**

ATV at DAYTON 2005 Planned Activities:

The national meeting will be on Friday evening with state of the art ATV programs and prizes. Ron, K3ZKO, is getting the programs organized with exact details to be posted on the website in the near future. The ATNA/ATN dinner location in the past has been changed to Tudy's Inn, 3928 Colonial Glenn Highway, Fairborn, near Dayton.

Ron Cohen, K3ZKO, has booth number 236 for the club and so far two volunteers from his chapter. He has requested a list of volunteers from all ATN chapters to help man the booth and get the necessary passes to get in early before the Hara Arena is open to the public. Let's make this a share experience and promote the ATV mode and ATN. Please email Ron at **rcohen@voicenet.com** ASAP thank you!

ATN WEBSITE:

Don, KE6BXT, webmaster and now ATN-CA's new Vice President is keeping the website up to date. The ATV forum is getting more activity. Great work Don! Please email a digital photo of your ATV studio (shack) to Don at **ke6bxt@qsl.net** so it can be included on the website.

ATN-AZ NEWS:

Ron, KE6QU, a resident in both the AZ and CA chapters has been elected to the office of President at the winter ATN-AZ meeting. We had several ATVers attend and membership has doubled. Ron is working on getting more new members.

ATN-CA NEWS:

The winter meeting was well attended even in the poring rain that day. Allan, W6IST, was elected the new ATN-CA President and Don, KE6BXT, the Vice President.

Thanks to Jim, K6CCC, for running the Monday night Mt. Wilson ATN net, Roland, KC6JPG, and Dave, KA6DPS, for running the Tuesday night linked system ATN Net.

SANTIAGO:
Sunday following the ATN-CA meeting, Brian, WB7UBB, Beth, WB7WPJ, and Mike, WA6SVT, drove to Santiago Peak to install new updated software for the ID screens and perform preventive maintenance while Brian and Beth were in town. The lower part of the road was very muddy due to construction of homes and part of the road collapsed under a concrete drain ditch bursting Mike's new front tire (less than a week old). We got out and drove into town to replace the tire, making this trip one to remember.

OAT MT:
Allan, W6IST, worked on an audio problem with the link audio. The audio cable had a bad connection.

ATN-IL NEWS:

ROCKFORD:
Gene, WB9MMM, picked up a waveform monitor for the repeater. Gene has used it to more precisely set video and sync levels. Gene also found out that his own ATV transmitter had distortion to the video and he was now able get it set too!

Saturday ATV & SSTV Forums At The Dayton Hamvention 2005

SSTV FORUM
2:45 - 5:00 pm Saturday
May 21, 2005

Location: HARA complex
Meeting room 1

Moderator: Dr. Don C. Miller, W9NTP

Speakers:

Dr. Robert Suding, W0LMD
Slow Scan Television (SSTV) For Beginners

Louis McFadin, W5DID
SSTV IN OUTER SPACE (SUITSAT and ISS)

Dave Jones, KB4YZ
Comparison between digital SSTV systems

Mel Whitten, K0PFX
Introduction to WinDRM Software

For additions, changes, or corrections to this file contact Dave Jones, KB4YZ **djones@tima.com**

IVCA Meeting - Friday Night

The International Visual Communication Association (IVCA) meeting will be held Friday evening at 7 PM at the Best Western Executive Hotel, 2401 Needmore Road (intersection of I75 and Needmore, Exit 58). The speakers will be Dave Jones, KB4YZ; Barry Sanderson, KB9VAK; Tom Jenkins, N9AMR; Dr. Don C. Miller, W9NTP; Farrell Winder, W8ZCF; and Dr. Robert Suding, W0LMD. The talks will cover new software programs, comparison of SSTV systems, better and innovative uses of SSTV, SSTV web pages, and much more.

There will also be a general election of officers. Anyone is welcome to present a program on any SSTV related subject. Contact Don Miller, W9NTP, at **wyman@svs.net**.

