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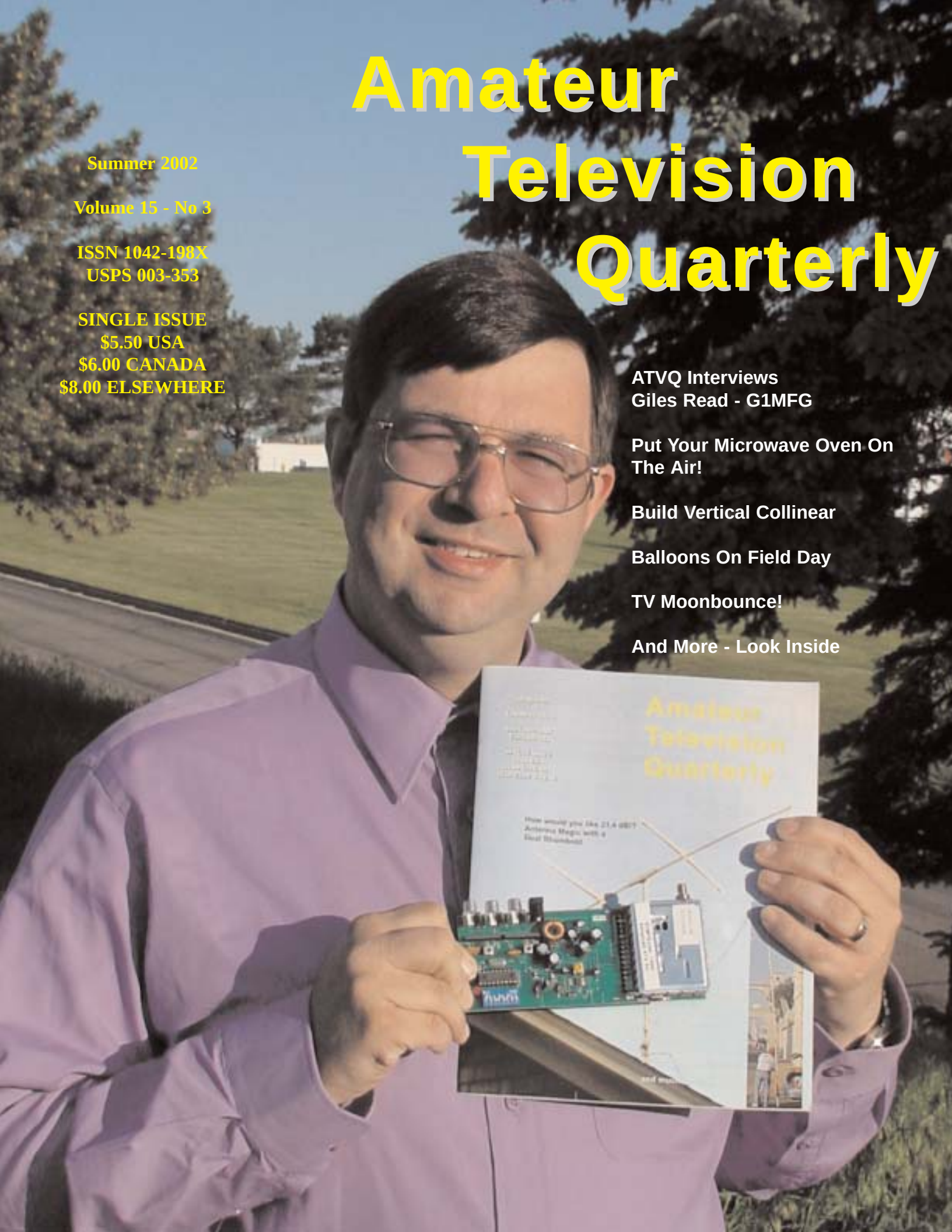

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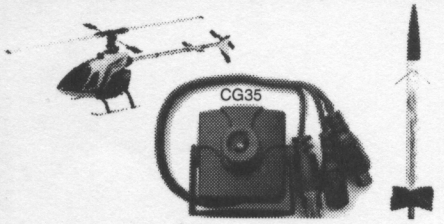
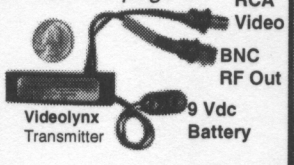


App notes available on our web page 3



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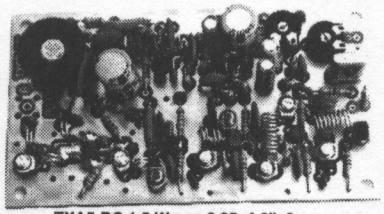

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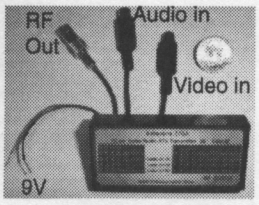

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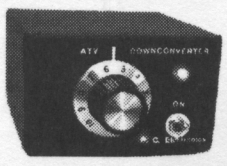

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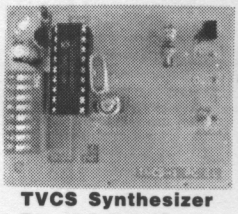

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Amateur Television Quarterly

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Editors Notes

We had a great time at field day this year! And this is mostly due to fact that we made some ATV and satellite contacts! John Auerswald, KA9SOG, brought his ATV gear and we were able to contact either 3 or 4 stations. Not bad for a part of the country where you used to turn on your ATV and could only talk to yourself! The picture below shows John looking at a snowy screen, but we really did had a P5 picture at one point.

We also set up for satellite communications, and made two contacts through RS-13 and one contact with the ISS. Boy did the cheer go up when the ISS contact was made. We had tried pass after pass with no luck, and the during the last pass we would have had on Sunday morning, he responded to W9AXD.

And we had great news coverage. The other photo shows our field day chairman, Jeff Anderson, N9ZUT, preparing before the interview on camera with Dani Maxwell from NBC Channel 13 here in Rockford, IL. She gave amateur radio a supper boost with maybe 6 to 7 minutes on the newscast at 10 PM after 3-4 minutes at 6 PM. Dani even sat down and made a contact for field day on 20 meters (control ops present, of course). Many modes of communication were mentioned including amateur television and satellite communications. While they were there, the ISS was going over, and they recorded the voice and told about communications with the space station. It was about as good as it gets.

I hope you enjoy this issue of ATVQ. I had to add 8 pages just to get as much material in as I could. I enjoyed putting it together.

Gene Harlan - WB9MMM - Editor ATVQ

Digital ATV Development Honored
Rudolf Horkheimer Award 2002 for DATV Team

Prof. Dr.-Ing. Uwe E. Kraus, DJ8DW, received the DARC Rudolf Horkheimer award 2002 on behalf of the DATV working group at Bergische University Wuppertal. DARC board member Dr. Walter Schlink, DL3OAP, handed over the award to Uwe Kraus, DJ8DW, and Hans-Juergen Schmitz, DJ8VR, during the opening event of HAM RADIO 2002 fair end of June in Friedrichshafen, Germany. In his speech DL3OAP appreciated the outstanding development by the DATV group and stressed the fact that Uwe Kraus devoted himself to the UHF bands and the amateur television technology soon after having received his license in 1962.

Latest DATV lecture sheets from DJ8DW with block diagrams and pictures of the new 3rd generation MCBs, results from field tests on 70 and 23 cm and future developments are ready for download at www.datv-agaf.de/.

Klaus, DL4KCK
DL4KCK@t-online.de

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!

ATVQ

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**
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ATVQ

Experiments in Hi-Power Microwave

If you are interested in getting powerful microwave signals on the air, as I am, these experiments may interest you. Several years ago, I had an article on how to get two to five watts on 3300 MHz. Now I would like to show you how to get a kilowatt on the 2400 MHz band. And of course I always do things on the cheap.

However, before I talk about KW type powers I want to talk about safety.

There are two major safety problems with hi-power RF.

1. The hi-voltage DC and power frequency.
2. The RF heating.

With the first, there are many protocols to observe if you want to remain healthy. NEVER work alone with exposed hi-voltage! If you desire any chance to survive a mistake you need somebody to turn the power off and call for help. It is also hoped that they know CPR. You also need a shorting stick to de-energize all of the capacitors. A shorting stick is easily made and is essential when working around hi-voltage. A three to four foot long insulated stick (a 3/4 inch dowel rod is fine), with a 1/4 inch steel or brass "L" shaped hook on the end, and a length of substantial braid fastened to the hook. A clip on the free end of the braid completes it. To use, fasten and clip the chassis ground and hold the stick by the end away from the hook, and touch the hook to the HV points after turning the equipment off and unplugging it from the line. (See illustrations). (Incidentally, the hook is "L" shaped so that it can be removed in a hurry, before you generate lots of smoke, if somehow the equipment you thought was de-energized is really live.)

The magnetic field of an inductor will go away when the power is removed, but the electrostatic field between the plates of a capacitor will stay there until the excess electrons on one plate return to make up the deficiency on the other plate. In other words, the capacitors can hold a charge after the power is removed! So short to ground both sides of all HV capacitors several times before you get your hand anywhere near them.

Shorting Stick

Even sitting on the shelf, air currents can charge HV capacitors so they are stored with a shorting wire. If you don't think air currents can generate electricity, ask yourself where lightning comes from. We are talking here HV capacitors that have very, very high leakage resistance. Electrolytic capacitors have a low leakage resistance. It is also different even on capacitors of the same rating and make. This means that if you put electrolytics in series to get the required voltage rating, you have to use equalizing resistors to get uniform voltage across each.

RF heating can cause trouble by making irreversible changes in the protein of the body parts, i.e. brain. An example that happens visibly is egg white. It happens at a different temperature, but is the same idea; it doesn't get hot, it changes composition. The human brain does similar things, just at a much lower temperature.

Now let's look at RF heating. All electromagnetic radiation will cause current to flow in a conductive material. At room temperature, there are resistive losses that show up as heat in conductive materials (I2R). The heat is proportional to the square of the current. The strength of the current is dependent on the size of the object, it's orientation with respect to the polarity of the wavefront, and the strength of the RF field. As the size of the object approaches a half wavelength in size, the current goes up and peaks at a half wavelength in size. As the object gets smaller the current decreases. As the size of the object gets smaller and approaches zero, the current approaches zero.

This is how small insects (fruit flies, midges, etc.) manage to fly happily inside of a microwave oven, and a man is not much affected by a 50 KW AM radio station, but a piece of meat several wavelengths in size will get really hot. I know, this is not the whole story, but is close enough for a working rule. LF and HF are not as dangerous as VHF and UHF, and these are not as dangerous as microwaves. In other words- THE RULE: Stay the HELL out of the radiation pattern of microwaves! Any frequency above one GHz. Remember the critical temperature is somewhere around 110° to 112°. Above this point, the brain stops working permanently. Just minimize the RF leakage from your microwave system and stay out of the radiated field.

Now how do we get a kilowatt at 2440 to 2450 MHz? We use a microwave oven magnetron! How do we get one? Defunct microwave ovens are cheap to free! It turns out that the most common fault is the control circuitry going kafiooey, leaving the Maggie and its power supply in fine shape. Can we use it as it

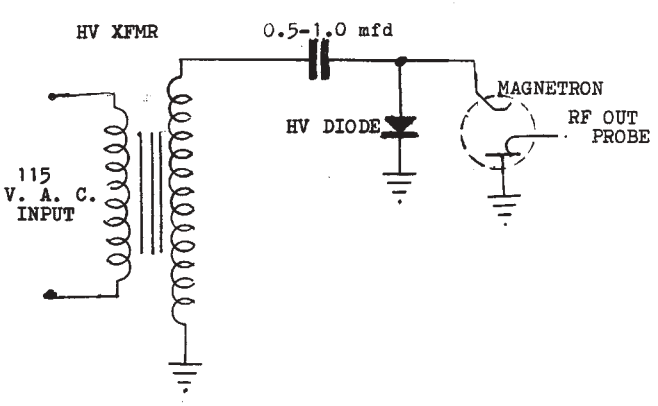
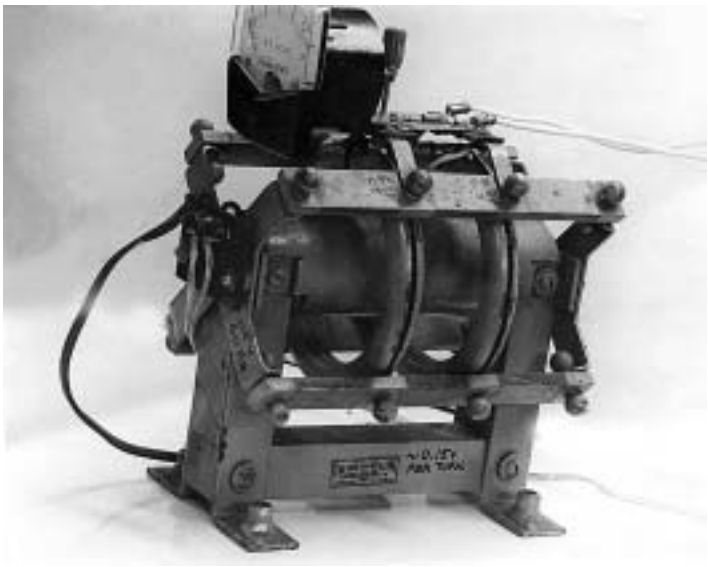


Figure 1

is? NO! But changes can be made to make it usable for us. In this article, I will describe how the oven is configured and changes needed for our use.

A comment about the power rating of microwave ovens. With my setup, I had a 30 A line current on the input, or 3300 W. The power supply was putting out one-half amp at 3KV or 1500 W. The magnetron was putting out 500 W RF. This says that the power rating advertised is the input power, the actual RF power in the oven is much less, and notice what it is capable of. The power of this setup is 3 to 10 times more powerful.

Microwave ovens are no different from other devices, in the philosophy of how they are designed, "cheap". The power supply for the Maggie is a voltage doubler, with the Maggie being the second diode (see figure 1). This saves on the transformer, and capacitor and diode rectifier. The transformer only has to put out half the voltage, and the capacitor is rated for half the voltage. This results in the RF being pulsed at line rate and the pulses are quite narrow. (I never measured but would guess them to be about 20° of the 360° cycle).



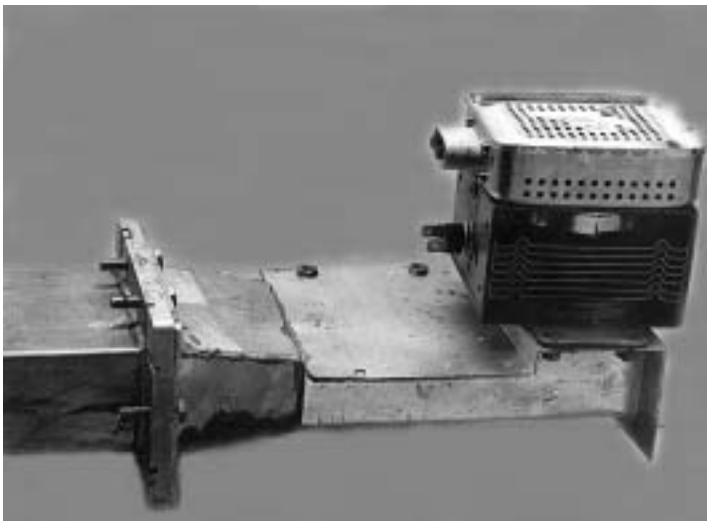
The low capacity filament transformer showing the secondary winding spaced away from the primary. Also note the 3 VAC meter to show the filament voltage.

I will now explain what I did and what I found.

I have built a test bed for the magnetrons to measure DC input and RF output. The power supply for DC is a standard full wave bridge to a pie section filter and a variation on the input. The variac is a 50 A device. I got it for free because the mounting and dial were missing. I mounted it with the dial on the other side so the over-voltage tap was on the wrong end and had to be switched. I also mounted a 50A ac meter and a 0-150V ac meter on the variac output. The power transformer was from an early microwave oven that did not use a doubler. It was mounted on a plate with a bridge rectifier making it easy to use. This was followed by a pie section filter using two 25 microfarad at 3 KV. They were leftovers from a project at work and were discarded. The choke was bought for one dollar at a hamfest and the label said "eight henries at one amp", and "insulated for 15 KV". If you cannot get a choke with this kind of insulation, get a regular choke with the most inductance you can, and mount it on insulators with the frame connected to the center of two 25K or so resistors tied to the terminals of the choke. This was quite a power supply. I tested it with a load of three thousand ohms 1200 watts. I was able to get 3.3 KV across the resistor. If you are unable to get the transformer to give this kind of power, there is a way around it, see power supply.

For the Maggie filament we need 3 V at 13 A. They all seem to have 3 V filaments but some of the smaller ones take a little less current. The filament is the cathode, so with only two elements (cathode and anode) and the anode grounded, and electrical modulation must be applied to the cathode. It might be possible to put a coil around it and modulate the magnetic field, but that would be difficult with video. To modulate the cathode with video the filament transformer must be low capacity (see photo).

If you are thinking about firing up one of these maggies, at this point it would be a good idea to go back and reread the part on safety again.



The magnetron on it's mount showing the waveguide from the oven and the transition to standard waveguide.

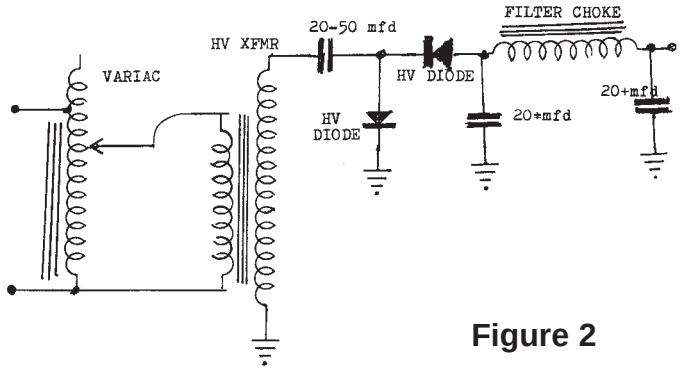
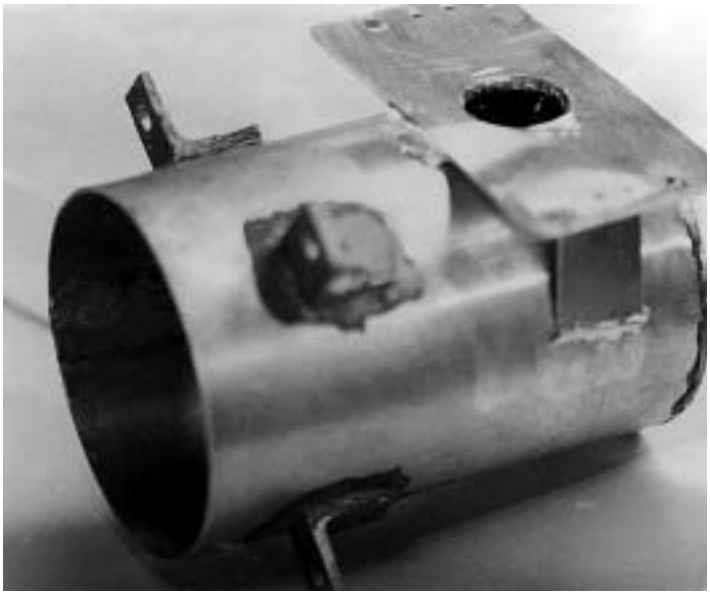


Figure 2

If we are to fire up one of these maggies, you need to take care of the RF. For my test rig, I drilled out the spot welds and removed the magnetron mount and waveguide to the oven chamber. For this I made a transition to standard waveguide and then had a mount and waveguide coupling for the RF (see picture). I made a 10 inch section of waveguide and mounted a 40 db down tap to go next in the RF line. At first, I used a waveguide to co-ax adapter and coax to a 500 watt dummy load. Big mistake. The solder holding the waveguide to co-ax adapter center connector melted and among other things I ruined the maggie. After this I managed to come by a 500 watt waveguide dummy load, only it was the next size smaller waveguide. I checked the books and they said it would still work at 2400 MHz. Just for funzies I mounted a waveguide to coax adapter on it and fastened a directional coupler to it. Using my signal generator at 2400 MHz I was unable to find any return signal. It seemed to work very well at 2400 MHz and up, so I made a transition from the large "S" band to small "S" band waveguide and everything worked fine. I had a test set for the maggies. I could characterize them and test modulation, etc.

Well now you are probably wondering, what good is all this power? My major intention is to try video EME. Can you just imagine working across the Atlantic Ocean with live real time TV? I know the books say I am 20 db short, but for many years the book also said that a bumble bee couldn't fly! Well, I still plan to try anyway. I have an eight foot dish and a four meter dish. The large dish is fiberglass with an embedded mesh and is too heavy to handle alone, so I will use the eight foot dish to start with. I have made a round feed horn with a magnetron mount to use with either dish (see pictures).

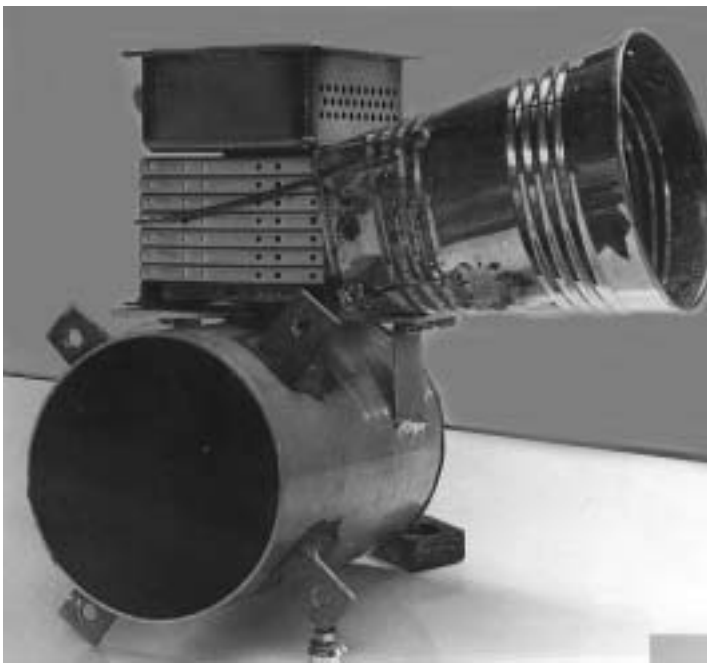
This seems like a good time to talk about safety with parabolic reflectors or "dishes" if you will. There is a large danger with polished dishes that will reflect light and IR, focusing the sun in your eyes. One man I know told me he was setting up a small dish (about four feet) and without thinking he tilted the dish so that the focused sun went near his face, and he was several days recovering his sight. A good rule is do not set a dish up on sunny days or paint it a color that reflects IR or visible light. There was another group with a 50 foot dish that had been painted gray. They were studying RF noise from space, and one day they were watching their instruments and all of a sudden they went dead! It turned out that the sun had crossed the field of view and the feed horn had melted because the paint was transparent to IR. In other words, be careful where you point a dish antenna.



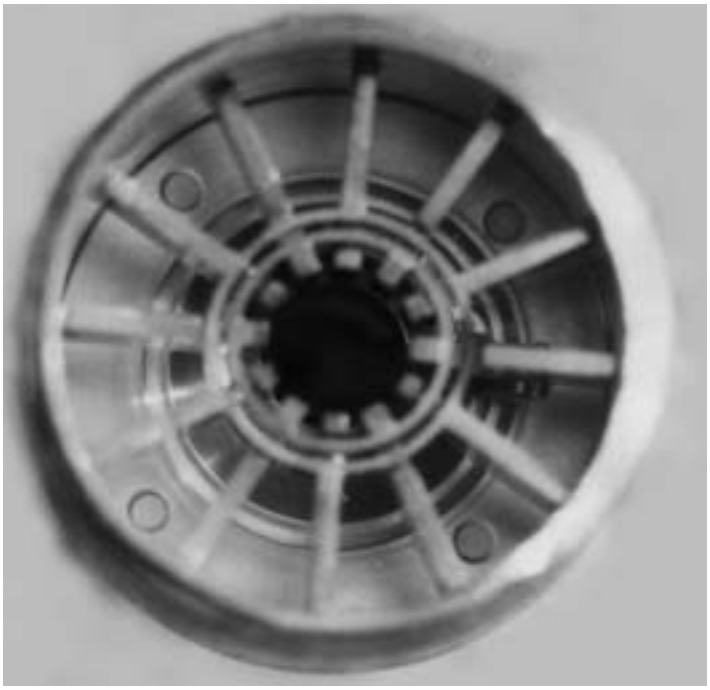
The "coffee can" type feed horn with magnetron mounting plate.

It seems like now is a good time to get a good sized dish cheap or free. Many long lines companies are going to glass and getting rid of their microwave dishes. Many "C" band TV satellite users are going to "X" or "K" band small dishes and the "C" band dishes are available cheap or free. So now is a good time to think microwaves.

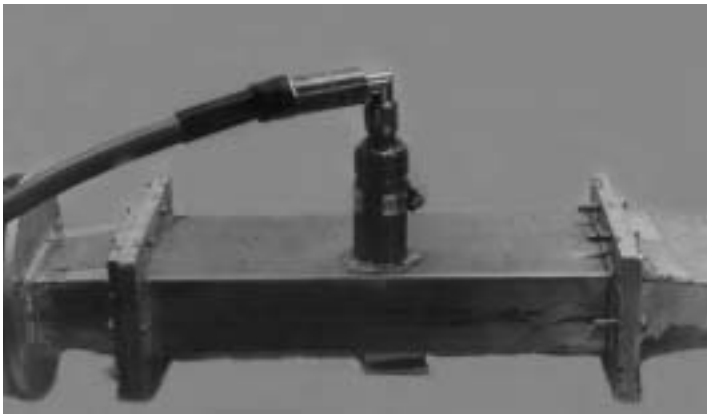
You might be able to get the position control unit with. the "C" band dish, which would save a lot of work. If you want to do EME work, you need to follow the moon's movement and it



The feed horn with magnetron and air hose adapter mounted.



The magnetron anode showing the cavities. The filiment is spiral down the center of the anode.



The short piece of waveguide I made. The 40 db tap and the trasition to the small "S" guide are shown.

takes a lot of work to make a large dish steerable.

To find the focus of a dish is not as hard as it sounds. One way is to put some shiny aluminum tape on the reflecting surface and point it at the moon. Use a piece of paper to find the moon's image. Since the focus is the same for all frequencies, the RF focuses at the same point as visible light, and you will have found the focal point.

How do I plan to try my 2400 EME, you ask?

My younger brother has a "get away from the rat race" house on a mountain top in West Virginia. Twenty acres on a mountain that is fourteen miles outside the quiet zone of Green Bank. No nearby public roads or neighbors, his will make the radiation zone calculation easy. As it will be pointed more or less straight

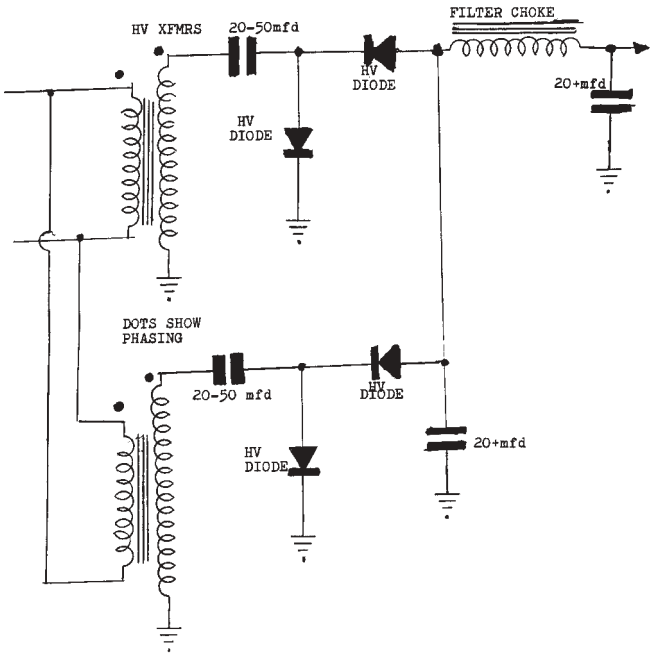


Figure 3 A method of giving a higher ripple frequency (120 Hz). With three of these on three phase, the ripple frequency is 360 Hz.

up, it will be even easier. My brother has graciously told me that I can put it on his property.

I plan to aim the dish at the moon and track the movement of the moon for fifteen minutes, and use an on-off cycle of one minute on, one minute off for the fifteen minutes.

If everything goes according to plan, I will do this on a Saturday night at nine o'clock. I have several friends who tell me they are ready to receive it. But when I am ready to try, I will also announce it. The picture will be my call as an ID.

Power Supply - Figure 3

To get the required 3 + KV the ovens use a half wave doubler. When all you need is RF at enough watts to do the job, you can tolerate pulsed RF, but for communications you need pure RF to start with. To get this you need a pure DC power supply. Filtering the 60hz out of a half wave rectifier is tough so if you use two of these half wave circuits with the inputs 180° out of phase and the outputs paralleled you have 120hz to filter out. If you use three phase with a total of six half wave units connected in proper sequences you wind up with 360 hz to filter out. (You can get transformers one per oven, and most of them are identical. I have several from different brands of ovens, and the manufacturer and part numbers are the same).

Now I can hear you saying "but I don't have three phase available". If you want to get serious about using three phase I will tell you the easy way to get three phase from a single phase. It tums out that a three phase motor will run on single phase if you start it. Running on single phase it will generate the two missing phases!

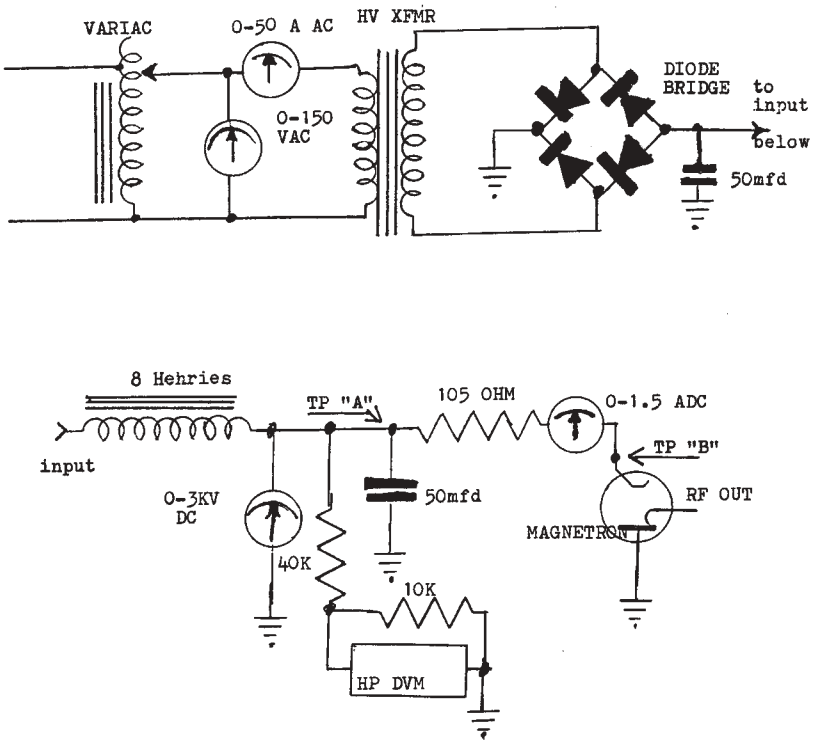


Figure 4 - The power supply I use on my test rig.

To do this, get a two or so hp three phase motor and couple the shaft of the three phase motor to a small single phase motor and put the single phase power to one of the phases of the three phase motor. Now momentarily energize the small motor to start the large one. Once the large motor is turning, cut the power to the small motor. If you check the three lines on the large motor, you will find all three phases present.

If you have a lathe or other machine with a three phase motor and you are wondering how to run it, this will work and avoid getting the power company to provide the power.

Magnetrons

The magnetron is a crossed field device. The magnetic field is at right angles to the electric field. Electrons leaving the cathode and heading for the anode find themselves going across a magnetic field that wants to turn them to go sideways to the electric field. This causes them to circle back to the cathode. Until the voltage is high enough to drag them through the magnetic field to the anode the device draws no current. When the electrons finally have a strong enough electric field to pull them all the way to the anode, they follow a curved path around the cathode.

Now the anode is made up of parallel tuned circuits with terminals facing the cathode.

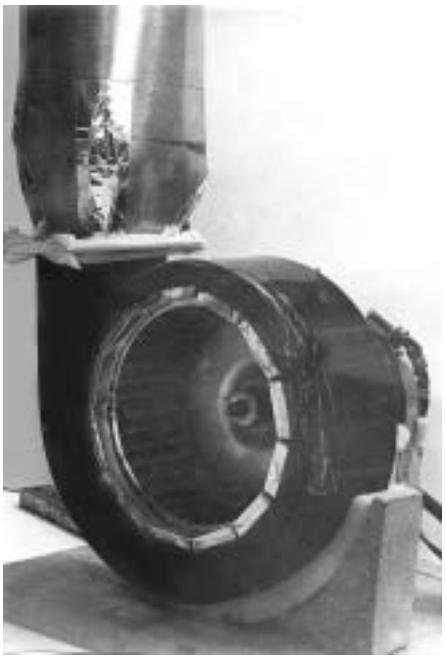
As the electrons pass first one terminal of the tuned circuit then the other, they give up energy to the tuned circuit. The tuned circuits are actually cavities. A coupling loop in one of the cavities couples RF to the outside world. (See picture).

With a working test rig for these magnetrons I can now select one for use in the EME experiments. The rig also gives some interesting results.

I was talking to a man at a hamfest who was knowledgeable on microwaves and he claimed that the microwave oven maggies had a negative resistance region, and that the power transformers had a magnetic shunt so that the maggie current could be set at a value that didn't overload the power supply. I wasn't sure that I believed all this until I got my test rig going and looked at the power transformers in the ovens.

I wanted to measure the dynamic input impedance of the magnetron so that I would know what it took to drive it from the video amp. The anode current was easy to measure with a standard 1.5 A DC meter, but the voltage was a different story! A diagram of the power supply is in figure 4.

First I tried to measure the HV with an analog meter but once the magnetron started conducting the meter did not move the width of the needle. I then thought of using a digital multimeter. I didn't have one with a high enough range so I put a divider on the HV. I put it on the power supply side of the 105 ohm resistor (TP "A"). I figured that I could subtract the voltage across the 105 ohm resistor from the P.S. voltage and get a more accurate reading. Of course the voltage across the resistor was easy to figure because the resistance was known and the current was measured. The divider was five times. A 40 K 100 w resistor in series with a 10 K 50 w resistor were used so that any meter resistance would not have a noticeable effect on the reading. The first DMM I tried was a cheap plastic case one. It worked fine until the maggie started putting out power, then it went crazy. Even with the leads removed and within a few feet of the waveguide it gave no stable reading of zero.



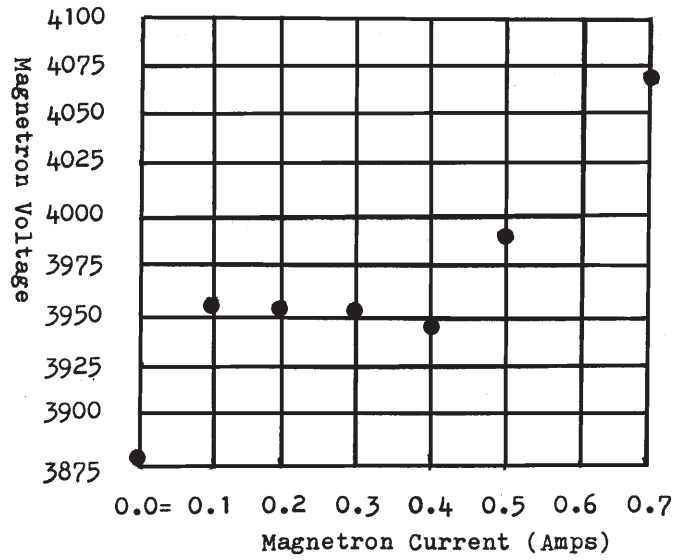
The large blower with adapter for 4 inch dryer hose.

I wound up using my rack mounted HP digital volt meter. It didn't seem to be bothered by the magnetron.

The results of the first try are strange. A table and simple plot is shown below. It looks like there may be a negative resistance component. The unusual results may also be the result of magnetic shunts in the power transformer. I will find out before I try to modulate it.

Column One- Anode current set point.
Column Two- Power supply volts read on HPDVM.
Column Three- Column two times five.
Column Four- Calculated volts across 105 ohm resister.
Column Five- Column three minus column four.

Anode Amps	HPDVM	HPDVM X 5	VOLTS RESIS.	V @ TP "B"
0.0	776.0	3880	0000.0	3880.0
0.1	793.2	3966	10.5	3955.5
0.2	795.2	3976	21.0	3956.0
0.3	797.6	3988	31.5	3956-5
0.4	798.2	3991	42.0	3949.0
0.5	807.8	4039	52.5	3986.0
0.7	829.2	4146	73.5	4072.5



The frequency, as it came from the oven, was 2450 Mhz. I tried cutting strips from a tin can and wrapping them around the magnets to shunt some of the field. The frequency went to 2452 Mhz. This says that to lower the frequency I have to increase the field. I will try a few turns of wire around the magnets so that I can adjust the field up or down. I hope this will allow me to set the frequency where I want it.

Video Modulator

The video amplifier will have some interesting problems to solve as well. If this negative resistance tums out to be real, I may have trouble with oscillation. I have not started on the video amp yet, but I am thinking and planning for it. The capacity of the filament circuit will have to be low so that the reactance will be high and not affect the frequency response very much. To this effect I obtained a low capacity filament transformer and rewound it to give 3 volts. It had originally been a 6 volt device. (See picture).

Some final comments:

The fan that comes with the oven is way too small. Use a much larger blower.

You probably should remove the magnetic shunt from the transformers.

If you are mounting the dish with feed horn more or less permanently you should cover the open end with some plastic that is transparent to microwaves. Birds think it is a beautiful nesting place.

Some nails are very close to a half wavelength long. If the antenna is pointed at them, they may build up enough voltage to arc, and set fire to the building being held together by them.

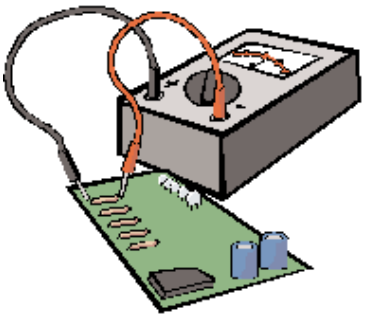
Large juice cans make good transitions from the 4" dryer hose to the square maggie fins.

This has turned into far more of a project than I had thought it would be, but it is fun. I will write another article when I finish.

Have fun

Heru W3WVV

ATVQ



Sparks from the Bench

by Ron L. Sparks - AG5RS - Email: atvq@sparkles.com
P.O. Box 945
Katy, TX 77492

Regular Featured Column!

Even though things are often chaotic around here, given time some consistency will eventually appear. If you have been following along this year you will remember that we started a temperature controller and heater combination back in the Winter 2002 issue. That column covered the requirements, theory and initial design steps. Now it is time to see how well that theory translates into actual practice.

Back in the winter, a lot of you might recognize many places where a temperature-controlled environment would be useful. Now that it is summer, the applications may not seem as pressing. But, for those of us in the southern states, summer can present its own challenges. One problem we have here in the Gulf Coast area is high humidity. The dew points along the coast are often in the high 70 ºF range. Amateur astronomers will instantly recognize the problem that causes – condensation on optical components. An ATV camera is no exception. With those high dewpoints it is desirable to heat the camera housings to keep the lens and lens windows clear.

Once you have the controller working, you will probably find many more applications for repeater components, oscillators, cameras and housings, and downconverters. The next thing I plan to do with my prototype is add a switch so that the power circuit operates in reverse. That will allow me to substitute a small Peltier cooler in place of the heater resistors. The controller will then work as a cooler and dehumidifier.

Reviewing and Preparing

The first thing I do when restarting a project is go over the schematic and make sure I understand the concept. Then there is usually an irritating flurry while I try and locate all the parts needed for construction. Once it is all ready on the bench I break the circuit into logical sections and start building.

What do I mean by logical sections? Let's look at the controller schematic again. The *corrected* schematic is shown in Figure 1; more on that later. If you look at the design, you will notice that the negative power supply is independent of any of the other sections. The same is true of the TL431 voltage regulator. The LM335 temperature sensor is another logical block. The LM350 and heater resistors form a final block.

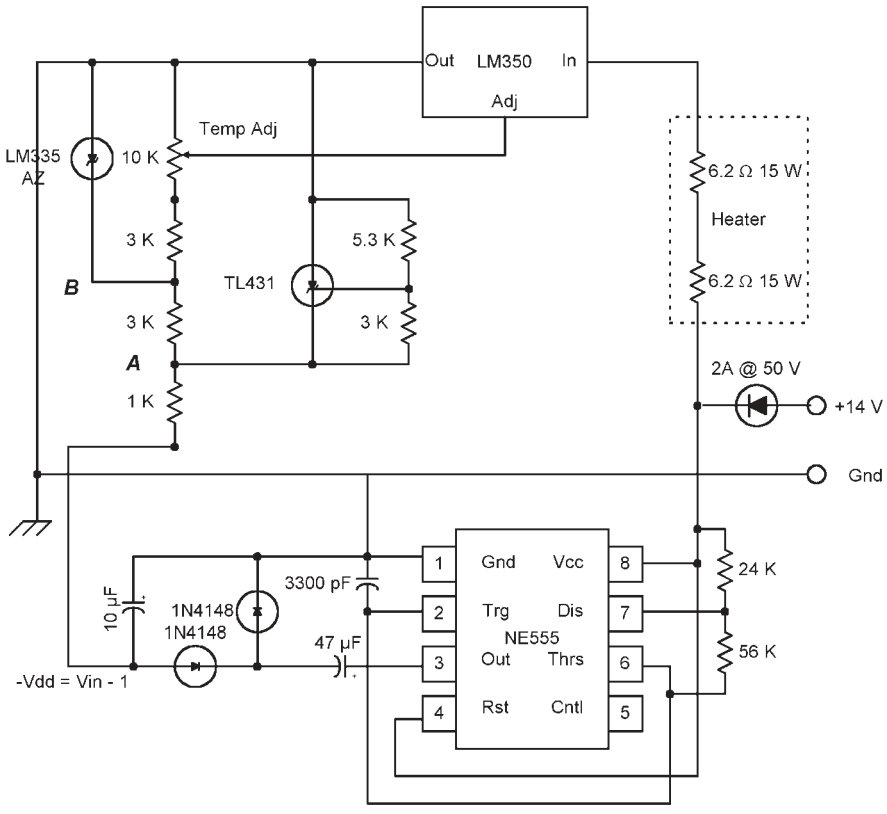


Figure 1

Each of these blocks can be built up and tested independently. That reduces the amount of smoke produced by any errors. The chances of errors are higher for a project that has been designed from scratch, so this approach is quite useful. It also allows easier debugging if something is not working exactly as expected.

The next preparation step is to decide on a construction method for the prototype. Today there are lots of choices. Table 1 shows a few and some of the pros and cons. I chose to use the "Ugly" perfboard style for this project because it is not sensitive to layout, it might change a bit, and the components are large with few connections. You can see the results in Photo 1 and Photo 2.