ATVQ

Fast Scan Amateur TV Forum,
12:15 - 2:30 pm Saturday
May 21, 2005

Location: HARA complex
Meeting room 1

Chairman: Reuben Meeks, Jr. W8GUC
Asst. Chair: Jim Ashman, W8ASH

Moderator: Bill Parker, W8DMR

Speakers:

Ken Morris, W8RUT - "Introduction to Digital ATV, as applied to the WR8ATV Repeater"

The application of D-ATV to the Columbus, Ohio ATV repeater may be the first in the U.S. The gear selected, test trials, and results will be presented. Expected expansion plans declared.

Art Towslee, WA8RMC - "The Care & Feeding of a Comprehensive ATV Repeater"

Bands & frequencies choice, site selection, equipment and antenna types, power levels, transmission lines, and other critical issues.

Bill Brown, WB8ELK - "High-Flying ATV"

University Balloonsat - Carrying ATV to the edge of space.

Announcements by:

DARA ATV Repeater Status, KB8OFF
ATVQ, Editor, WB9MMM
ATCO, Editor, WA8RMC
ATNA Activities, K3ZKO

ATVQ

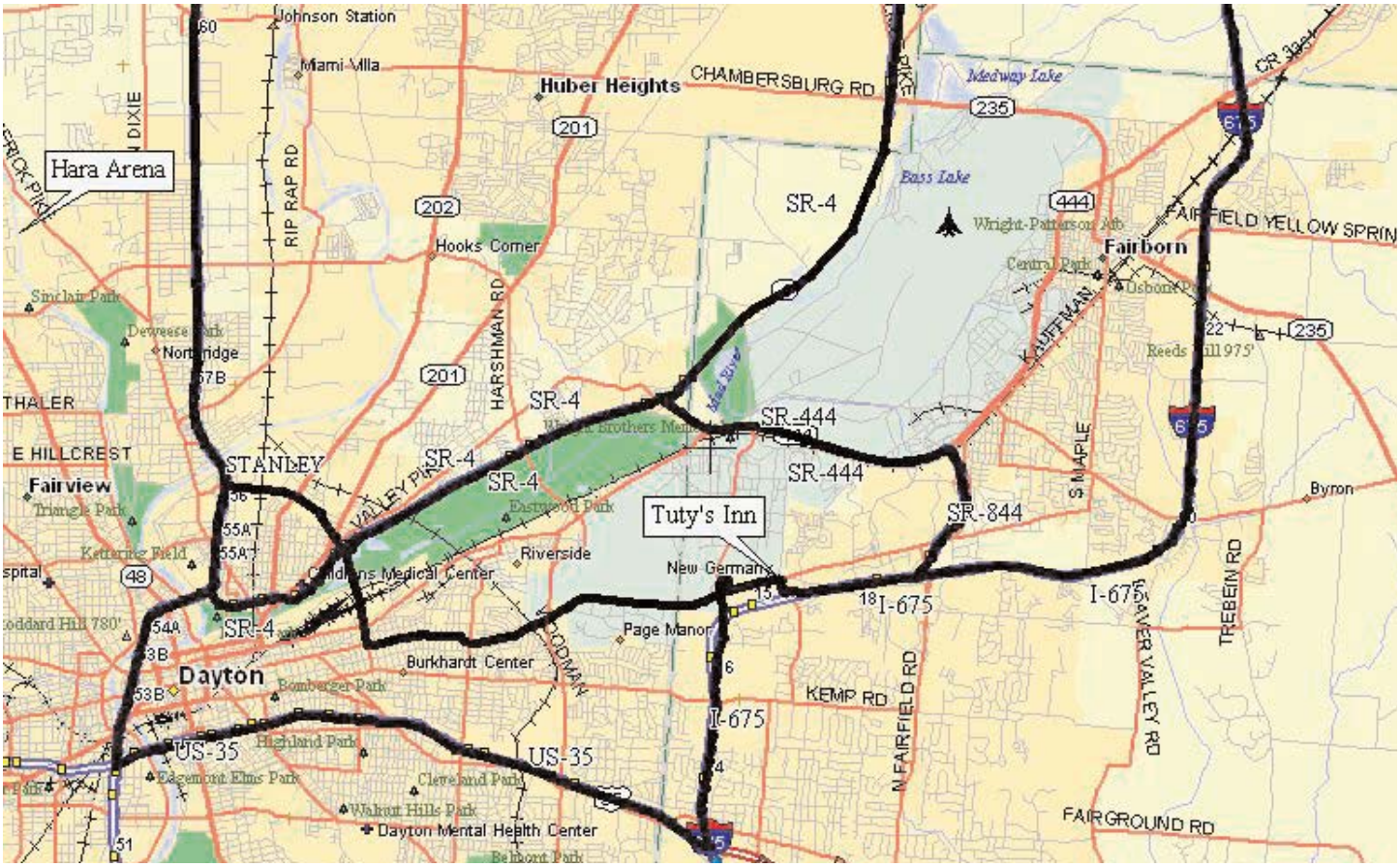
AMATEUR TELEVISION NETWORK (ATN) will be in Booth 236