Construction

The first part I chose to build was the negative voltage generator. This is the part of the

Style	Method	Benefits	Drawbacks
"Ugly" or "Dead Bug"	Turn the bigger parts on their back and mount or glue them to a surface. Then use their pins to wire up the other components	Works well for DIP style integrated circuits. Can be compact and quick.	Doesn't work well for projects with lots of discreet (or small) parts. Hard to change.
Manhattan	Glue bits of PC board to the copper side of another board and use them as solder pads	Provides natural ground plane for RF projects and gives a neat appearance that follows the schematic well	Punching the pads can be tedious and Cyanoacrylate glue can be messy and dangerous
PC Board	Draw and etch a printed circuit board.	Rugged, very neat, and quick to construct once the board is done.	Time consuming and very inflexible for changes or error correction.
Perfboard – "Ugly"	Bare perfboard method which uses the wires of the components for hookup.	Quick, easy to change, can handle fairly complex circuits, can handle RF if care in layout is used	Not as rugged because mechanical integrity of joints is not good and prone to cold or gapped solder joints.
Perfboard – Bare	Similar to wire wrap except that regular wire is used to solder the leads of parts together	Quick, neat, easy to change, and can handle fairly complex circuits.	Care is needed for layout of RF circuits, short pieces of wire can be awkward to handle
Perfboard - Copper	This is a cross between socket boards and bare perfboard, and a printed circuit. Socket board patterns are etched onto a perfboard	Easy soldering, rugged, minimizes jumpers, easily changed.	Layout is slightly more difficult, the boards are a bit more expensive than bare boards, changes require desoldering
Socket Board	Boards with lots of sockets are available from many sources. The pins of parts are inserted in the sockets and jumpered together	Quick for small projects. Can be changed easier than most methods.	High mutual coupling makes RF design difficult. Complex circuits can be difficult to lay out and debug.
Wirewrap	Special long pin sockets and pins are inserted into a perfboard and wired together with a wrapping tool and special wire	Fast for complex projects, fairly easy to change, quick for circuits with lots of repetitive connections like a data bus	Requires special tools, wire, pins, and sockets. Nearly impossible to debug RF coupling problems.

Table 1

schematic containing the NE555 chip and its associated capacitors and voltage doubler. The NE555 is a free running square wave oscillator with about a 40% duty cycle. If you wanted to wire just this part first along with the two resistors and 3300 pF capacitor, you can. When I applied power to the chip it ran just fine at about 3500 Hz. The voltage doubler worked as expected, but the voltage was about a volt lower than expected at about Vin – 2, but that is fine for this design since the TL431 voltage reference was set to be about 6.5 to 7 volts. Anything from about 9.5 volts and up for Vin would give us the voltage needed.

The next part I built was the TL431 voltage regulator. When I built this part, the voltage at point A was only about 0.5 volts – briefly. Then it went to zero. Here is where the correction I mentioned earlier came in. The TL431 works like a Zener diode and needs to be hooked in reverse mode. Since the voltage being regulated was a *negative* voltage, it needs to go with the *cathode* to ground! I had forgotten this polarity reversal when drawing up the original design. Figure 1 shows the correct orientation for the TL431.

So when hooked to the negative supply, it conducted fully and effectively shorted the supply. This is why the voltage went to zero. The short had "let the smoke out" of the main diode feeding the doubler and it opened up.

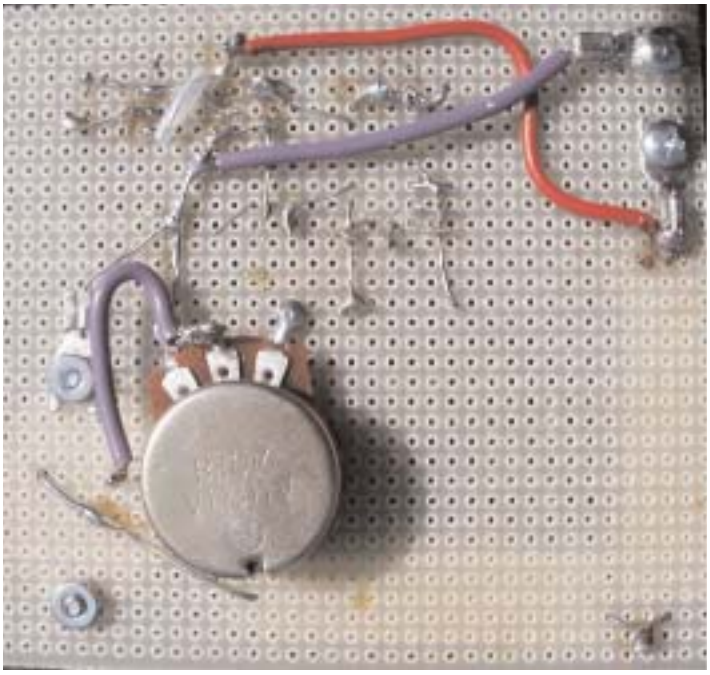


Photo 1

After replacing the diode and reversing the TL431, this part worked perfectly. The voltage at point A was -7.02 volts. This is slightly higher than the -6.7 volts planned, but still not a problem. The LM335 only needs about -4 volts to work, and the current through it would still be within the recommended range.

The next step was to build the LM335 temperature sensor part of the circuit. Before doing so, I double-checked the polarity since I had made the mistake on the TL431. Sure enough, the LM335 was reversed too – for the same reason. After correcting the drawings, I hooked up the LM335 and measured -2.982 volts at point B. Quickly grabbing the calculator I determined the indicated temperature:

$$(2.982 - 2.7315) * 100 = 25.05\ ^{o}C$$
or
$$(25.05 * 1.8) + 32 = 77.09\ ^{o}F$$

My thermometer on the bench showed 77.2 ºF so I knew things were operating correctly.

This is probably a good time to discuss accuracy and resolution. You will notice that the resolution of my calculator was higher than the resolution of my voltmeter. The voltmeter was capable of showing 4 digits, but the calculator showed 9. So when I did the math, it looked like I was measuring temperature to the 1/100 th of a degree. That is not correct! You should always watch out for this kind of error. It can be misleading at best. The worst resolution is dominant. So the numbers above need to be rounded up to only one decimal (25.1 ºC and 77.1 ºF). The other thing to watch out for is accuracy. The uncalibrated LM335 is specified to have a typical accuracy of 1 ºC. As you can see, the typical is often better than the spec. My particular unit was exactly on the temperature my lab grade thermometer showed. But be aware that yours may not be. Accuracy is relative to the absolute reading shown. So don't confuse that with resolution or repeatability. The spec sheet says that any given unit will have a linearity (similar to repeatability in this case) of 0.3 ºC.

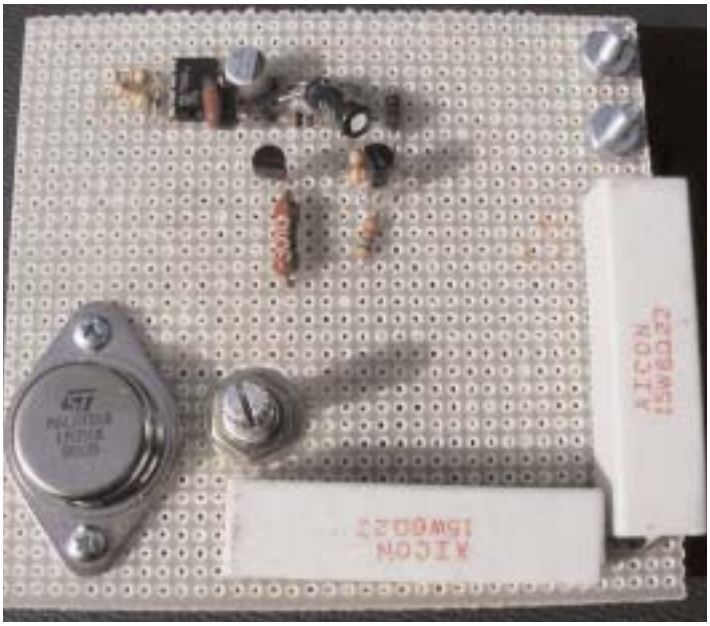


Photo 2

That doesn't mean that any given unit will perform that way, but it certainly could. If you are looking to build a thermometer where the accuracy is important, all of these things must be considered. As you will see later, small differences in accuracy, linearity, and resolution can be very important.

The final stage of construction was to add the LM350 and heater resistors. This went smoothly and the unit worked as expected when powered up. When the voltage on the adjustment leg of the LM350 is about 1.25 volts below the output leg, it turns on. If it is less than that, it turns off. This action forms the basis for the controller and it is slow enough that electromagnetic spikes are not formed. Thus the controller is RF quiet.

Testing

I really enjoy this part. At first there is a reluctance to "get rough" with a project you just spent so much time designing and building. But, once I get into it things begin to change. Just remember, if you can break it on the bench it can surely be broken in the field. A good design should tolerate anything you can throw at it. If you are tough enough in this stage then your equipment will stand up in emergency use and foul weather. After all, isn't that what we are supposed to be able to do?

The polarity protection diode was added for that reason. There are two simple methods of polarity protection. One is shown in Figure 1. Adding a diode in series with your circuit so that reversing the polarity will simply cause it to not operate. The other method is to put a reverse connected diode across the input **and put a fuse ahead of it**. If the polarity is reversed the diode will conduct and form a short, blowing the fuse. If you use this

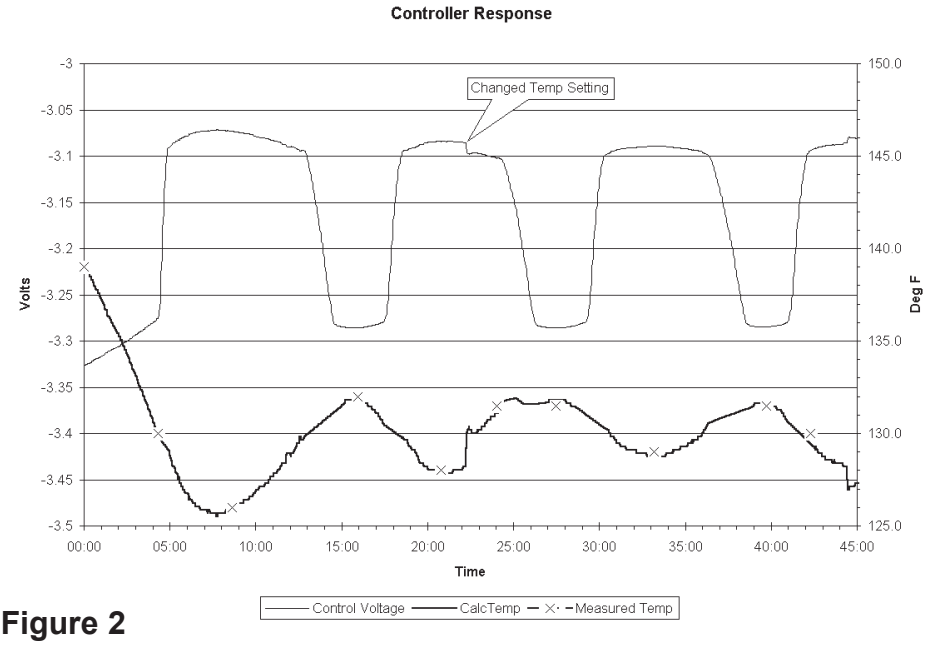


Figure 2

approach, it is important to use a fast diode with a large current rating as well as a fast blow fuse.

The temperature controller may be in a remote location, but will probably be powered by a large power supply. In that case, a blown fuse would be more inconvenient than the voltage drop from a protection diode (usually about 1 volt). Especially if you just installed it on a tower, climbed down, and inadvertently reversed the power leads.

I constructed a sophisticated environmental test chamber, for testing this project. It consisted of several styrofoam cups taped end to end around the circuit board, placed in some styrofoam peanuts and sealed in a cardboard box. Okay, maybe it was not sophisticated, but it was cheap and it worked well.

One neat "by product" of this design is the ability to monitor the temperature inside the test environment by simply connecting a lead to point B in Figure 1. This was done and the results are shown in Figure 2. If you remember the cautions about accuracy and small errors, you can see another one in Figure 2. The temperature change is not as big as the voltage change would seem to indicate. The current flowing into the LM350 regulator causes this. The specifications state that the error current is about 50 A.

For my particular device, it was actually 61A. Across the 3 K resistor this is an error of 0.183 volts which makes the temperature look 18.3 ºC too low. That is a sizeable error. But when the LM350 is off, the error was negligible. While it is turning on or off the error current changes from 0 to its maximum of 61A. I had a lot of fun trying to model the transition period – unsuccessfully. It is not an easily predictable curve.

So in practice, if you are using the value at point B for temperature monitoring, you will need to do so only when the LM350 is off. You can figure the correction for your device when it is on, but during the switching it is probably best to ignore the readings. That is what I did for the calculated temperature curve in Figure 2. Also in the Figure, the X marks are the temperature I read on my lab thermometer placed inside the test container. From this you can see the measurements are quite accurate once adjusted as I just described.

The first part of the testing is not shown on Figure 2. For about 20 or 30 minutes, I cranked the temperature up to 140 ºF (60 ºC) and cooked things. The parts are only rated for 50 ºC (122 ºF), but as I said earlier, now is when I wanted them to break. Figure 2 starts when I turned things down to a more respectable 54 ºC (130 ºF). All seemed well for the remainder of the test.

You may notice that the temperature variance settled out at about 129 ºF minimum to 130.5 ºF maximum. That is 1.5 ºF (0.8 ºC) variance. Any on/off type of heater needs a gap between the two states and will have some small temperature variance. This will be just fine for our intended purposes. If you need a tighter temperature control than that, for example in a high accuracy oscillator, the design would need to be changed to one that is fully linear.

What next?
Well, that is probably more than you wanted to know about controlling temperature. But, hopefully, by explaining the process for this circuit you can get some ideas about how to approach your next project. The steps and approach work well for even very complex systems. Along the way, I have also pointed out some fun future changes you could do. For example, adding cooling or making the circuit linear to make it more temperature stable. Have fun with it and let me know what you did.

Let's see, what should go on the bench next? I think it just might be that remote controlled CarCam that started life as a RocketCam. Now where is that 70 cm ATV transmitter…

ATVQ

GPSL 2002 Group Photo

More details on the meeting and balloon lauch next issue.

Kneeling left-to-right:
Ralph Wallio, W0RPK Indianola, Iowa (HABET)
Harry Mueller, KC5TRB Tulsa, Oklahoma
Paul McCrone, KC0KXR Bellevue, Nebraska (NSTAR)
Jim Lamb, W5GAF Panhandle, Texas
Mark Conner, N9XTN Bellevue, Nebraska (NSTAR)
Michael Gray, KD7LMO Fountain Hills, Arizona (ANSR)

Standing left-to-right:
Bob Davis, K0FPC Overland Park, Kansas
Larry Cerney, KØANI Denver, Colorado (EOSS)
Paul Verhage, KD4STH Caldwell, Idaho (TVNSP)
Bill Brown, WB8ELK Huntsville, Alabama
Chuck Crist, W9IH Indianapolis, Indiana (WINDTRAX)
Doug Eubanks, KA0O Bellevue, Nebraska (NSTAR)
Bobette Doerrie, N5IS Booker, Texas (REACH FOR SPACE)
Jerome Doerrie, K5IS Booker, Texas (REACH FOR SPACE)
Marty Griffin, WA0GEH Highlands Ranch, Colorado (EOSS)
Mary VanWinkle, KC5UNW Seiling, Oklahoma
Mike Manes, W5VS Littleton, Colorado (EOSS)
Unknown
Rick von Glahn, NØKKZ Parker, Colorado (EOSS)

ATVQ

The President Speaks...

When I became the Director of a small research lab, I asked the owner what my job description was. He said it was very simple; "Don't do anything dumb, and if an opportunity to do something smart comes along, try to recognize it." I had hoped for something more specific, but it was good advice. It also proved very hard to follow. Through the years, I did some dumb things, but the really hard part was recognizing opportunities. Recently, the FCC gave those of us who operate 70cm ATV a golden opportunity to have our concerns about unlicensed interference heard, and most didn't recognize it. I'm talking of course about the invitation to comment on the Part 15 RFID proposals, which were included in Notice of Proposed Rulemaking ET-01-278, aimed primarily at reviewing and updating portions of Parts 2, 15, and 18 of the FCC rules. These proposals would allow unlicensed RF identification devices between 425 and 435 MHz at greatly increased power levels and duty cycles over those now allowed. This is the sub-band where the maddening interference to ATV pictures is currently at its worst. If you operate ATV on the BRATS repeater, you know that the existing interference levels are making the repeater almost unusable today, even without what the ARRL calls "this ill-conceived proposal." The ARRL, in its comments, said, "The level of interference from the devices permitted under the proposed rule is intolerable." So, where was the howl of protest from the ATV community? Because I did file personal (but not BRATS) comments in opposition to 01-278, I get copies of reply comments filed by large law firms representing various users of the affected band. As an appendix, these documents include a listing of those who filed comments, and while there were a few ATVers and ATV organizations (and of course the ARRL through its general counsel), most of the ATV crowd was among the missing. This was our chance to say to the FCC that we can't live with the EXISTING Part 15 abuses, let alone a relaxation of the limitations. I heard a frustrated ATVer the other night asking whether we could talk to the FCC about our interference problem. Where was he when this golden opportunity was talked about in the Milliwatt, in Dave Sumner's QST editorials, and on the air?. The chance to be heard was there. It was a slow ball, right across the plate. And most ATVers didn't even bother to pick up the bat. As the President of a club which was formed to promote ATV, I give thanks to the ARRL for going to bat for us. The ARRL posture on ATV has always seemed one of benign tolerance, but right now they are our strongest ally! If the proposed rules do become law, it will mean even more interference to ATV. On the other hand, if the rules are defeated, the existing interference will not go away, and will continue to increase unless the FCC strictly enforces the current rules. That needs to be our message to the FCC, and it was good to see that many of the non-ham respondents said the same thing. Meanwhile, we will do what we can to locate and minimize the current interference.

73, Bob, W3WCQ.
President - BRATS
The Baltimore Radio Amateur Television Society

ATVQ

3 AND 13 CM FM MODULES...
eat way to get started in ATV!

A Technical Review
by Art Towslee - WA8RMC - Email: towslee@ee.net
180 Fairdale Ave.
Westerville, OH 43081

I have had the great fortune of testing the modules for sale on the Internet at **www.tvham.com**. At that web site, Giles Read, G1MFG has 1200MHz and 2400 MHz modules for both transmit and receive. He even has LCD controllers that work with either the transmit or receive module for extended tuning of 800-1800 MHz receive and 1240-1320 MHz transmit for the 23 cm modules and 2200-2700 MHz receive and 2310-2450 MHz transmit for the 13 cm modules. Note that the transmit modules are capable of operating outside the USA Ham band so care must be exercised when working with these in the United States. PLEASE KNOW WHERE THE BAND LIMITS ARE. DO NOT OPERATE CLOSER THAN 8 MHz TO THE BAND EDGE. I don't intend to commercially endorse his products, only evaluate them as described. However, I personally purchased the 13 cm transmitter module previously and am completely happy with both the product and the speed with which it arrived...only 4 days which is quicker than most items coming direct from the USA.

The basic specifications of each module will not be covered here because they are adequately covered in the correspondence available on the web page. I will only cover the results of my testing along with operational notes worth mentioning. OK, with that said, let's get down to the individual module specifics.

23 CM RECEIVER

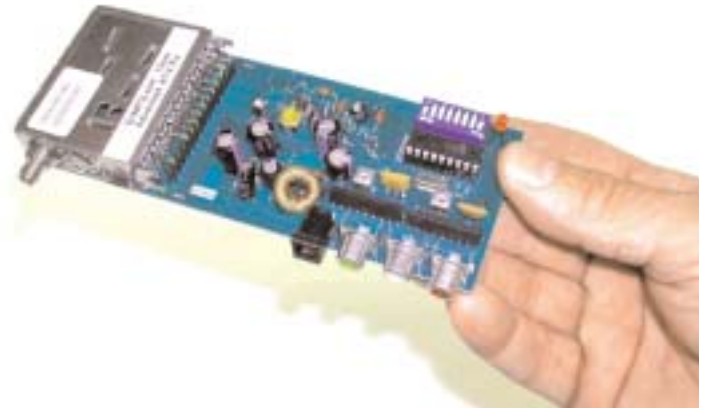
The first module I tested was the 23 cm receiver. As stated, the module did in fact tune the range of 1240 to 1367.5 MHz in 1/2 MHz steps via an 8 bit DIP switch. Since the tuning selectivity is very broad, a signal within 4 MHz of the center frequency is received almost as well as being directly on frequency as long as there is sufficient signal strength. So, the tuning steps of 1/2 MHz are nice but probably much finer than they need to be for most ham ATV use. If the signal is very weak however, the finer steps will help. If tuning in the "US Ham band only" is desired, I'd recommend a 4 bit 16 position binary rotary switch in place of SW3 to SW6 (or a decimal switch wired as binary - another subject) to cover 1240 to 1304 in 4 MHz steps. Locally, only 1250 MHz is needed to receive the ATCO repeater so the DIP switch set to that position is just fine. If one wanted to look at 1280 MHz also (the repeater input frequency) only 2 switch positions change so that task could be handled with a single pole double throw toggle switch. I'm not trying to talk against the use of the LCD controller for it has its use and convenience but in some cases, it is not needed. A simple switch or none at all will do just fine.

The sensitivity of the "Gold" unit is nothing short of amazing. For testing, I have NOT added the needed de-emphasis network for good video so my observations will tend to make the signal appear slightly worse than it really is. (The Platinum receiver has the de-emphasis built in but I didn't test that one. I expect it has the same input sensitivity). To keep the test simple and easy to understand, I will not refer to microvolts or dBm in the details. (Reading between the lines, I don't have the professional equipment needed). Instead, I'll compare it to another receiver in the shack. The "Gold" receiver has about 10 dB more sensitivity than my best LNB downconverter. That is, I inserted an attenuator in the antenna line to my LNB receiver and adjusted it until I got a barely recognizable picture (P0 level). Then I swapped the LNB for the Gold receiver and had to add 10 more dB to get it down to the same point. Many of you are familiar with the PC Electronics 33/23 FMR receiver. The Gold receiver is 6 dB better than that one. I don't know what's inside of this little gem but it's got my vote.

13 CM RECEIVER

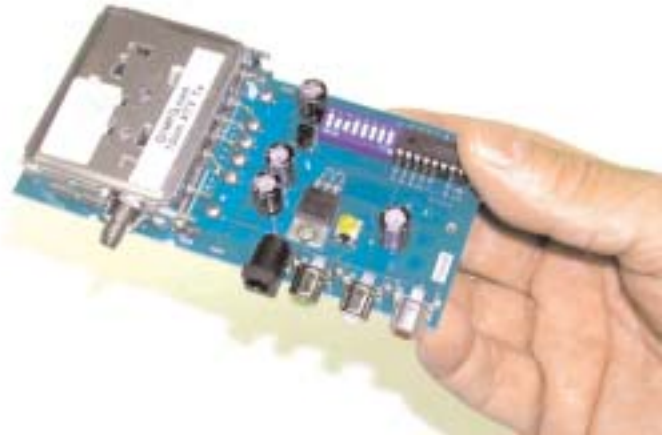
This module is very similar to the 23 cm unit described above except for frequency range. The DIP switches cover 2304 to 2559 in 1 MHz steps, which can be extended with the LCD controller. It also incorporates a jumper feature to allow 1/2 MHz stepping but, as mentioned above, I see no real practical ATV use for this. This band presents some real adventure "snooping" however, for many commercial downlinks operate just below and above this ham band. Many of the race car cameras as well as major sporting events use the 2450 to 2500 MHz portion so external tuning here may be desirable in a manner similar to that described above.

Again, the sensitivity really stands out. Most of you are familiar with the Wavecoms and Radio Shack units available. I have two



Wavecoms and a Radio Shack unit which all have very similar sensitivity and this unit outperforms them by 10 dB. It's very impressive.

An overall note on the power requirements for both receivers is well worth considering. First, the acceptable supply to these units is 10 to 15 vdc. The 13 cm power circuit employs a switching regulator which is more efficient so the current is about 220 ma at 10 v and about 165 ma at 15 vdc. (Switching regulators draw near constant power) The 23 cm receiver on the other hand, has 9 and 5 volt linear regulators so a current of about 330 ma is nearly constant throughout the 10 to 15 volt range.



23 CM TRANSMITTER

This module is smaller than the receivers and draws less current. It employs a linear 12 volt regulator so the minimum input voltage to maintain regulation should be no less than 14.5 vdc. Below that the regulator stops working so the voltage to the module will drop and power output will go down accordingly. The literature supplied says 12 vdc is minimum, and it works OK there, but you should stay above 14.5 vdc for a good stable output. A maximum of 18 vdc is OK however. At 15 vdc, it draws 140 ma making it very attractive for portable and RC applications and if a switching regulator was designed to replace the linear 7812 regulator, additional current savings could be realized. The unit tested has an RF output of 75 milliwatts at 1250 MHz but I'm advised it could vary from 40 to 80 between units. (a second unit I have outputs 60 milliwatts). The output is very clean and has 6 and 6.5 MHz sound subcarrier. A pre-emphasis circuit is not included in this unit but a schematic is available on their web page.

13 CM TRANSMITTER

This module looks almost exactly like the 23 cm unit and draws approximately the same current of 140 ma. The RF output is 22 milliwatts at 2400 MHz for the unit I had but can be between 20 to 30 milliwatts. The output variation from 2390 to 2450 is less than 5 milliwatts. As above, this unit has no pre-emphasis circuitry.

13 CM ANTENNA

The small yagi antenna I tested was very cute indeed and for its size, it performs well. However, my coffee can antenna shown

below has the same gain and with a wider beamwidth. My outside range testing indicates 12 dBd gain. The description on the web page claims 13 dBi so I wasn't far off. The yagi beamwidth seemed to be less than 15 degrees whereas the coffee can maintained its gain for at least twice that. It's hard to get exact measurements with the short range test setup I had so if anyone tests these and finds them different, I'd like to hear about it. The coffee can antenna is easy to build in about 30 minutes and costs virtually nothing if you drink coffee. In addition, it comes with a ready made plastic radome if the re-sealable plastic lid is used. (I'm told that Folger's cans produce about 3 dB more gain than Maxwell House cans but have not been able to prove it!).

That's about it, folks! In summary, I feel that these units are well worth the investment and perform better than anything else I've seen on the market so far, including commercial equipment. A shortly to be completed project is to use the 23 CM module driving a Mitsubishi M67715 brick for about 2 watts output. A M68719 brick could be used instead for over 15 watts but costs more. Two watts should be plenty to access the ATCO repeater within the metropolitan area. When complete, I'll share the results.

For details about possible modifications and improvements to the boards described here visit G1MFG's web site **www.g1mfg.com/website/mods.html**. For parts orders in the USA use **www.tvham.com**.

ATVQ

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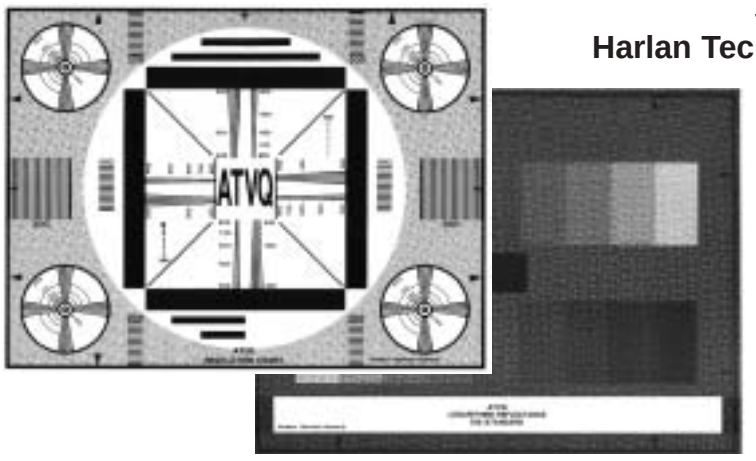

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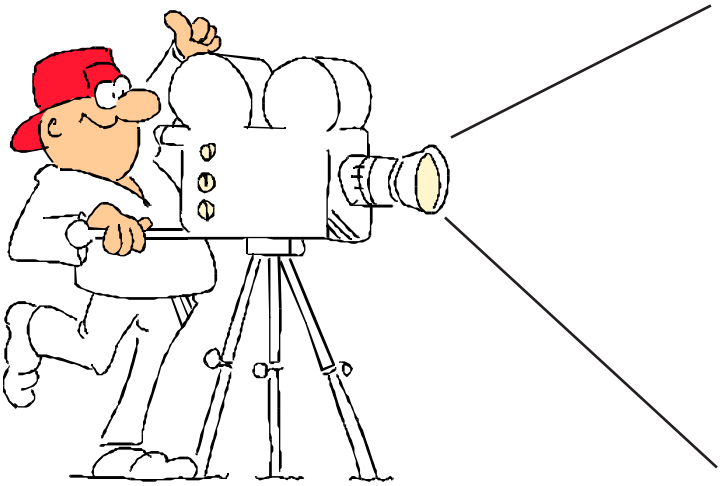

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IVCA VISION NEWSLETTER No. 19

Keeping Amateurs Informed On Developments In Visual Communication Around The World

Ray Glidden, W5NOO EDITOR - Email: ray@junct.com

2002 Dayton Hamvention IVCA Meetings (Information submitted by Don Miller W9NTP and Farrell Winder W8ZCF)
Dayton is over and quite a success as we had 35 people attending the hotel meeting and the New IVCA Officers were elected. The new President is now Clarence Fowler, WA0TSL, and the new Vice President is Robert S Robinson, W9RSR, that also conducts the SSTV WAS program, and the new Secretary/ Editor is Marlin Alberty, KA8LWR. The programs presented on May 17, 2002 were "The Rigblaster" by John Lalotai, N1OLO, and " SSTV from the satellites" by Dr. Robert Suding, W0LMD. Dr.Suding presented 700 + pictures received through several satellites including 600 from AO-40 and described antenna controllers and feeds which he researched and developed and manufactured for use with AO-4O. His web page is **http://www.ultimatecharger.com/dish.html** with a wealth of information on this subject. John Lalotai, N1OLO, provided a program on the Rigblaster Interface unit used for SSTV and the various digital modes using computer sound card operations. The Dayton forum room was filled on Saturday May 18 and Ralph Taggert WB8DTQ Talked about his new ARRL book on Visual Communication and discussed how easy it is to get on SSTV. This was followed by Barry Sanderson, KB9VAK, bringing us up to date on improvements with "Digital HDSSTV." If any one is interested or would like to participate, contact Don, W9NTP, at **Wyman@svs.net** . Hank Cantrell, W4HTB, showed a tape from Miles Mann, WF1F, discussing the work that has been done on the International Space Station for SSTV and other ham operations. Early next year looks like the soonest that we can expect SSTV from the ISS. Farell Winder, W8ZCF, showed some very fine SSTV pictures he has received from AO-40. We encourage everyone to get interested in AO-40 SSTV because it works well and the satellite is not over populated. The pictures come down at 2401 MHz.

Web Picture Phone/ Net Cam Operation (No transceiver or antenna or even an Amateur license required)
As most know SSTV and fast scan TV are not the only ways to communicate using video. The hardware used for SSTV and a Windows computer that is using special video programs will also permit you to not only exchange pictures including JPG, BMP and GIF files that are usually sent in your normal e-mail as inserts or background or attachments, but you can also exchange two way live video with motion and sound over the web. You need a telephone dialup modem (28.8KB or faster) connection and a 330Mhz or faster computer with a camera attached with USB or a camera and capture connection arrangement) to run the numerous freeware, shareware and commercial programs that you can purchase, download, and use, to run live two-way video phone, even with your non-amateur friends. You can do a web search for "Video Phone" or search for a particular program by it's name or just click the following URL and signup at the ZDNet Downloads at **http://downloads-zdnet.com.com/3120-20-0.html?qt=5ptfwc5&tg=dl-2001&SWLink=n&tag=sptlt** where you can down load several of the video phone programs and various useful software. These video programs provide a way to select your camera and audio setup and also provide for a self view. A schedule will also have to be arranged with your friends that are logged on to the selected program and also on line to make a video phone call connection. I have used a number of the web video phone and also video mail programs in the past including: iPhone 4/5, WebCam 32, Paltalk, iVisit, EyeBall and Yahoo Messenger, CUseeMe,WebCam, Audio Vision, Intel, Win98/XP /Net Meeting, etc., just to mention a few. There are also several free video programs from companies that are no longer in business as you might expect. Most programs also have ways to log in to the user directories of various categorys and contact folks and monitor conversations etc. One video phone program "iVisit" even permits conference video connections with several stations at the same time on screen and also runs on an IBM and Mac platform as I remember. Some of the free Video Phone programs may have popup/ popunder advertisements, problems with poor audio quality, drop-outs and disconnects, and audio echos etc. However some programs have very high quality video with fair frame rates that permit reasonable screen motion using a codex or compression method. Some even have an adjustable transmit and self view picture window size adjustment. Some programs have near Hi Fi audio quality. At any rate we believe that an almost free long distance two way net cam video phone call with a picture that's in color with motion and sound, is not a bad idea, especially when your antenna is not working (like mine at present)! On the web I find talking is easier than typing and I also like to see and hear who is on the other end. I can also pan around and show off my shack, etc. and besides you even get to say things just like in some of the old Hollywood movie productions, "I'm ready for my close up now Mr. DeMille".
Ray W5NOO

Removing Bad Cookies, and Tracking Spy-ware etc. (it's a jungle out there on the web)
If you go to lot's of web sites and down load lots of programs you will probably get infected with the various "Spyware" and bad cookies and tracking parasites that infect your system. To

locate and remove these you can eliminate this problem if you download the free German/English program "Ad-aware" by Lavasoft at the following URL with a mouse click!
http://downloads-zdnet.com.com/3000-2094-10045910.html
This is a multi spyware removal utility designed for all Win9x / ME / NT40 / W2000 platforms. It scans your system and drives for components of known spyware type parasites and lets you remove them safely. Read the complete details in it's help files (Note: we have checked all our drives and found and removed over 30 of these parasites). I believe the typical anti-virus and filter programs will not locate or remove these tracking parasites! Ray W5NOO

Web Page and Language Text Conversion (Attention non English viewers for help with this e-mail page!)
Use the mouse pointer wipe and copy text for translation or view an HTML web page text in a different language by visiting the following URL: **http://www.t-mail.com/index2.shtml** (Note: the operating instructions are even available in various languages). You can use the "Sail the Web" / T-Sail to convert a web page and use the "T-Text" / Paste Text function to do a wipe, and copy text into the program for a conversion to a selected language. You can also use the carbon copy or the Cc: in normal e-mail if you type in the following information in the little Cc: window English-German@T-Mail.com as an example to specify and send your normal e-mail that is then also converted to a foreign language you have specified. Note: language conversion accuracy may only be 90% and special fonts are required to be installed, for example with Japanese. (Wow these computers are sure getting smart and even know lot's of foreign languages!). Ray W5NOO ray@junct.com

Computer Tips (Let's check that confusing 'puter system out)
To check your computers hardware and software and performance you can do a Google search for, download and install the following programs "Bellarc Advisor" (a free program that runs off line and can also do your complete systems print out), and "Sandra" (a free demo that checks your system and settings and performance of your processor,memory, drives, etc.), or possibly the one available at **http://www.karenware.com** called "Computer Profiler" one of several of "Karen's power tools" that gives information on your hardware etc. We use the three preceding programs to check the computers configuration and performance and print out a complete history of the system setup and hardware and all the software that's installed, etc. (Note: My IBM computer can do almost everything, including cooking that is when a fan quits, it, however, doesn't always do Windows). Hi Hi

QST Magazine Article "Getting Started with SSTV" in PDF format!
If you don't subscribe to QST but would like to read or print out the QST article by me published back in Sept 1997 "Getting Started with SSTV" click the ARRL Link URL:
http://www.arrl.org/tis/info/pdf/99753.pdf. Note: you will have to first have the Adobe Acrobat Reader installed, (a free PDF type file viewing and printing program and after it's installed click the following URL:
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Ray W5NOO

New Digital Wireless Web Cam/PDA etc. Device (A look into the future of wireless video communications)
As we have indicated before you ain't seen nothin' yet! The new Richo RDC-1700 is a small (6.2 X 3.7 X 1.3 Inch) device with a 3.34-megapixle camera equipped with a 3.5 inch LCD TFT rotating color viewing screen that also has motion and sound recording functions that can use a wireless send function using 802.11b and also the faster 3G operation where available. This remarkable little device is designed for the corporate market as the cost is $1,299. It has resolution as high as 2048 X 1536 with a 6MB of recordable internal flash memory. It has a touch screen and 3x optical zoom and operates with the Mac and Windows systems using internet protocols. A remarkable device with e-mail and web browsing and FTP that provides very high quality digital pictures and all this as a wireless portable device operating on battery power yet.

New Low cost Robot Dog by Sony Co, Batteries & Software Included (Digital Photography Is just going to the dogs)
We will soon have a new AIBO type robot dog by Sony Co. that sells for only $599 list that can respond to 75 voice commands and perform things like wake up and dance etc., but also has a routine where it walks around and photographs things of interest and saves them on an internal memory stick. I wonder what it finds interesting? Perhaps a fire plug or just some more Robot Dogs, Hi, Hi. My Intel USB web cam will snap a picture if it detects motion but doesn't move around and search for subjects to photograph like the Sony Robo Dog cam. However, so far, the Sony Robot Dogs are unable to reproduce or replicate themselves without more engineering and technical development but are just manufactured clones.

New VISION Editor
(contact the new VISION editor at ka8lwr@bright.net)

The newly elected Secretary/ Editor Marlin Alberty KA8LWR will soon be taking over the VISION operation and I hope the viewers will give their support and send him information to put in the news letter so we can have a useful and interesting publication.

Happy Viewing. 73, Ray, W5NOO, (past Editor/Director IVCA)

ATVQ

W e Finally Did It!!!

WATS Happenings July 2002
by John Chamberlain, AC5CV - Email: AC5CV@arrl.net
3506 Greenleaf Dr.
Waco, TX 76710

WATS Happenings - Official Newsletter of the Waco Amateur Television Society, Inc.
http://www.qsl.net/kc5oyn

The Waco Amateur Television Society (WATS) has tried without success for three years (or was it four?) in a row to get a high-altitude ATV camera to soar over the annual Field Day site. But in 2002 we finally did it!

At the June WATS meeting, the Directors authorized the investment in a tank of helium to inflate a 6-foot diameter balloon (previously purchased by John Gafford N5XAK). The plan was to attach the N5XAK Sky-Eye (a low-powered ATV camera and transmitter) to the balloon and loft it high above the Field Day site. Previous years' attempts were pretty disappointing: burst

balloons, kites with too strong winds, and so forth.

Just a little bit more...a little more...
while the news media is filming away...

But 2002 was looking pretty good! An on-site weather station reported wind speeds around 3 to 8 mph. N5XAK had the large tank of helium, one large balloon waiting to be inflated, and a working Sky-Eye camera and transmitter. To top it off, we had local news media there with their television cameras eagerly filming the inflation process. Amidst growing excitement, it grew more and more apparent that we were really going to make it happen this year!

KC5KQL, AC5CV, and N5XAK letting out tethers. Note the cross-bar and Sky-Eye below the balloon.

Nobody had calculated how much lift we could expect from a helium balloon, so we just "winged it." We inflated the balloon to about 3 feet, tied a string around the balloon's nipple, attached the Sky-Eye assembly (including tethers), and released it. Well, the camera and balloon immediately sank to the ground. Not enough lift. So, back to the helium tank we went. We increased the volume to over twice the first attempt, bringing the balloon diameter to almost 5 feet, and repeated the "lift test." This time it had plenty of lifting power! Hurrah!

So, Justin Martin, KC5KQL, N5XAK, and I carefully walked the tethered balloon over to a clear area where the trees were far apart and began feeding out the pair of tether lines. N5XAK had designed an approximately 3-foot wooden cross-rod for the camera assembly that could be somewhat stabilized using a pair of tethers. We hoped that this would reduce the tendency of the camera to spin wildly beneath the balloon, and yield more usable ATV images.

David Bush, KC5UOZ, had set up a television monitor tuned to cable channel 60 under the park's pavilion, and everyone there was able to easily watch the overhead view from the Sky-Eye. It clearly showed the pavilion area growing smaller and smaller, as

John N5XAK and Justin KC5KQL slowly fed out the tethers to 500 feet. The balloon steadily lifted its payload to the maximum altitude and delivered great images from high above the HOTARC-WATS Field Day site. We noticed that at that range, the little 80 mW PC Electronics transmitter using a simple loop antenna had trouble getting color pictures to us. Congrats to N5XAK, and all who participated and contributed! What a great exercise! And, a fun thing to do for Field Day!

Sky-Eye image of HOTARC trailer and ham vehicles (center), and pavilion rooftop (lower left) from about 500 feet. Note: We lost color from this altitude.

KC5NT, KI5QT, and N5XAK: the "salvage operation."

Oh...shall I say how the story ended? About an hour after the balloon had been tied off and everyone was getting pretty used to the high-altitude images of the pavilion on the television screen, there was suddenly a loud Bang! on the pavilion's metal rooftop. The first thought was that HOTARC's homemade 40-meter vertical mounted atop the metal roof had collapsed. But then it was apparent that it was not the antenna, but rather the Sky-Eye! The balloon had burst and the whole assembly came down in a crash-right on the edge of the pavilion. A videotape recording being made showed that the balloon's carcass wrapped itself around the camera and fell (or fluttered) for about 8 seconds before striking the pavilion! Thankfully, no one or nothing was hurt or damaged as a result of the 500-foot fall! Even the Sky-Eye seemed to emerge unscathed, with little more than a cracked battery case. N5XAK's aluminum-box Sky-Eye construction seemed to justify itself!

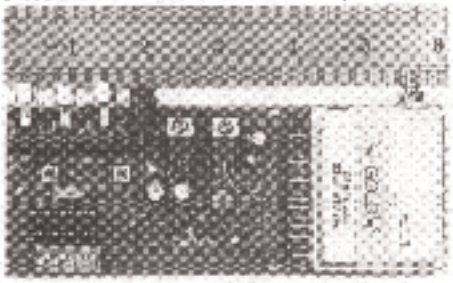
ATVQ

A fun time was had by many hams and visitors at the Field Day site who took their hand at driving around the KC5UOZ radio-controlled ATV "hot rod." A battery powered X10 camera module transmitted 2.4 GHz pictures back to a TV monitor. By watching the TV screen only, one could drive the car around the pavilion's picnic tables using the RC transmitter. Neat trick, David!

TVHAM.com

The best ATV gear in the world...

'Gold' 23cm (1.24-1.36GHz) FM ATV receiver $109.99

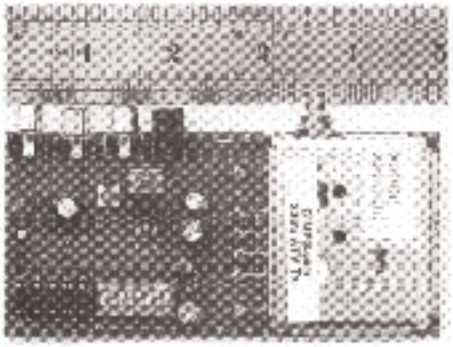


Incredibly sensitive, fully synthesized, covers the 23cm band (and beyond) in 500kHz steps. Includes 6.0 & 6.5MHz intercarrier sound. Runs from 12-15V DC, RCA sockets for audio & video, SMA RF socket. Built & tested.

'Platinum' 23cm FM ATV receiver $129.99

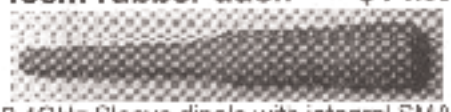
Includes video de-emphasis circuit, all other specifications similar to the Gold receiver (above). Built & tested.