Be sure to visit the Amateur Television Network group in booth 236. If you are presently doing ATV or just interested in what it takes, these guys have the answers! I am willing to bet that there will be live ATV transmitted from this booth to others at the Hamvention (such as the ATVQ booth #207).

Do you have an ATV repeater? If so, consider joining the ATN group. They have been a lot of support for us getting our ATV repeater up and running here in Rockford, Illinois. Whenever we have questions, they have the answers (oops, I think that phrase has been taken.....).

ATVQ

Friday Night ATV At The Dayton Hamvention Be There!



AMATEUR TELEVISION DAYTON DINNER MEETING FRIDAY NIGHT

Sponsored this year by the Amateur Television Network (ATN)

The Dayton Friday night dinner meeting will be held at 6pm on May 20, 2005 at Tuty's Inn, 3928 Colonial Glenn Highway, Fairborn, OH 45327, (937)426-4266
For the high tech types you will find Tuty's at, (39-46-29-N) (84-04-47-W).
Price is $11.00 per person which includes tax and tip.
We can may choose 3 of the following dinner items to be prepared.

1- Beef Tenderloin Tips and Mushrooms
2- Ham steak
3- Veal Parmesan
4- White Fish
5- Fried Chicken
6- Baked Swiss Steak
7- Breaded Tenderloin

The above is served with salad, Baked Potato, Bread, Coffee or tea, and dessert If you are planning to attend, please email Ron, K3ZKO (**k3zko@voicenet.com**) with your primary choice plus a second choice from the above seven (7) choices.

The program, as in the past, will be very interesting. As in the past we will be giving out amateur related door prizes if you have the lucky number. Call us on 144.340 MHz simplex.

From North of Dayton, take I-75 South and East on Stanley Avenue. Stanley will change to Findlay Street, after 2.4 miles. At East 3rd Street turn LEFT and go East. This street will change to Airway Road and then to Colonel Glenn Highway. This leg of the trip will be 4.2 miles to Tuty's which will be on your LEFT next to Wendy's at the intersection with Grange Hall Road.

From North of Dayton, I-75 South and East on SR-4 for 5 miles. Take a RIGHT on SR-444, go 3 miles south on SR-844, then 1.5 miles west on I-675. Continue for 1.0 miles getting off at Grange Hall road. At the end of the ramp turn RIGHT and at Colonel Glenn Highway look for Tuty's next to Wendy's.

From I-70 go South on either I-75, SR-4, or I-675.

From South of Dayton, I-75 North, then East on US-35. Go about 6.0 miles and then North on I-675 for 1.7 miles. Exit onto Colonel Glenn Highway, (at the end of the ramp turn LEFT). Go about 0.5 mile looking for Tuty's on your LEFT, next to Wendy's at Grange Hall Road.