23cm FM ATV transmitter $89.99



Fully synthesized, covers the whole 23cm band (and beyond) in 500kHz steps. Includes 6.0 & 6.5MHz intercarrier sound. Runs from 12-18V DC. RCA audio & video connections. SMA RF socket. Typically 50mW RF output.

13cm rubber duck $14.99



2.4GHz Sleeve dipole with integral SMA plug. Suitable for Rx or low power Tx.

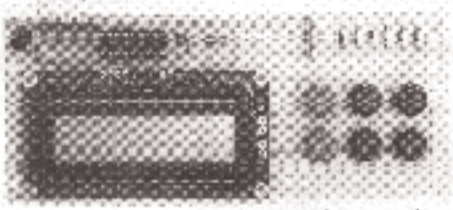
23cm 18W high gain amplifier kit $199.99

This PA kit gives up to 18W from our 23/24cmTx. Needs 0.5°C/W heatsink (not supplied), runs on 12-14V @ 5A.

'Does everything' 23cm 18W amp $499.99

Our best 23cm amplifier! Gives up to 18W out for 50mW drive. **On-board co-ax relay** to switch between Tx and Rx, includes a **directional coupler** for power indication. SMA sockets for Tx, Rx and antenna. Built & tested, mounted on a large heatsink. 12-14V DC @ 5A.

23cm LCD transceiver controller $89.99



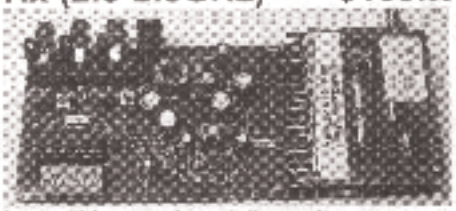
Connects to our receiver and transmitter for pushbutton frequency control in 125kHz steps. Adds 3 VFOs for Tx, 3 for Rx. Can auto-tune the receiver to the transmitter frequency (for checking your input to the repeater). Many more features including wideband receive from 800-1000MHz! Built & tested.

Will not work a transmitter without a receiver.

13cm magmount $89.99

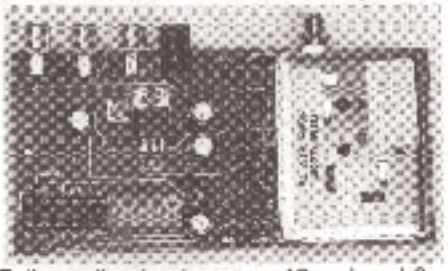
Professional quality 5dBi gain co-linear. Complete with 2m of LMR-240 co-ax and fitted SMA plug.

'13cm Advanced' FM ATV Rx (2.3-2.5GHz) $109.99



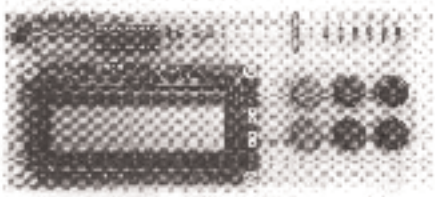
Incredibly sensitive, fully synthesized, receives 2.305-2.559GHz in 1MHz steps. Includes 6.0 & 6.5MHz sound. Runs on 12-15V DC. RCA's for audio & video, SMA RF socket. Built & tested.

13cm FM ATV transmitter $89.99



Fully synthesized, covers 13cm band & beyond in 1MHz steps. Includes 6.0 & 6.5MHz sound. Runs on 12-18V DC. RCA audio & video connections, SMA RF socket. Typically 20mW RF output.

13cm LCD transceiver controller $89.99

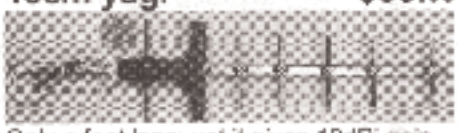


Connects to our Rx & Tx for pushbutton frequency control. Features like our 23cm controller but receives 2.200 - 2.700GHz. Built & tested.

Will not work a transmitter without a receiver.

Did you know that FMTV can give PS pictures with up to 20dB less signal than is needed for AM? Or that your amplifier doesn't need to be linear, so you get more bang per buck?

13cm yagi $99.99

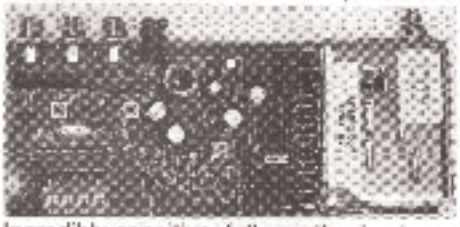


Only a foot long, yet it gives 13dBi gain. Includes 18" of co-ax with fitted SMA plug, and the antenna is supplied with a full mast mounting kit (not shown).

6W 13cm high gain power amplifier $469.99

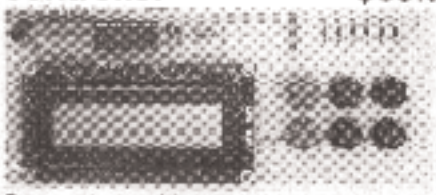
Requires around 25mW in for 6W out, typically gives 5W from our 13cm Tx. Runs on 12-14V. Fairly broadband - covers whole 13cm without re-tuning. Built, tested and aligned.

'ENG' FM TV receiver 2.20-2.70GHz $109.99



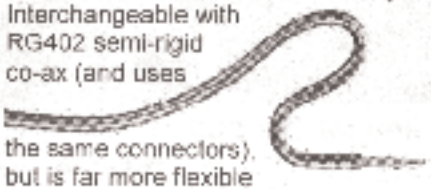
Incredibly sensitive, fully synthesized, receives 2.2-2.7GHz in 2MHz steps. Covers a lot of the outside broadcast frequencies, video senders and lots of other interesting stuff. All other specs similar to our 13cm Advanced receiver. Runs on 12-18V DC. Built & tested.

"ENG" LCD receiver controller $89.99



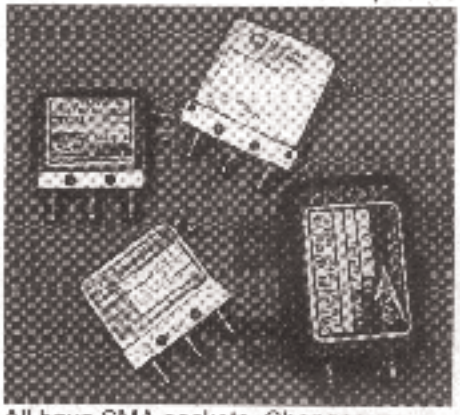
Connects to either our 13cm Advanced or ENG Rx. Receive frequency range 2.2-2.7GHz in 125kHz steps. Adds 10 memories plus memory scan and band scan modes. Built & tested.

Quickform 141 microwave co-ax foot $2.49



Interchangeable with RG402 semi-rigid co-ax (and uses the same connectors), but is far more flexible and easier to use. Good to 18GHz. Shipping $1.50 (any length).

Microwave coax relays new / used from $49.99

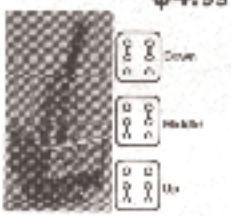


All have SMA sockets. Changeover (3 port) and transfer (4 port) types available. Typically 0.1dB loss and 70dB isolation at 13cm - detailed specifications are given on our web site at www.TVHAM.com.

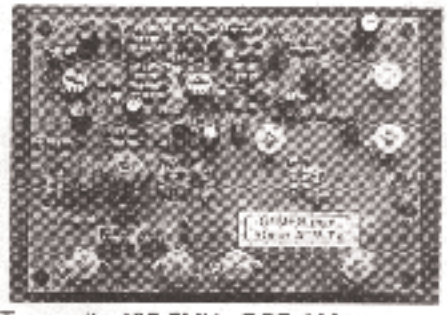
- *FREE Tx/Rx sequencer switch with every relay!*

Tx/Rx sequencer switch $4.99

Special switch for simple Tx/Rx sequencing. Full details on web site. Please add $1.50 shipping (free shipping if bought with any other item.)



70cm AM ATV Tx $144.99



Transmits 435.5MHz DSB AM, 50-100mW output. Crystal controlled - other frequencies are available by arrangement. Runs from 12-14V DC, supplied built & tested. ~2.8"x3.9"

70cm 10W amp kit $159.99

This PA kit gives around 15W peak sync up from our 70cm Tx. Requires 0.5°C/W heatsink (not supplied), and runs on 12-14V at about 5A.

Scanning microwave FM TV receiver $294.99

5" mono monitor with built-in scanning receiver for 2.3-2.5GHz FM video. On-screen frequency display (while scanning), very sensitive, built-in patch antenna. Demodulates 6MHz sound. Runs on 12-14V DC @ 1A, includes cigar lighter power lead. Built & tested.

About TVHAM

TVHAM is the US and world-wide arm of G1MFG.com, Europe's leading supplier of TV equipment.

- All our equipment works fine with NTSC video.

HOW TO ORDER

The best way to order is to buy online from our web site at **www.TVHAM.com**. We aim to dispatch within 24 hours, and delivery usually takes 4-6 working days. Prices include shipping (except on a couple of items, and it's clearly stated).

We can accept personal checks subject to a $20 processing fee. *Please email us for details before sending a check.* Our mail address is PO Box 12, Hedge End, SO32 2AA, UK. We give a full one year parts & labor warranty on all our built & tested products (return to base basis), excluding damage caused by misuse.

Email any inquiries to info@TVHAM.com.

Visit our web site at www.TVHAM.com

Life Is Too Short For SSTV
An Interview With Giles Read - G1MFG

by Gene Harlan - WB9MMM - Email: ATVQ@hampubs.com
Editor ATVQ

This year at the Dayton Hamvention, I had the pleasure of meeting and getting to know Giles Read, G1MFG. Giles is the guy behind the ad you may have noticed in ATVQ titled **TVHAM.com**. Shari and I found him a very interesting person and we enjoyed his company during the time we had together. We decided it would be interesting to interview him while we had the chance.

ATVQ: How long have you been in ham radio?

Giles: I have been in ham radio about twenty years. I got my license when I was 17 years old and have kept it up ever since. I had a few years when I wasn't very active but since I discovered ATV I've been on the air a lot more.

ATVQ: Why did you get into ham radio?

Giles: Well, CB was an interest when I was about 12 years old. I used to design beep tone boards for local CB'ers at the peak of the sunspot cycle 22 years ago. I think it was then that I fell in love with the magic of radio. I got into ham radio a few years later when I was working with a family friend in a ham radio supply business.

ATVQ: So have you been frying components for a long time?

Giles: When I was about 2 years old, while being watched - but not very well - by a babysitter, I drove a nail into a wall outlet. I blacked out a whole block, and the electricity supply company was amazed that I survived. I didn't suffer a scratch! I think my Mom still has that nail somewhere.

ATVQ: Are you enjoying Dayton?

Giles: Yes, very much. I hope I can come back in the future. It's a lot bigger than any of the hamfests (we call them "rallies") in the UK - many of ours would fit into the main hall at Dayton!

ATVQ: What is this equipment that you brought with you to show us?

Giles: I brought you one of each of our most popular items: an ATV transmitter, receiver and LCD controller set for 23cm and 13cm. The power output of the transmitters is quite low, but of course you just add an amplifier as required. The receivers are incredibly sensitive, by the way - most preamps I've seen actually degrade the received signal! I have been selling this equipment for over three years now, and it has been taking Europe by storm, with thousands in use. We have used FM TV for donkeys' years (that's British for "a long time") on 1.2 GHz and up. Some people still use AM on 440 MHz, a great DX band, but we only have a narrow allocation at that frequency. In Britain, for instance, the whole band is less than 10MHz wide and we can't do sound or PAL color without going to VSB (the color carrier is 4.43MHz). And of course, the other hams have a few things to say about an ATV'er taking up the whole band!

Waiting in line for the bus at the Salem shopping mall. From left Gene Melton, AK9N, Giles Read, G1MFG, unknown, and Darrell Crimmins, KG5E.

ATVQ: Do you make all this equipment by yourself?

Giles: Yes and no. The basic transmitters and receivers are brought in from the Far East and we then work some minor miracles to make them work on the ham bands. I do most of the design-related stuff, and I have a couple of helpers who assist with the run-of-the-mill production work. It's a typically British arrangement.

Giles is telling me about one of his boards.

ATVQ: Do you have ATV repeaters in Great Britain?

Giles: Yes, around 30 or 40 throughout the country. Almost all are in-band repeaters, most being on 1.3 GHz with a couple on 2.4 GHz, and a few on 10 GHz. It is not uncommon for the longer-established repeaters to have inputs on two or more bands. There are plans to link some of the repeaters together like the system in California.

ATVQ: How many hams are there in Great Britain?

Giles: I think there are about 55,000, which is around one in a thousand across the whole population. Unfortunately, the ham community is getting older. Relatively few young people seem to be able to understand the magic of radio, and sadly they don't see the need when they've got their game consoles, the Internet and cellular phones. Looking around at Dayton I'd say that there were a lot more young faces than you'd get at a similar event in Britain.

ATVQ: Tell us a little about your past.

Giles: For about 15 years I used to write technical handbooks

High power 1.3GHz transceiver receiving repeater GB3ZZ at a range of about 25 miles

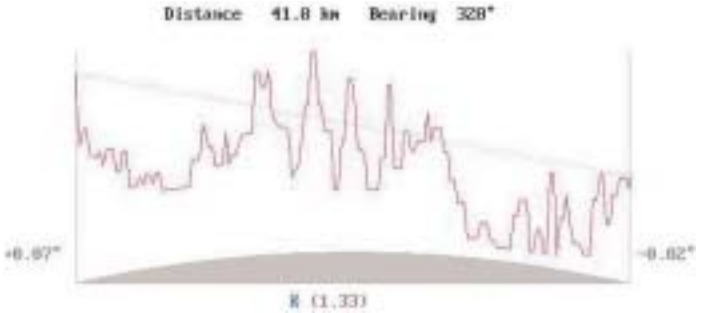
for a living. Subjects of these handbooks ranged from hardware, software, and process control - more or less everything. I was doing this for private companies and for the British government. At one point I was an assessor for ISO9000 and wrote quite a few quality assurance manuals.

ATVQ: Are you a member of any other societies?

Giles: I am a member of BATC and advertise heavily in their magazine, member of ATNA, and subscriber and advertiser of your wonderful publication ATVQ. Oh, and I joined the RSGB just after I was licensed. Back then you had to get a letter of recommendation from another member before you could join!

ATVQ: How did your business start?

Giles: My first experience with ATV was modifying (screwing up, wrecking) a regular TV to try and make it work on 70 cm. But I lived in the country where there was no activity (I was a teenager at the time). Next I played with video senders (part 15



Showing the (very difficult) 25 mile path over which I was working GB3ZZ in the above photo. The repeater was getting a P5 from me, but that's not surprising: repeaters are limited to 25W ERP, and I have about 4kW ERP.

type with a range of 100 feet) and fitted one with a hand held camera. I coined the phrase 'Creepie Peepie', the video equivalent of the walkie-talkie and of course today's popular hat cams. For a few years my interest went quiet until I came across a foreign manufacturer offering 2.4 GHz video transmitters and receivers. I thought they would be kind of fun and ordered a few pairs. After thorough investigation, we found that we could make them sing and dance on the ATV frequencies. Suddenly, people wanted to buy them from me, because the cost was about 1/10th of anything else on 2.4 GHz. So I ordered some more, and got some 1.2GHz transmitters and receivers from the same source which we also modified for the amateur bands. At the same time I got a web site going. Word spread like wildfire to the ATV community, and soon I have to give up my day job to cope with the volume of the business.

ATVQ: How many countries do you sell to?

Giles: It has become a worldwide business selling to places like Belgium, Norway, Greece, El Salvador, and of course the US! I even have a re-seller in New Zealand. The basic plot is that I never forget I'm a ham first and foremost, and I treat my customers the way I'd want to be treated. I don't make exaggerated claims for my products, deliver promptly, and keep the price as low as possible. Starting from humble beginnings and keeping to these principles, it has grown to a global business.

ATVQ: What are your plans for the future?

Giles: Rather fuzzy, actually. I hope that the US will wake up to the huge advantages of FMTV on the microwave bands - no need for linear amplification, much better receiver sensitivity, noise immunity and so on. And, naturally, I hope that a lot of people will buy their FMTV gear from me. I plan to add some more items to the TVHAM.com web site soon, for instance a low cost simple ATV repeater controller and various antennas. And of course I'll keep going to the hamfests in Europe and hopefully come back to Dayton next year!

Giles' old "battlebus" with the 60' trailer mast in a field. Typical English weather - at least it wasn't raining much.

1.3GHz transceiver front panel

The inside of my general purpose 1.3GHz transceiver

ATVQ: Do you operate much yourself?

Giles: Yes, although I'm quite limited from home because of the local terrain. Instead, I have put together a portable station based around a very ancient motorhome. I've also got a 60 foot portable mast, which helps. You'll sometimes find me in a field, or on top of a hill, happily working TV direct or through a repeater.

ATVQ: So what sort of gear do you use?

Giles: The motorhome is equipped with 1.3GHz and 2.4GHz transmit and receive, and sometime I put 430MHz AM in for good measure, usually during contests. On a recent trip I used a high power 1.3GHz transceiver I've recently put together, which worked very well. Using this gear from a hilltop during a contest I'd expect to get a P5 range of 100 miles or more.

WEB LINKS

Giles' US web site - **www.TVHAM.com**
Dayton Hamvention - **www.hamvention.org**
British Amateur Television Club (BATC) - **www.BATC.org.uk**
Radio Society of Great Britain - **www.rsgb.org**
Map of UK 23cm repeaters - **http://www.coldal.org.uk/23cmtv.htm**

ATVQ

What s on (A)TV Tonight?

Ed Busch, K8MKN Email: edbusch@tvec.net
The Cedar Creek Amateur Radio Club
103 Merlin Dr.
Mabank, TX 75147

If you are like most ATV or Repeater operators the answer is "not much." There is a reason it costs billions to create interesting and entertaining television for the networks.

It takes people by the thousands and expensive equipment to produce what we see. And even though satellite services offer hundreds of channels and they've spent all those billions, my wife's answer to the above question is still generally, "not much."

To be sure ATV has a very special audience and we enjoy net and other personal touches that are not appreciated by the masses. However, the principle is still the same as commercial TV; you have to offer something new and interesting to keep people watching.

I have an idea taken from commercial TV that might help us gather taped segments worth watching. Before there was satellite distribution of syndicated television shows, they had developed a cheap and reliable way of getting tapes of programs to stations across the country and the world.

They put together a list of stations that were to receive a weekly television show. They then mailed the master tape to the first station on the list. That station knew when they received the tape, to make a copy of it or broadcast it. When they were through, they mailed the master tape to the next station on the list. Everybody had this list. If it didn't show up in Chicago, the list showed it should have been sent from Detroit.

They always knew who had the tape and if it was late, they knew immediately where to look for it. Simple, cheap and reliable. And what has this to do with ATV?

We all have camcorders...we use them on the air. Take some shots of your ATV system, your club meetings, speakers, Field Day, public service, weather, nets, any historic locations near you? Let's see them. These tapes can be five minutes or fifty minutes. The point is, it would be great to share information and video with each other, from all over the world.

Somebody has to start, so I will. We will shoot some video of our small club (30 members) and show you our installation on a commercial tower (370 feet mounted upside down). We are located in Texas, on Cedar Creek Lake, it's beautiful so I'll shoot some video of the area. We have speakers from time to time and I'll include a highlight from that.

So is anybody interested in seeing this? The Dallas group hamtv.org is and they have said they'll start to work on their tape right away. These tapes must be sent out on standard size VHS on SP speed. Beyond that there are no rules. I have conned ATVQ to be the keeper of the list. So if you want to produce a short video and receive videos from others, contact Gene by e-mail or otherwise.

Don't be afraid to shoot something; we don't expect it to be professional and have lots of graphics. Just show us what you are doing and how. Consider it a video letter.

Now does somebody have a source for some past video? Has anybody taped the forums at Dayton and elsewhere? The video doesn't have to be about ATV, any ham activity is fine. I think this could be the beginning of a way to make our ATV hobby more interesting.

So what's on ATV tonight? You have a choice: the ID graphics or Fred showing us his dog or the Sydney Australia group video tonight.

Note from ATVQ: I want to thank Ed for writing up his idea, and I think it is a good one. Anyone who would like the tapes should also commit to producing one or more themselves. For starters, send me an email to ATVQ@hampubs.com to tell me you or your group are interested. After we know that there are those that are interested, I will keep a list in the order they were received. So, if you are first to respond, you will be first to see the newest tapes out there! There will be no cost to any club except the cost of making your own tape and mailing costs. We will have to have a limit on how long you can keep a tape before sending it on. I would suggest one week. This way the tape can make it to lots of people/groups quickly.

Let me know what you think. I hope to see lots of tapes coming and going!

Gene - WB9MMM
ATVQ

Omni-Gain Vertical Collinear for VHF and UHF

Coax comes alive II, the next generation

By Mike Collis- WA6SVT - Email: WA6SVT@aol.com
POB 1594
Crestline, CA 92325

This rugged antenna, an omnidirectional collinear, is capable of surviving harsh environments. It's a good choice for repeater installations and can be top, or side mounted to the tower. You can obtain approximately 3 - 10 dB of gain over a dipole, depending on the number of elements you use. The higher the gain the narrower the elevation pattern. Bandwidth is normally 10 Mhz. on the 70 cm. band and 25 Mhz. on 23 cm, making the antenna an excellent candidate for ATV repeater use. Many improvements have been made since my original article, "Omni-Gain Collinear for 70 cm and 23 cm," was first published in the May 1982 issue of 73 magazine.

Concept of construction.

The main elements are constructed from ½ wavelength sections of rigid coaxial cable that you build. You can calculate the element length using the **formula** *5904 divided by the desired resonant frequency of the antenna, times the velocity factor of the coaxial cable*. Originally I used RG-213 with a velocity factor of .66 or 66%, I now use RG-11 or CAC-11 (a solid conductor aluminum shield cable) for high power antennas and RG-6 for low power.