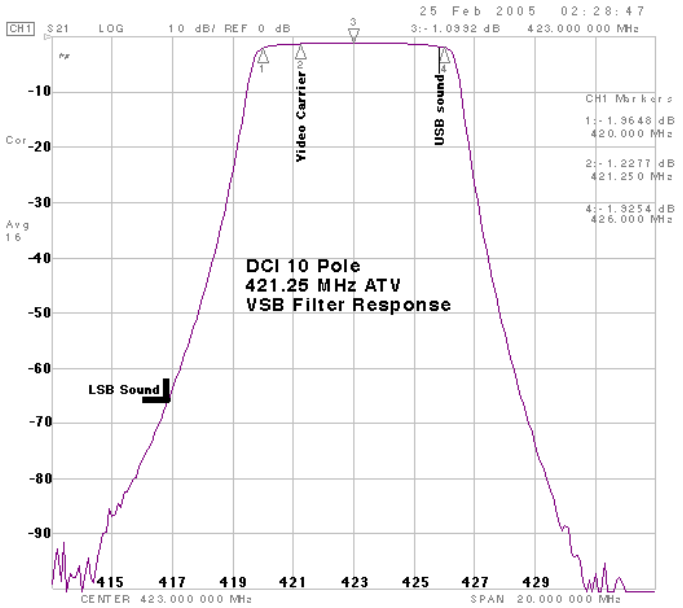
ATVQ

P. C. Electronics 2522 Paxson Lane Arcadia CA 91007-8537 USA
Tel: **1-626-447-4565** m-th 8am-5:30pm pst (UTC - 8) Tom (W6ORG) & Mary Ann (WB6YSS)
24 hr FAX order line 1-626-447-0489 Email: Tom6org@hamtv.com
Web site: http://www.hamtv.com

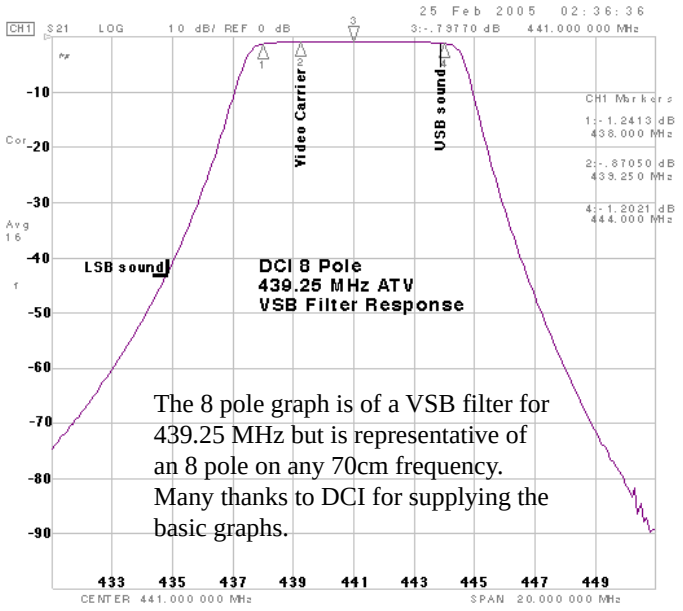
ELECTRONICS

8 Pole vs. 10 Pole VSB filters for 70cm Inband ATV Repeaters

For inband 70cm ATV repeaters, especially those transmitting on 421.25 MHz, the DCI 10 pole VSB (Vestigial Sideband) filter might be prefered over the standard 8 pole. While the insertion loss is only about .3 dB more for the 10 pole (1.2 dB), the attenuation slope is much faster which will attenuate the unwanted lower sideband sound and subcarrier by 23 more dB (42 dB vs. 65 dB). This is a significant amount if there is another service user close by on that frequency outside the ham band.



For instance, the unwanted lower sideband sound energy from a 100 Watt ATV transmitter would go from about 1 milliwatt to less than 1/100th of a milliwatt. Neither of these power levels sound very high but for reference, 1 mW after coax loss and antenna gain is about the same level as the Part 15 license free Wireless A/V transmitters that get up to 500 ft. However, into a FM voice receiver you have a 23dB lower noise floor, so with the 10 pole, you should not interfere with a narrow band receiver greater than 500 ft away and the 8 pole about a mile and a half line of sight on the LSB sound frequency.