Construction is facilitated by the removal of the jacket and shield from the coax and sliding the dielectric and center conductor into the hobby brass tubing to create the rigid hardline element. Select the diameter of the brass tube to just fit snugly over the dielectric and center conductor of the coax. The brass tube provides a more rigid support for each element and makes it easier to solder them together. Use the above formula to calculate the lengths of the brass tubes. Cut the coax segment 7/8" longer than the brass tube. This will allow 1/16" of dielectric and 3/8" of the center conductor to extend out each end of the tube for element spacing and soldering.

Make as many ½ wave elements as needed for the gain you desire. 4 elements = approximately 3.5 dBd, 8 elements = 6 dBd, 18 elements = 9 dBd, and 21 elements = 10 dBd. In addition to the ½ wave elements, you need a ¼ wave element and a ¼ wave whip for the top of the antenna. The whip is cut to a true ¼ wavelength (no velocity factor correction) and is made out of number 12 wire or 1/8" brass rod. Vertical beam downtilt can also be applied into the calculation and construction of the antenna.

Constructing the collinear.

Step 1. Determine the length of the ½ wave elements using the formula: 5904 divided by the Frequency in Mhz. multiplied by the Velocity Factor of the of the dielectric. (5904/F x VF) Use the manufacturer's stated velocity factor for the cable you plan to use. Solid polyethylene usually has a velocity factor of .66 or 66% while foam cable ranges from .79 to .83.

Step 2. If you desire vertical beam downtilt, cut the elements 2% shorter, than the length calculated in step 1, for 3° of downtilt.
See figure 6a for elevation patterns.

Step 3. Cut lengths of coax approximately 7/8" longer than the brass element tube.

Step 4. Remove the outer jacket and shield from the coax and slide the dielectric and center conductor into the brass tube. Center the coax element in the brass tube.

Step 5. Using a knife, being careful not to nick the center conductor, cut the dielectric so that a 1/16" sticks out past the end of the tube. This should leave about 3/8" of center conductor exposed on each end for soldering.
See figure 1.

Step 6. Being careful to keep the whole antenna as straight as possible, solder the prepared elements together by soldering the center conductor of each element to the outer conductor of the next element. You will end up with transposed connected elements.
See figure 2.

Step 7. The last element is ¼ long, exactly ½ of the measured length of the ½ wave length element. Short out the top of this section by bending over the center conductor and soldering it to the brass tube. A ¼ wave whip is connected to the top of the shorted out ¼ wave coax element. The whip is a true ¼ wave long (no velocity factor correction) and can be constructed out of small diameter brass rod. Make certain that the full ¼ wave extends above the point where the coax section is shorted out by cutting the rod a bit longer and soldering this excess to the brass tube.
See figure 3.

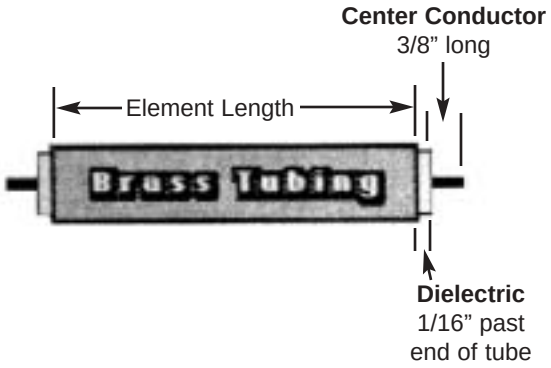


Figure 1 - Element preparation

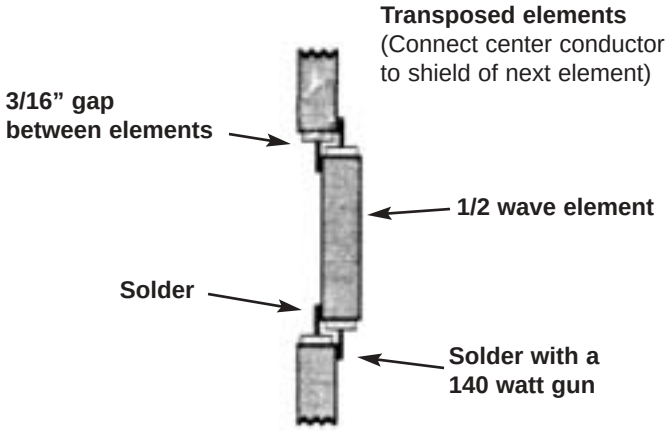


Figure 2 - Element assembly

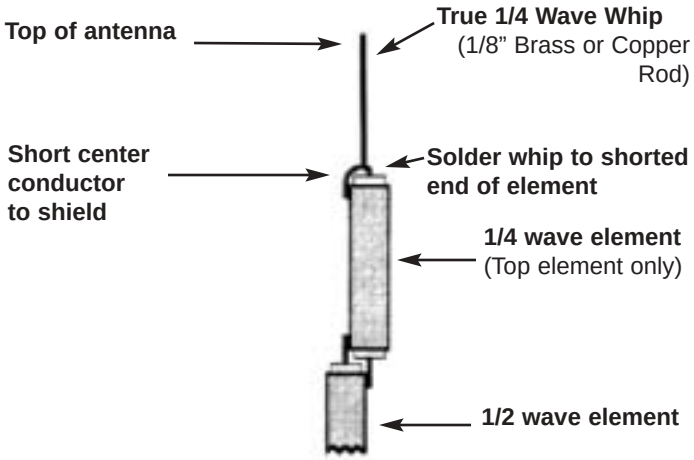


Figure 3 - Top section of collinear

Step 8. The 50 ohm feedline can be any length. I use RG-213 or RG-214 coax with an "N" connector attached . Strip off at least a half wavelength of shield on the other end of the feedline. Leave about an inch of shield sticking out of the vinyl jacket for soldering to the brass tube. Cut the dielectric and center conductor to expose about 3/8" of the center conductor. Slide the half wave length or longer brass tube over the end of the exposed feedline so that the 1" of braid can be soldered over the bottom of the brass tube.

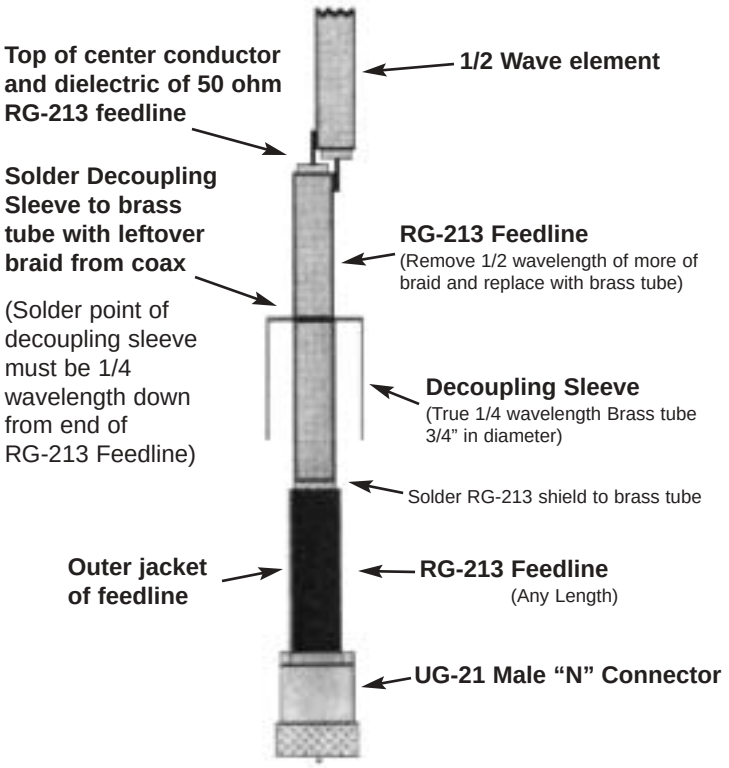


Figure 4 - Feedline attachment and decoupling sleeve

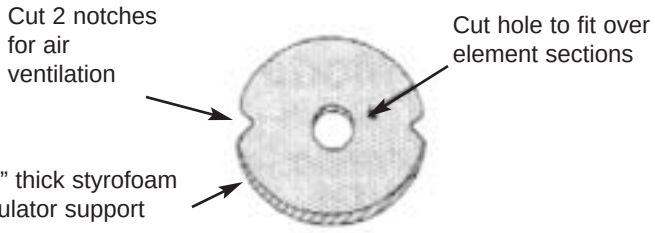


Figure 5 - Styrofoam spacer (3 or more needed)

Step 9. Make a true ¼ wave long (no velocity factor correction) decoupling sleeve out of a piece of ¾" brass tubing. Using some excess shield material, or some other acceptable manner, solder the decoupling sleeve to the feedline outer conductor at a point exactly ¼ wavelength down from where the feedline attaches to the first ½ wave element.
See figure 4.

Step 10. Attach the exposed end of the feedline to the bottom of the collinear by connecting the center conductor of the feedline to the outer conductor of the antenna and vice versa.

Step 11. Make some styrofoam spacers to slip over some of the antenna elements. Cut the spacers for a diameter slightly less than the inside diameter of the radome pipe. Space them out to evenly support the antenna when you place it in the fiberglass or PVC radome cover. The spacers should be attached to the mid-point of the element with a small amount of epoxy or hot glue.
See figure 5.

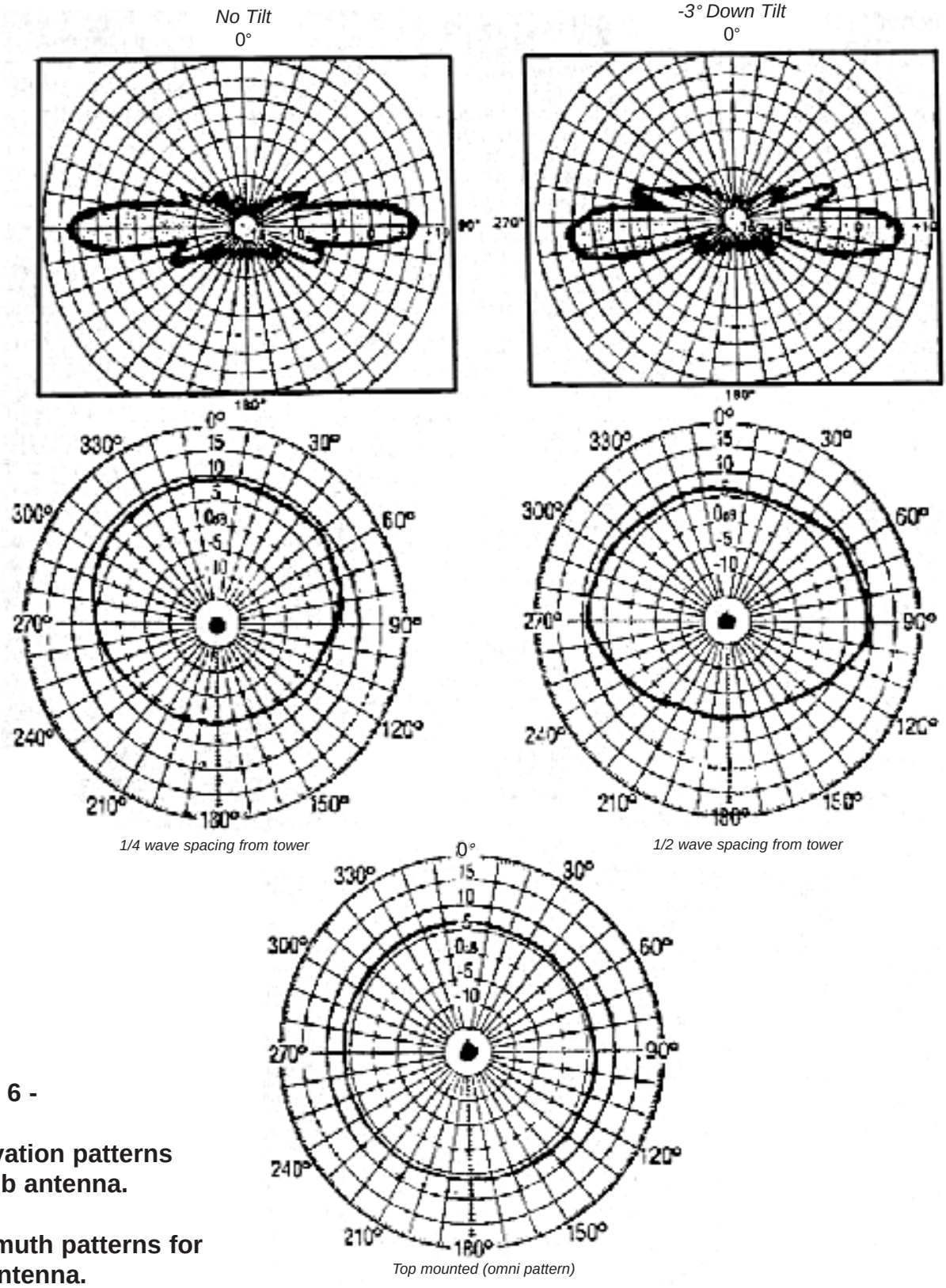
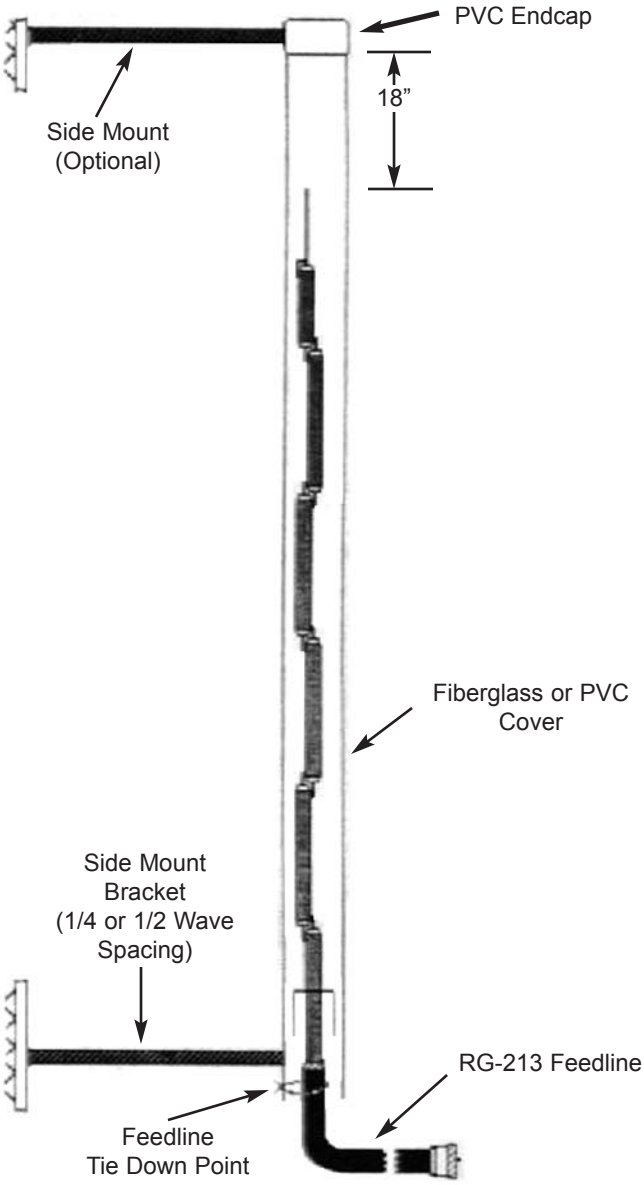


Figure 6 -

a) Elevation patterns for 6 db antenna.

b) Azimuth patterns for 6 db antenna.

Step 12. Cut a piece of fiberglass or PVC pipe so that 18 inches or more extend past the top of the whip and also below the decoupling sleeve. Slide the antenna carefully into the pipe and cap off the top. Drill two holes near the bottom of the radome pipe and pass a piece of insulated wire through and around the feedline below the decoupling sleeve to support the weight of the antenna. Twist the wire until it holds the feedline tightly against the radome cover. Place another styrofoam spacer on the very end of the pipe and glue it in place. Make sure to poke a few small holes or notches in the spacer to allow the end of the antenna to breathe. You are ready to fire up the your collinear! See figure 7.



Mounting your collinear on top of your tower will give you an omni-directional pattern. If you desire a Cardoid pattern, or if your only option is side mounting, you can mount the antenna to the side of the tower with one or two brackets. Make sure the bottom support is attached to the antenna below the decoupling sleeve, and that the top support is mounted 18” or more above the top of the whip. Mounting the collinear ¼ wavelength away from the side of the tower will give you about a 2 dB increase in the frontal lobe of the pattern. A spacing of a ½ wavelength will increase the signal 2 dB at 90° angles from the frontal lobe. Both patterns give a null in the direction of the tower.

See figure 6b.

This antenna should handle the worst Mother Nature can throw at it. It has performed admirably at the ATV repeater site on 5670’ Santiago Peak for many seasons. Mounted on the tower it blends right in with the commercial antenna installations.

Mike Collis WA6SVT is active on amateur television (ATV) in the Los Angeles area and works as a communications supervisor for San Bernadino County. You may reach him at P.O. Box 1549 Crestline CA 92325 or at WA6SVT@aol.com

ATVQ

Figure 7 - Completed collinear (four 1/2 wave elements)

Tune up and Operation.

Find a clear area, free of obstructions. Mount the antenna to a pole making sure to clamp the antenna to the mast at a point below the decoupling sleeve area. Attach a wattmeter or SWR bridge to the antenna. If the SWR is over 1.5:1 you can adjust the decoupling sleeve slightly up or down for the best reading. If you have designed the antenna for downtilt you can check it by observing the signal strength of a nearby repeater. Tilt the angle of the antenna until the signal peaks, then measure the angle with a protractor. If the angle checks ok you are ready to mount the antenna to your tower!

TV Technology For Non-Techies
Three Paths to Quality

All television systems are designed with three basic elements. This applied to audio, video or digital signals. The three basic systems are universally applied to all facilities, stations, production houses and remote vehicles. The same three principal systems exist in all size plants, from the largest production houses or TV stations, radio stations, and cable TV systems, all the way down to basic "garage" operations with small facilities. Each of the three elements are basic to the operation of any facility and to understanding how any facility works. No matter what equipment is involved, no matter what brand, no matter what age, no matter what condition, there are always three basic elements that make the facility work.

In the end, the three elemental systems form the technology of a technical plant and make it work, and make it possible to produce a coherent output product.

QUALITY IS JOB ONE

All the equipment in the world will not provide a quality product unless there is first a starting point to establish the proper operation of the equipment. This starting point is calibration. Before any judgment can be made about sound, video or data, there has to be measurement. In order to measure, you must have an accurate ruler. In television the "rulers" are standard reference video and audio signals. Depending on the specific type of equipment, different rulers are used to calibrate performance. Once the calibration step is completed, then reasonable judgment can be made about the quality and value of audio, video or data. If the calibrate step is violated later, then there is no longer a valid comparison and NO judgment can be made about the signal.

For operational purposes, WYIN and most facilities have a standard reference value. You do not need to know what the absolute values are, that is an engineering, maintenance or a design function. For example: The standard calibration for audio is 0 VU. The actual absolute value of ZERO may be any established power. ZERO does not represent nothing, or a complete lack of signal. It represents an absolute value to which other levels are compared. Over the years, different absolute values have been established to meet the technical requirements of the transmission medium.

Here are some absolute values of ZERO

-22 dBmv	@ 50,000 ohms
-10 dBm	@ 10,000 ohms
+4 dBm	@ 500 ohms
+4 dBm	@ 600 ohms
-50 dBm	@ 70 ohms
-50 dBm	@ 25 ohms
70.7 volts	@ 600 ohms
+8	@ 600 ohms

As you can see there is a wide variety of values for ZERO VU. There are equally other values for measuring ZERO level in video, RF and sound pressure (SPL) as well as any mechanical system. ZERO pounds of tire pressure means there is equal pressure inside and outside the tire. 32 pounds of tire pressure means there is 32 pounds per square inch more pressure inside than outside. 32 PSI is also known as 1 atmosphere or 29.94 inches of Mercury.

In video the reference value is 1 volt P-P. The absolute value is 1 volt at 75 ohms at load terminal impedance.

As an equipment operator, you seldom need to know the absolute value of ZERO, it is enough to know that ZERO was chosen as a REFERENCE level and everything else is measured relative to that value.

PATH ONE

Of the three basic elements, the one most people think of most is the **PROGRAM SIGNAL PATH**.

This is the electronic connection route that carried the actual information, ie: audio, video or data, from point A to point B. This could be the wire from the microphone to the connector panel, to the audio console, through the mic amplifier, through the mic fader, into the mix buss, into the buss amplifier, into the sub mix fader, into the line amplifier to the output fader, to the output connector, through the cable to the routing switcher, through the cross points of the routing switcher, to the patch panel, to the audio control amplifier, to the stereo generator, to the microwave to the transmitter. Or any other signal path to a recorder, or other TERMINAL EQUIPMENT device.

Along the way, the signal is controlled by manual, electronic or

conversion processes to generate the desired output product. Whatever adjustments or conversions made in this path determine the quality and value of what comes out the final connection.

PATH TWO

The second most recognized path is how you see or listen to the **MONITORING SIGNAL PATH**.

At any point in the SIGNAL PATH, there can be MONITORING. Monitoring does NOT alter the signal path in any way. The sole purpose of MONITORING is to check the value of the SIGNAL against a reference CALIBRATION. This may mean measuring the level of the mic signal, looking at the oscilloscope to measure the video values of a camera, or decoding a data stream to be sure there are no errors.