The 8 pole graph is of a VSB filter for 439.25 MHz but is representative of an 8 pole on any 70cm frequency. Many thanks to DCI for supplying the basic graphs.

The other benefit of the 10 pole over the 8 pole is the greater attenuation which might be required if you cannot get enough antenna vertical separation on the repeater tower or find you have desense after going from 10 Watts to 100 or 150 Watts, but cannot move the antennas anymore to find that magic null location. The 10 pole can also give a few more dB's attenuation to FM voice systems that are just outside the video passband. Cost of the 10 pole is about $50 more than the 8 pole VSB filter.

The DCI duplexer which consists of a 10 pole transmit and 8 pole receive connected through a phased coax combiner might be enough isolation if using low power to a single antenna system. But high power will still need an additional 8 pole between the duplexer and transmitter and a low pass filter on the receive side. Consider that there is 157 dB difference between receiving sync bars at 1 microvolt and transmitting 100 Watts peak sync. Thats a huge isolation and desense requirement while at the same time passing a 6 MHz segment with little attenuation in the same ham band. More info on building an ATV repeater can be found on the P. C. Electronics web site (www.hamtv.com) application notes page.

ATVQ

ATVQ TO PAY FOR ARTICLES!

Payment for Technical Articles

ATVQ will pay for certain articles that it publishes. I will outline the policy here, but it will be subject to change as needed to make sure that ATVQ continues to be an ongoing publication. ATVQ will pay $25.00 for technical articles that are published and are a minimum of 2 pages. While this is not a great amount, I hope it will encourage more technical type articles to be written. Exceptions will be articles that are written by a manufacturer/seller of equipment that is being written about. While I do not want to discourage this type of article, the article itself is an advertisement of the product. Articles from clubs will be encouraged, and I would expect they would like to share their information with the ATVQ readership. Information gathered from the Internet will not be paid for and is mostly small filler items.

Ideas

Do you have an idea for an article that you've said to yourself that you wanted to write, but never did. Feel free to check with us to see if it is of interest, or write and send it in. No guarantees that it will get published, but if you don't try, you will never know. I'll be looking to see what you can do!

CONTRIBUTORS GUIDE

Preferred method of receiving articles is from **Microsoft Word**, however **Wordperfect** is OK too. Next preference would be **ASKII text**, followed by **typewritten** or **hand written** (clearly). Diagrams or pictures (B&W or Color) can be sent in hard copy, or if you scan them in, save to PCX or JPG formats (actually I can read about anything). If you send a computer disk, make sure it is PC (not MAC) format.

When sending in articles in Microsoft Word, please SAVE with FASTSAVE OFF and save in Word 6 format. Also, articles written in any word processor, consider what will happen when it is re-formatted to fit the style that I might put it in. An example would be setting up tables or adding figures into the article. They can be very hard to strip out. If possible, put the tables, figures, each in a file by itself. This will help me to be able to import into the magazine format.

Articles can be sent to:
ATVQ, 5931 Alma Dr., Rockford, IL 61108

or to our email address: **atvq@hampubs.com**
Also note our web page address: **http://www.hampubs.com**

ATVQ ATVQ

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ATVQ on the Newsstands

If you find a store willing to carry ATVQ on their shelves, we will extend your subscription by one year. In the case that two people turn in the same store, the first one wins! Offer subject to change at any time, but not likely to!

Name Tags by Gene

New from Harlan Technologies - beautiful, colorful, plastic name badges! Available with locking safety pin, magnetic bar, luggage strap, or lanyard.

These colorful badges can be made from our sample artwork, or if you like to be creative, you can make your own. Great to have a club badge with your club logo, or for proper identification with group such as ARES.

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Name Tags by Gene

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