Monitoring is done with the CALIBRATED monitoring devices mentioned on page one. Making any adjustment to the monitoring device invalidates any measurement the device can make. Even an audio monitor amplifier level is critical in a critical listening environment such as a recording studio where the audio mixer depends on the absolute and relative audio levels the ears are used to hearing. If the monitor amp or level is not at the standard reference level, then noise and distortion values heard are not valid. For example, if the system has a known noise floor, the audio monitoring system may be adjusted to where the operator hears the noise at their threshold of hearing. If the noise seems louder, the operator must believe there is a noise problem. If there is less, then the operator must believe there is an omission in the system resulting in lower noise. In some studios the loud speaker volume is measured with a test signal and adjusted to a specific SPL, sound pressure level, such as 90 db A SPL. That's 90 db above the threshold of hearing using 'A' frequency weighting. An absolute value, 90 db is a common value since speakers are rated as so many db SPL at 1 watt. By then watching the WATT meter on an amplifier, the operator knows the absolute value being generated so that the maximum loudness in an established theater sound system can be achieved without distortion caused by overloading the playback system.

Adjustments to the MONITORING PATH have no effect on the SIGNAL PATH. The changes are only those PERCEIVED (viewed or heard) by the operator. You cannot correct a SIGNAL PATH problem by adjusting the MONITORING!

Monitoring can be done by interrupting the signal path, or by paralleling the signal path.

PATH THREE

Perhaps the least visible signal path is what makes the entire facility work together as one system.

CONTROL AND REFERENCE PATH

The audio and video devices need to be able to mix, join, match and otherwise blend different signals together without gaps, overlaps, jumps or other time disturbances. While less visible in analog audio, TIME of when events occur is important. For a switcher to properly sequence the video signal, the signals must be in time coherence. The beginning of each video line and each frame must be exactly at the same moment so that there is not a video disturbance: glitch, jump, phase change, etc. In digital signals (which may be carrying information for video, audio or 'data') the digital signals are sent in packets which must also be "spliced" at the exact right time to avoid decoding problems.

Audio and TV production uses SMPTE time code and a timed video signals. Usually the timed video signal is

Quality Continued on Page 43

Possible Threat To The Future Of Digital Amateur Television

ATNA has been approached by the Electronic Frontier Foundation to endorse their comments concerning the "Consumer Broadband and Digital Television Promotion Act" (CBDTPA).

This act could potentially prevent the sale and manufacture of digital television transmitting equipment (broadcast compatible) to anyone who is not a "Professional Broadcaster" ... It also requires future recording/receiving equipment to have controls to prevent copying of encrypted materials.

Please comment to your congressional delegation and copy the ATNA board c/o **john@hays.org**

I am also soliciting any help in formulating a response.

John D. Hays - Sr. Vice President - ATNA

Here is a review by Seth Schoen of the EFF:

I'm writing from the Electronic Frontier Foundation, a non-profit civil liberties organization based in San Francisco. We wanted to let you know about a legislative proposal to regulate ATSC modulators and demodulators, and to seek ATNA's help in opposing it.

As you may be aware, legislation supported by some entertainment companies was introduced in the Senate by Sen. Ernest "Fritz" Hollings, by the name of the Consumer Broadband and Digital Television Promotion Act (CBDTPA). This is a revision of an earlier piece of Hollings legislation called the Security Systems Standards and Certification Act (SSSCA). Both bills impose broad government mandates requiring manufacturers of digital media devices to incorporate copy-restriction technologies.

Although the CBDTPA (in its current form) has been relatively unpopular, the major Hollywood studios have been using the threat of legislation with considerable success to force major electronics manufacturers to negotiate with them on a series of "compromise" standards which would incorporate particular rules sought by the movie studios. These standards would then be mandated by law on a broad range of manufacturers; since they are narrower than the CBDTPA, electronics industries would not oppose these bills as vigorously as they opposed the original legislation.

The first of these compromises, a set of rules on "broadcast protection", is nearing completion. The Broadcast Protection Discussion Group (BPDG), convened by the studios, expects to issue its report on Friday, May 17. The BPDG's work is of concern to us, and we believe that it should also be of concern for amateur television.

The studios expressed the view that the new digital television standard, ATSC, was insufficiently "secure" for their purposes, because it contained no encryption or restrictions on recording. (Of course, NTSC does not have either of these things, either, but recently the entertainment industries have been arguing that the availability of works in digital form entitles them to more control over technology, because it's easier to copy digital works accurately.)

To be precise, encryption of ATSC is permitted when it is carried over satellite or cable, but not when ATSC is transmitted in a terrestrial broadcast. The studios have already reached arrangements which satisfied them (for the most part) for encryption of cable and satellite transmission, and corresponding restrictions on home recording. But traditionally terrestrial broadcasts have not been encrypted at all, and there's a widespread belief that there are strong public policy principles forbidding the encryption of terrestrial broadcast. Certainly the FCC has long prohibited the use of encryption for terrestrial broadcast.

Since the ATSC standard has already been established, and many ATSC receivers and transmitters have been sold, and many terrestrial stations have begun their ATSC broadcasts, it would be difficult to replace or modify ATSC. Therefore, the studios suggested that their purposes could be achieved by leaving ATSC as it is, but imposing government regulations on all manufacturers of ATSC modulators and demodulators, other than those meant for and sold to "professionals".

The idea is that the government could require manufacturers of ATSC receivers to incorporate the restrictions the studios seek, so that, even though the broadcasts will be unencrypted, all consumer equipment will still implement restrictions on the ability to use or record them.

There are parallels to the 1991 cell phone scanner ban here: the proposal would limit the ability to make receivers for a certain kind of signal, even where that signal is not encrypted. In that case, the goal was to protect privacy (or perhaps the economic interests of cell phone companies); in this case, the goal is to protect copyrights (or perhaps the economic interests of movie studios).

The particular restrictions contemplated include a rule that an ATSC demodulator (or any product which contains one, including associated software) must be "robust" against end-user modifications, so tamper-resistant and not user-serviceable. In addition, the demodulator must not allow the end-user to access the ATSC signal directly. And it may not provide a digital output of a signal with a copyright bit set except using "Approved Output" or "Approved Recording Method" technologies, which are to be approved using criteria written by Hollywood studios, and include only proprietary technologies with encryption and copy restrictions.

For somewhat obscure reasons, the group is also proposing corresponding rules for ATSC modulators. Both of these rules would mean that a variety of existing ATSC equipment would become illegal. However, no incompatible changes to ATSC itself are contemplated, so that all existing HDTV equipment would continue to work. There is no technical enforcement measure in this proposal; the enforcement is purely legislative. It is a prohibition of the manufacture of any ATSC device (other than for TV professionals) which does not incorporate certain restrictions in its function or which is not tamper-resistant.

For more information, including the draft itself, please see

http://bpdg.blogs.eff.org/

We expect that Philips will be writing a dissenting report within BPDG, which we will sign and which we will encourage others to sign. (A draft of that dissent should be available tomorrow.) We think radio amateurs should be concerned about restrictions on receivers, about the attempt to impose proprietary rules on all uses of an open standard, and about the limitation of the ability to build or modify one's own receiving equipment. We'd appreciate ATNA's support and advice.

Seth Schoen - Staff Technologist - schoen@eff.org
Electronic Frontier Foundation

Some Ideas On Attracting New Hams

Henry Ruhwiedel AA9XW - Email: A9xw@cs.com

It seems to me that we may not have noticed how we can attract, promote, Elmer new hams with little or no cost. There just seems to be so many ways that the grass roots ham can apply a little effort to help things along. Are you doing any of these activities?

When you administer a ham license test, do you follow up? Isn't it rather simple to give each applicant the club newsletter and meeting information at the time of the exam? Maybe a list of club or group activities in the area, dates of the next local ham-fests and a personal invite from the examiners?

Ask the applicant if they need help finding equipment, Elmering their first on-air experience, of a list of equipment dealers, or locally known used equipment is all the person needs to feel they have JOINED ham radio, not just taken a test.

How about asking them if they are going to put up an antenna and offering some advice or help in doing it so it is done safely? Do they know how to connect coax, put on connectors, tune up, or have any experience? Just ask them!

When the newly licensed get on the air, do you talk to them? Do you invite them to local club meetings? Do you ask them to drop by on Field Day or other FUN activities?

Its nice to take a rig to a scout meeting or a classroom, but how about getting thesScout troop or class to a local ham store and let them just look around at all the stuff, watch as the demo rigs are used for contacts, and encourage them to ask questions? Make them sit there and read a book or magazine from the literature racks. Let the OM's tell them of fun happenings in each ham activity, that rare DX, the VHF contest, your first ATV or SSTV contact, why you like CW or SSB. Let them look at all the mobile stations in the parking lot. Get them to participate in the QSO, something besides asking the name, rank and QTH. What does the other person do for a living, is ham radio a part of their career or just a hobby and what other hobbies do they have? Get them to actually converse with another ham over the radio.

Here's an easy one. Buy your local high school a subscription to the ham magazines. QST, CQ, World Radio, ATVQ, and ask them to find the scientific errors in the 73 editorials. Encourage them to become amateur scientists in their own homes.

If you have a radio store, how about a blurb in the local paper for a learn about ham radio day? Invite the public, have some extra demo gear out. "You are invited to explore the fascinating world of Ham Radio at the XYZ radio store. Come see how communications have changed over the years and the new fun and excitement to be found in being a ham. Free soft drinks and chips or some other imaginative ploy to attract the unlicensed. Invite the media.

They don't have much else to do on a weekend anyway.
Is your club bogged down in politics? Meetings as exciting as a barb wire collection? Then cut to the chase, eliminate the business meeting and get to activities or have a segment for business and a fixed starting time for general stuff so those who want the details arrive early, those that want the activities arrive later. If each officer and board member can't cut their report to 50 words or less, vote them off. Learn how to be brief and not drag out every little nickel and dime detail.

There have been a couple of clubs that have had their own cable access TV show. Why not contact the local cable company and do one of your own. Interview various hams and others affected by ham radio. You might even get a local sponsor if you ask around town.

Many years ago I tried to promote hams getting LPTV stations. These low power TV stations could have been had for about $3,000 each. Today most are worth a half million or more. One LPTV station is now a major market ABC affiliate and worth millions. You could have made money as a Home Shopping Channel affiliate and sprinkled in your own ham radio club meetings, televise (legally broadcast) your ham events, etc. Today there is still an opportunity for a low power FM station to do the same thing. A 100 watt FM station with a 100 foot high antenna would fit on many ham towers, buildings etc, and costs about 10 cents an hour to operate. Interference free coverage is about 6 miles radius and typically receivable up to 15 miles radius. That covers just about any town in the country outside of the top 20, and a sizeable portion within the top 20.

Back in the late 60's and early 70's I made a TV PSA 60 seconds long, and sent copies to about 200 TV stations. They get tired of running the same old spots for the same old charity, a cup of coffee a day can feed thirty filthy rug rats spots. With the inexpensive but high quality consumer TV gear today, you could take a DVCam and edit a simple spot to promote ham radio and your local club on local TV and cable channels. With a little group you could easily produce a simple program for cable

New Hams Continued on Page 41

ATV And Henry Amp Question

Hello Mr. Ruhwiedel,
I have a Henry UHF amp that I would like to use on ATV. Specifically, to output on 426.25Mhz. I live in Massachusetts and the trees and hills make ATV quite a challenge. So far, I have removed the internal filter so as not to clip my signal. Also, it is my understanding that the amp should be run in ssb mode due to bios issues. The problem I seem to have is broad-banding and power output. I am feeding the unit with 20 watts (peak to sync tip) about 9 average with no video. If I tune for maximum output on my Bird meter, the results are dismal. I would have thought that the amp could output more than about 10 watts, little more than the input.

You are the only ham that I know of that has used a Henry for ATV. Can you help? If I can get the power up to respectable levels, I will put an interdigital filter on the output and ATV life will be good.

Thank you for any advice and assistance.

Larry Steiner, N1URE - larry_steiner@hotmail.com
Springfield, Ma. USA

Ps. I have the only ATV repeater in Western Ma. See it at my clubs web site: **www.hcra.org**

Subject: Re: ATV and Henry Amp question

You didn't say which Henry amp you are using. I had the 3CX800 version and now have the 3CX1500 version. The 800 watt amp should output about 600 watts peak of sync with 25 watts drive. The bandpass filter was the first item to take out. You should have 10-13 db gain, the tube is spected at 13 db gain at 400 Mhz. I found it hard to tune. Basically just kept going back and forth with the tune and load controls till I got a bunch of watts. The peak is very narrow when tuning, and because the cavity drifts with temperature, you have to tune after you've been key down a short while.. It finally stabilizes after about five minutes at QRO.

Mine also had a defective input coax cable. This was from the box input to the tube tuning area. I finally drove it with a 25-40 watt output of a D100 to get full power. The input of the amp seems to be not well designed for low input. The tube is supposed to be full power at 15 watts, and the gold will evaporate from the grid and deposit on the cathode killing emission.

Open the top of the RF output line box. The flapper coupling capacitor on mine was poorly built. It needs to move parallel to the plate. On mine it came sticking up in he air so one edge was a lot closer than the other. This makes for a much higher Q and voltage gradient. I had to take mine and unsolder it from the N connector, then bend it L shape and resolder it so that it would move up and down vs move like a clock arm.

SSB mode is right. Has nothing to do with bias, that was set with a diode. Has to do with getting enough HV to make it work. The amp was more for FM than AM so I don;t think they bothered with trying to design a good power/bandwidth amp.

The main limitation after the output BPF, and you do need one external to the box because it can go into oscillation and screw up the spectrum, is the high Q output tank. You can lower the Q by replacing the silver plated plate with a less conductive one, but then gain drops. For video, it really doesn't matter that much since a receiver equalizer would have compensated by lowering the 1.5 Mhz near the carrier in favor of more power in the upper sidebands. On ATV, since the info we want is mostly LF anyway, the color and sound just go along for the ride and in DX you are lucky if the receive station can see your call sign let alone color and subcarrier. So I would not really bother with modifying the design for broadband operation. If you have some silver plate material I would increase the size of the output coupling flap capacitor by 50%. To operate at the low end of the band the flap is pushed down to the point where it is mashed against the plate insulation teflon. It's a cheap crappy way of making an output coupling cap that is tuneable. A better method would have been to have a fixed cap in parallel with a real rotary blade type cap. For $3495 you think they could do a better job.

The bigger amp is no better in construction, the amp also is temp sensitive and is unstable, needs to have a neutralizing network. On the QRO amp, the tuning knobs are hard to get at, have power leads exposed near them, and it looks like an industrial box. Nothing ham like in appearance. At least the 3CX800 version looks like a traditional Henry ham amp.

I did a write up about these in ATVQ many years ago. After the mods I was finally able to get 800 watts out for 40 watts PEP in (25 watts average). The newer 25 watt PC Electronics transmitter would give you about 400 watts out PEP. If you can get one of the old Alinco 30-40 watt amps or a Mirage D26, that will give you about the right drive level. On SSB I used my Yaesu FT736R and got decent results. Also for FM.

I do recommend that you run a watt meter or spectrum analyzer when ever you use the amp to aid in tune up and operation. its the only way you can maintain the amp in resonance as it changes tuning while you operate. Just keep adjusting for max output/smoke (that's a DX joke).

I would recommend that you first tune in the FM mode, then jump to the SSB mode so it doesn't arc over. Maybe Henry Radio has some fixes for these by now. You might want to contact them. They still make amps, just no more ham store last I heard.

I keep waiting for some company to make a really good QRO 440 amp. The Alpha guys finally made it to 6 meters and say soon a 2 meter version. But anything above DC seems to be beyond the grasp of the main stream amp builders. The Henry 2 meter and 6 meter power amps seemed to work fine. I have a

old 6N2 to clean up and put back together some day. If my old Henry 4K-2 worked on the WARC bands I would have kept it. Now I am having a hard time finding a good QRO HF amp for 160-10. The ones that claim QRO are QRO for about 10 minutes an hour, or actually run 750-1000 watts output. Time to find a good old Heathkit 1.5 KW amp and modify it for all band operation. The solid state amps are even worse. They rate them as 1 KW but they hardly make 500 watts CW. and then fade to lower power after a few minutes. I have one rated for 600 watts. Sure, maybe the first half cycle of RF. After that, its lucky to make 500 and barely holds 400 after 20-30 minutes before the thermal breaker pops you off the air. That's with extra blowers that make the shack so noisy you want to move the mic outside.

I'm passing this along to ATVQ and PC Electronics as they might want to make comments or pass the info along to others.

Henry AA9XW - A9XW@cs.com

ATVQ

New Hams Continued from Page 39

access. You don't have to produce a "Ham's Wide World" just concentrate on a fun aspect of the hobby and explain it in simple terms. If you aren't up to video, do it for radio. In 1970 A few hams and I recorded a series of ham radio shows called the Marconi Experiment, and distributed it on tape or CD to stations to air during those non profit hours on Sunday AM It meets their public service requirements! It cost about $5 a week to do. You can ask the stations via letter or a phone call to air your free program. The tapes can be sent from station to station so you don't need a lot of tapes. With internet file transfer, you could record it on your PC and send the audio file to the station for zero cost. Did you ask the local Radio Shack store if they would put up a poster listing your local club meeting days and times? How about the local book store? Do you send notices to local schools for inclusion in their school papers, or activity boards? Do you even contact the local schools? How about inviting a school class or science club to your home shack for a demo? Simple project: using algebra, a measuring tape and compass have them figure out how high your antenna is or verify your rotor heading.

Do you fox hunt? Did you ever invite non hams along for the ride? "Hey lets go for a beer and pizza, oh by the way, I have to find a transmitter along the way. Here, hold this while I turn the antenna." Maybe give the fox hunt receiver and antenna to the scouts or school group, show them how to use it and let them find the fox! Just about any fun ham activity can be a fun activity for a non ham if you invite them to participate, show them how or what to do and let them in to the circle of ham radio. That's how we get new people to JOIN ham radio, not just throw license tests at them and challenge them to get the right answers. Be friendly, pass on a smile and a bit of knowledge. They may want to buy your old rig when you want a new one! Now come up with some ideas of your own!

ATVQ

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

PC ELECTRONICS

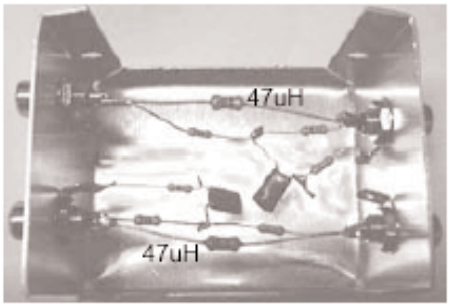
33/23FMR-2 Two Band FM ATV Receiver

This imported FM video receiver has been converted by us to receive in the 33 and 23cm ham bands. The frequencies are selected by the front panel rotary switch with a small flat blade screwdriver. If other frequencies are desired in the ham bands, the PIC can be replaced with one from WB7UBB, Brian. Miles, 12015 N. 34th St., Phoenix AZ 85028 email: wb7ubb@cox.co, however the AFC is very wide and will lock on to frequencies typically within 10 MHz of the channel frequency. None of the old push buttons do anything, the FIX light is only a power on indicator and the channel 4 light indicates that the synthesizer is locked.

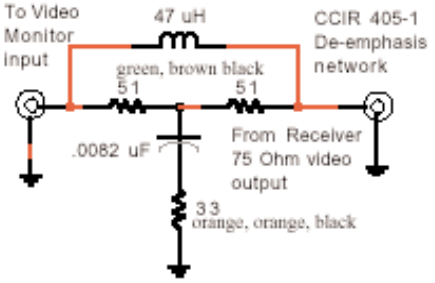
A wall plug power supply is provided, however, the receiver can be powered from any 12 to 14 Vdc power supply.

The rear panel has dual video and line audio RCA jack outputs. Sound subcarrier is 5.5 MHz. De-emphasis is standard on these ham bands but is not built into this unit and must be added if used in your area. Pre-emphasis of the video frequencies in the transmitter and corresponding de-emphasis in the receiver reduces the noise bandwidth and results in about 6 dB more sensitivity or twice the distance for a P4 to 5 picture. However, you cannot mix those with and without the network or you will get very distorted video or unstable sync.

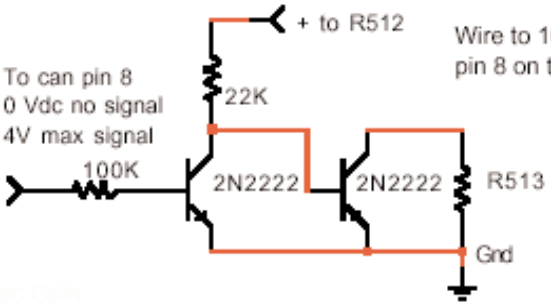
De-emphasis detail: Parts less box and connectors are supplied . The photos and schematic show the network mounted in a Radio shack 270-235 aluminum box. Run a short RCA plug shielded jumper between the receiver video out jacks and the de-emphasis box. To make up for the loss through the network, solder a jumper across R422 and another across R424, turn up the video gain pot, VR401, for 1 Vp-p output into a 75 Ohm resistive termination.



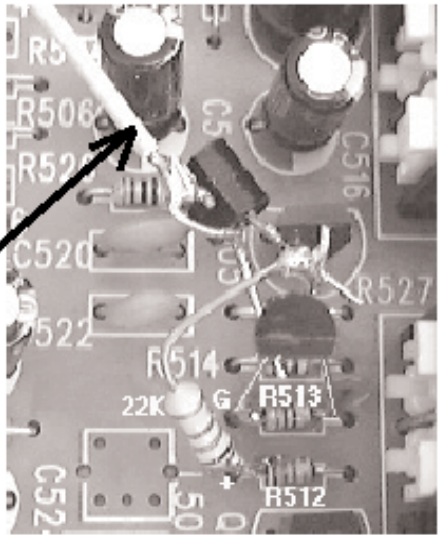
Twist one end of the 51 Ohm and .0082 uF leads together and then solder the parts as shown. Twist the other end of the cap with one end of the 33 Ohm resistor and solder together. Cut off excess leads from the solder joints. Connect and solder the 47 uH to each RCA jack along with each end of the 51 Ohm resistors. Solder the 33 Ohm resistor lead to one of the ground lugs.



Audio squelch can be added to the -2 version (square front) of this receiver using the circuit to the right and shown in the photo. Pin 8 on the downconverter can is the AGC test pin (counting left to right). The audio outputs will open with about a P4 picture. The transistor leads are used to make solder connections.



Wire to 100K connected to pin 8 on the metal can



Quality Continued from Page 43

called reference black or black burst (BB). It is simply a signal that starts at the master generator and is used to synchronize all the video equipment in the plant.

The BB signal usually has one reference point called TIME ZERO. Since the signal takes some amount of time to get from point A to point B, once again ZERO is not an absolute but a convenient REFERENCE point. All signal times are compared to the TIME ZERO point. For a studio, the TZ may be the black or matt signal at the switcher. All other signals are adjusted so that none are late or early. Adjustments in time have NO effect on adjustments in LEVEL (amplitude). All signals exist in both time and amplitude at all points and times in a system. Each is independently controllable. At a plant level, the TZ may be the master router and all signals are timed from their source to TZ. In some plants this can be very complicated.

TBC's and FS devices are used to automatically adjust and control the time of a signal to arrive at TZ at the exact right moment. These devices also have user controls to adjust the AMPLITUDE of the signal to correct for errors in levels and phase.

Time code (TC) is also a TZ signal. For proper editing, TC signals are phased with the video signal or the digital audio signal so that edits occur at the precise frame point selected. In audio, you can have sub frame editing, since a video frame is 1/30 of a second, and audio can be sliced into any time division. Video is always edited on a full frame. For absolute perfection, the sophisticated editing systems use the four field color frame for editing to prevent color shift at the edit point. This is not necessary with most video editing since the output TBC forces correct color framing at the output.

Time for questions.

ATVQ

Amateur Television of North America(ATNA)

What are you doing to help advance the technology and popularity of ATV operation in your community?

Are you a member of an active ATV club that needs more clout with the local frequency coordinating body?

Do you have questions about the legality of transmitting some specific type of video via ATV?

Do you believe ATV operators interests are being well represented by the ARRL or anyone else?

Who is your liaison to the FCC or local coordinating body for technical ATV related issues?

Who is working to tie together all the regional ATV groups to combine forces for a common cause?

If you aren't doing these things yourself then you need to join us and become a member of the national ATV organization that can provide all of these services and more !

You, and your club can become a member and affiliated member club of Amateur Television of North America (ATNA), the national organization dedicated to the future of Amateur Television in North America. ATNA will be the central focus to promote ATV operations and technological advancement for North America. Among other activities ATNA's members will support ATV presentations at amateur conventions around the country, including the Dayton Hamvention.

Our Mission:

* Protect our ATV interests and frequencies.

* Use video transmission methods to support public service.

* Plan for the amateur radio adoption of new technology.

* Advance the state of the art of video and video transmission methods.

* Work with National Frequency Coordinators as the official coordinating body for Fast Scan ATV in North America

* Associate in an equal role with other like minded societies

If you want ATV to prosper in North America, please fill out the application on the other side of this form and join us as members of ATNA.

More information about ATNA can be found on the Internet at World Wide Web page http://atna.ampr.org, by email to atna@qsl.net or by regular mail to:

ATNA c/o Harry F. DeVerter Jr., N3KYR 303 Shultz Road Lancaster, PA 17603-9563

Email messages about ATNA operations will be distributed on the following Internet list server
atv@atv.tallahassee.net

Please see the instructions on the ATNA web page about subscribing to the ATV Tallahassee list server.

INDIVIDUAL MEMBERSHIP APPLICATION FOR ATNA

NAME _____ CALL_____ (Please Print)

ADDRESS_____CITY_____

STATE_____ZIP_____+_____ E-MAIL _____

TELEPHONE #(_____)_____ Please check here if you want it kept private_____

Member of any other ATV club? _____

Select all bands you are active on:
440 Mhz____, Simplex____, Repeater____,AM___, FM___, 900Mhz_____, Simplex____, Repeater____,AM___, FM___
1200 Mhz___, Simplex____, Repeater_____,AM___, FM___, 2300Mhz___, Simplex____, Repeater____,AM___, FM___
10 Ghz_____, Simplex____, Repeater____,AM___, FM___, Other_____, Simplex____, Repeater____,AM___, FM___

Indicate Frequency and check those that apply to you.

Individual membership (USD) $5.00 per year.

Enclosed (USD) $_____for _____ years dues.

Individual membership (USD) $8.00 (Non-North American)

Enclosed (USD) $_____for _____ years dues (Non-North American)

ORGANIZATION APPLICATION FOR ATNA

NAME _____CALL_____E-MAIL/WEB SITE _____

ADDRESS_____CITY_____STATE/COUNTRY_____ZIP_____+_____
NUMBER OF ACTIVE MEMBERS _____

ORGANIZATION DUES:

Category "A" Club is 3-9 members and dues are $10.00 per year.
Category "B" Club is 10-24 members and dues are $20.00 per year.
Category "C" Club is 25 members or more and dues are $30.00 per year.

Signature of Applicant_____

Make checks, M.O., etc. payable to:

ATNA C/O Harry F. DeVerter Jr., N3KYR
303 Shults Road
Lancaster, PA 17603-9563

FOR ATNA USE ONLY: ATNA #_____CLUB CATEGORY_____CHECK#_____AMT._____

Membership card sent___/___/___ Certificate sent___/___/___ (ORG. ONLY)

ATNA Dayton 2002
by Dave, KC3AM

The Amateur Television of North America (ATNA) meeting was held this year on Friday May 17, 2002 at the Stockyards Inn in Dayton Ohio with about 25 people in attendance. This included one DX visitor from the UK, Giles, G1MFG.

President John Shaffer, W3SST, conducted the meeting and the nomination of officers for the two year term 2002-2004 as follows: Ron Cohen, K3ZKO for President, John Hays, K7VB for Vice President & Technical, Dave Stepnowski, KC3AM for Secretary / Treasurer. There were no other nominations so this slate of officers was elected by acclimation. The Executive Board made the conscious decision to reduce the number of officers nominated to those just cited to streamline the management of ATNA. W3SST and W3HMS remain Board members.

John Jaminet, W3HMS, served as MC, commencing after dinner with a moment of silence and members tribute to John Hey, W8STB who became a Silent Key shortly after Dayton 2001.

The MC then introduced Mike Collis, W6SVT, who gave a great talk about the ATN system in Southern California. The videotape he showed said it all. Mike makes good use of our microwave allocations on 1.2, 2.4 & 10 GHZ for linking. There are some long distances between mountaintops and Mike's group has conquered these distances.

I thought I was doing well with a 24-mile path here in the east but I now see what can be accomplished. Door prizes were drawn and the winners were WA8HFK winning a $50 gift certificate from Intuitive Circuits, KB8CRM picked up a video sampler board and WB9KMO took a subscription to ATVQ.

After break Mike talked about the controllers he has made to use in the system and mentioned something about a MAX 453 chip for video, I'll have to look into that and see what it is. Mike can be contacted at **WA6SVT@AOL.COM** or **WA6SVT@ARRL.ORG**.

Next Bill Brown, WB8ELK, talked about some of his balloon flights and suggested **www.wb8elk.com** and **www.hamballoons.com** for some info on balloon launches. You can also look at **www.detroitatvrepeater.com** for info on the Michigan crew and their launches. There were two more prize drawings and WA3CPO took a subscription to ATVQ and W6CDR received a circuit board for a 28-volt power supply. Mike finished up the night with information on how to file comments on NPRM's with the FCC. Comments are needed when a NPRM may affect us but they have to be of very high quality with substance and comments that can that can be substantiated. The meeting was adjourned about 2200.

We also had a dinner meeting again at the Stockyards Restaurant on Saturday night. I might add that the Prime Rib was just fine Thursday, Friday and Saturday night. I eat well when I come out for the weekend though not necessarily healthy!

Outgoing President John Shaffer, W3SST, recapped Friday nights happenings for the Saturday only attendees. As with just about any ATV organization, we need input for our newsletter and for ATVQ. . Little things that we learn may seem insignificant but they could help someone else sometime, so please share your experiences with the rest of us. The newsletters will be sent out by e-mail and when needed by snail mail for those without e-mail.

Gary, W3DTN, talked about comments to the FCC as well as general FCC issues and concerns. John, W3HMS, had a videotape of his microwave ATV gear along with some ATV video from his visit to France in April 2002. Ron, K3ZKO & Dave, KC3AM talked about their linking of the Philadelphia, PA and Wilmington, DE repeaters on 1.2 & 2.4 GHz FM over a 25 mile path. Ron talked about his experience with Bob, W3EFG in Florida and how they use Net Meeting to pass along their weekly ATV nets to each other over the net. Hope to see more of you next year at Dayton.

ATVQ

Dave KC3AM

ITVLP

I received several responses from my message about the start of TV linking over the internet. Since our friends "Down Under" have been doing a bit of SSTV using Reflector 5 in Sydney. See below...

Well, you'll probably recognize my name in the ITVLP list, but to let you know that REF 5 has already played host to SSTV (around a week ago), and a number of VK nodes have worked the mode over IRLP (think I've been in on every session so far! :)), so you're likely to get a good response from VK IRLPers. The downside, of course, is that the hours when SSTV is normally done in VK requires one to be an insomniac if you live in the USA! :-) I'll ask Pete (VK2YX) if REF 5 is going to be opened up to SSTV again in the near future. If I can make such a sked, I'll be there! :)

I figure our best bet would be to join in with them if they don't mind. We had responses from Canada, England and the US from node owners with an interest in joining in.

A friend of mine, also a node owner suggested a simplex link with IRLP to do SSTV and ATV. This is something I'm considering, what do you all think?

That's all I have for now, 73
John KD5INM
Kd5inm@aol.com

Britain s Terrestrial Digital TV System Folds

British pay-TV company ITV Digital was forced to pull the plug on all its services at the end of April 2002 following several weeks of being in administration (the UK equivalent of Chapter 11). The main cause of the failure was an expensive 3-year contract with the Football League. The deal left ITV Digital owing nearly 180 million pounds ($270m) over two years for the rights to televise soccer matches. Take-up of the subscription channels had been disappointing and anecdotal evidence suggests that the company was losing some $1500 per viewer per soccer match. Overall the business was losing roughly $1.5m per day by March 2002 and had a subscriber base of only about one million.

Digital TV in the UK has a short but interesting history. All terrestrial broadcasting is in the UHF band between 470-860MHz and ITV Digital (then ONdigital) was launched with great fanfare in late 1998. Its unique selling point was that subscribers could - at least in theory - get a subscription and a set-top box, plug it in to their existing TV aerial, and start enjoying around 30 subscription and free channels (at that time there were just 5 analog terrestrial TV channels). But the system was dogged with technical problems from the start. Digital TV signals were transmitted with some 30dB less power than the analog signals and many people needed to upgrade their aerials to receive the new signals. At G1MFG we had to go from a simple ten-dollar 10 element yagi to a rather more expensive 96-element antenna with a masthead preamp - and we were getting P5 signals on analog.

Rival pay-TV operator Sky (or B Sky B as it's known) launched a digital satellite service a couple of days before ONdigital came on air. You can only imagine the mad engineering scramble which was going on in the closing months of 1998 - including satellites being moved in orbit because the intended one was still on the ground - in order to beat ONdigital to market. Sky had the great advantage that it had been operating analog pay-TV for over 10 years and it already had a loyal customer base. The new digital satellite receivers used a small 16" (40cm) dish and snazzy new receivers which promised a whole host of interactive services. But best of all the satellite service offered some 200 channels, with the promise of many more to come.

From the moment the two services were launched it was all-out commercial war. In the beginning, ONdigital would sell you a set-top box and you then signed up for a subscription. So B Sky B countered by giving away its satellite boxes and dishes - whether or not you chose to subscribe to its services - although you did have to pay for installation (nailing the dish to a wall), which cost between $50 and $150 depending on whether or not you subscribed. This is where it got interesting. ONdigital decided to stop selling its boxes and instead make them available on free rental while you subscribed to their services.

Anyone could go into a TV shop, pay about $150 and walk out with an ONdigital box. They then had to phone ONdigital and get their viewing card authorized before they could watch any of the subscription channels, although there were a number of free-to-air channels which could be received without such authorization.

Now things started to get interesting. Someone, somewhere, hacked the ONdigital pay-TV code and started selling "see everything" pirate viewing cards. After a short while you could download everything you needed from the Internet. And apparently tens of thousands of people walked into TV shops, paid their $150 in cash, went home and started watching all the subscription channels (including the very expensive film and soccer channels) using pirate decoder cards. For a while it looked like ONdigital's subscriber figures were finally coming somewhere near their projections - until they noticed that huge numbers of their subscriptions were never being activated. One can only imagine the horror the company felt when it realized that the "established and safe" encryption system they'd hard-coded into their boxes was in fact as leaky as a sieve and being used to rip them off left, right and centre. No-one has ever published figures for the number of set-top boxes registered to John Smith (that's English for John Doe) but it's thought to run into hundreds of thousands. And remember, these boxes cost a lot more than $150 to make and - because they were on rental - probably appeared on the company's balance-sheet as assets!

Meanwhile, over at B Sky B, everything was pretty much rosy. Subscriber numbers were rising and - at up to $50 per month subscription - the real cost of issuing "free" boxes was probably relatively small. Add to that the fact that quite a few of the pay-TV channels offered by ONdigital were actually owned and operated by B Sky B and you start to see which way the wind was beginning to blow. One of B Sky B's strengths was its range of exclusive sports coverage, including many of the top soccer and rugby matches. For many people who weren't sports junkies that was one very good reason for signing up with ONdigital - much less sport! And, starved of the major sporting events by B Sky B, the five terrestrial channels also reduced their sports output, much to the relief of some.

At this point - April 2000 - ONdigital ran out of money and was taken over by Independent TV companies Granada and Carlton. The service was re-branded as ITV Digital and re-launched. For a while, you couldn't get a set-top box for love or money - the word on the street was that they were going like hot cakes. The reality was somewhat different: many of the ONdigital boxes on sale had been withdrawn, returned to a factory somewhere, and had little labels saying "ITV Digital" attached everywhere they once said ONdigital!

In a desperate attempt to woo viewers, ITV Digital decided to try and beat their larger rival at their own game. Having already invested some hundreds of millions into the service, it was decided to buy up sporting rights. In a 3-year, $475 million deal with the Football League, ITV Digital bought the rights to broadcast the Football League soccer games. Let's just put that into perspective for a moment: there are around 55 million men, women and chil-

dren in Great Britain, so they gambled around $10 per head of population on their coverage of one sport. Or, looking at it another way, with around a million subscribers at the time, they paid $475 on behalf of each of them for a channel which the subscribers would have to pay extra for anyway. Remember what I said about people possibly choosing ONdigital precisely because it DIDN'T have sports coverage? Now, I'm not a mathematician but I can't quite see how those figures add up.

In the end, as I understand it, only a few thousand people decided to pay the extra for the soccer coverage, even though it's supposed to be Britain's national sport. At this time many more people were watching all the subscription channels illegally anyway using pirate cards, so the true viewing figures will never be known. But it was too late and the rot had set in. Towards the end of 2001 it became clear to the owners of ITV Digital that the contract with the Football League was unsustainable and they tried to re-negotiate. Although some moves were made to compromise the costs (at this point ITV Digital owed them some $270m), an agreement couldn't be reached and the company went into administration. From then on it quickly became apparent that the company was mortally wounded and on the 30th April it ceased its pay-TV operations. Ironically, the ITV Sports Channel which had caused the demise of the company suddenly went free-to-air for around a couple of weeks until the broadcast TV rights expired, then it too went silent. Around a million subscribers were left with what amounted to blank screens, with only the few free-to-air channels left to watch.

This poses some interesting thoughts for amateur TV enthusiasts. It was originally intended to retrieve all of the set-top boxes when subscriptions expired, but that now looks very unlikely to happen. So there will probably be a lot of the boxes gathering dust or becoming available on the surplus market. Digital TV encoders are also just starting to appear on the market - indeed, experiments with digital transmissions were carried out last year at ATV repeater GB3AT in Winchester. Only time will tell whether the inventiveness of hams will be adequate to come up with coders and frequency shifters, but it could well herald a new lease of life for our (very small) 70cm band for TV purposes!

This particular cloud may yet turn out to have a silver lining, at least for radio amateurs. We'll keep you posted if anything else noteworthy happens!

ABOUT THE AUTHOR: G1MFG has been licensed for nearly 20 years and has become one of Europe's largest suppliers of amateur TV equipment, sold in the US via his web site **www.tvham.com**. He has published numerous articles over the years in various magazines, starting with a video digitizer he designed while still at school.

ATVQ

STOP PRESS: Just before press deadline we learned that the ITV Digital transmitting licenses have been re-assigned to a consortium including the BBC [Britain's national public service broadcaster] and Crown Castle [who owns the transmitters]. They plan to use the transmitter network to supply around 24 free-to-air channels instead of the 36 pay-TV services. It's expected that reducing the number of channels in the (limited) available bandwidth will address some of the reception problems which had dogged the pay-TV service. No further information was available when we went to press.

Consumer reaction:

I was hoping that the BBC would take over DTT, but the involvement of Sky in this deal is extremely disheartening and means I am still unwilling to switch to digital. Gregg, UK

An excellent decision - the BBC do most things better than the commercial broadcasters - who needs all those ads? The license fee is definitely great value for money now - how about a BBC version of MTV next? Joe Jones, UK

I couldn't care less about who won the digital licenses, just so long as ITV did not win them. After their absolutely disgraceful behavior towards the football league, it would have been a joke for them to get their licenses back to destroy another thing that millions of people cherish. Ben , France

I loved ITV Digital because, like many others, I didn't have access to cable and my house is obscurely located preventing me from getting satellite. My main reasons for Digital was for the pay-TV channels MTV and Sky movies. I'm seriously disappointed that the BBC gained those licenses because now we won't have the chance to regain the quality pay channels we want. How many news channels do you need? And radio, why?!! Claire Martin, England

I think this is a great deal for the viewing public because with other digital services in order to receive such channels as Sky Sports News you have to pay up to £47 per month, This will certainly win favor for the public and make the 2010 analogue with off date not so far fetched as first thought. Craig Watson, Scotland

Having paid up front for ITV Digital for a year one month before they went bust, I am very pleased I am going to get some sort of service. At least my set top box is not going to turn into an expensive paperweight. Roy, UK

ATVQ

TV Moonbounce!

Note: Most of these emails went through:

Andrew Emmerson - midshires@ntlworld.com

Thanks Andy for sharing them with us. Sounds like fun stuff!

Gene Harlan - WB9MMM - Editor ATVQ

TVDX chap I used to know quite well in Perth Australia (Anthony Mann) has apparently managed to receive moon-bounce USA TV transmissions. Not exactly to watch, just over the noise in a narrow bandwidth using a 15 db gain group A aerial + on telescope mount. This link shows the spectrum analyzer display + the doppler shift over a few minutes of some Hz. The US transmitters are supposed to be 5 Megawatt & reception when moon at transmitters earth horizon. He works in the dept of physics at the Univ of West Australia. I've emailed him for more info.

http://www.physics.uwa.edu.au/~agm/eme1.jpg

The following is a series of emails on the subject:

He's basically resolving the signal in a very narrow bandwidth via a pc based sound card. I suspect you won't even be able to hear a 60 Hz vision buzz, as it's more or less about a blip on pc screen. The GM4JJJ program is good, just downloaded it.

His email address is below He won't mind being contacted as he seems keen if anyone else will give it a try.

Tony Mann - **.agm@physics.uwa.edu.au**

I've had eight receptions from three stations and one doubtful (see below). These are most likely moonbounce given the times and the rate of freq drift (=expected Doppler rate).

The only requirement is to pick a US channel that's in a quiet part of the spectrum where you have decent antenna gain. It could even be in Band 5, as antenna gain compensates the increased path loss. Preference goes to the few 5000 kW omni-directional transmitters. e.g. some listed at:
http://www.w9wi.com/articles/uhflow.html

You need to detect carriers in a bandwidth of only a few Hz; this is the key to it! I think you need a spectrum analyzer that goes down to a few Hz (e.g. PC based via the sound card) or a very narrow audio (CW) filter. I have found GM4JJJ's MoonSked program very useful. Good luck. Let me know if you get anything!

Recent post to ICDX:
Below is a summary of EME reception up to 11 June:

date time (UTC)	tx freq (MHz)*	freq drift (Hz/min)
26 May 1021-1028	1 ? 483.250488	-2.5 #
26 May 1115-1122	2 501.248437	-1.5
27 May 1147-1206	2 501.248423	-1.4
28 May 1235-1258	2 501.248418	-1.3
29 May 1340-1352	2 501.248420	-1.3
11 June 0127-0142	2 501.248231	-1.3
30 May 1437-1444	3 483.251031	-1.1
31 May 1533-1540	3 483.251050	-1.3
11 June 0201-0212	4 495.251222	-1.5

* as measured at tx (i.e. rx corrected for Doppler)
# Doppler for tx 1 is only -0.9 Hz/min

1. WNDU-16 South Bend, IN 41.6N, 86.2W 5000 kW Z H
2. KWBT-19 Muskogee, OK 35.8N, 95.8W 5000 kW Z H
3. WAPT-16 Jackson, MS 32.3N, 90.3W 4790 kW ZdH
4. KUPB-18 Midland, TX 31.8N, 102.5W 5000 kW Z H

Except for tx 1 all receptions have exhibited frequency drift in excellent agreement with prediction of the Doppler shift (by GM4JJJ's program).

The 11 June reception occurred near new moon. I had to aim antenna near the sun! The KUPB signal was large (about 8 dB above noise) and there the whole time - little libration fading.

Tony Mann,

TVDX via moonbounce was done in the 70s by K3PGP!

EME expert David Anderson (GM4JJJ) sent me a copy of an article he found in Moon-Net NOV 1996 (see below).

Tony.
In Moon-Net, NOV 1996, by K3PGP:
"I'm glad to see there are other's out there with interest in using their EME equipment for experiments other than EME. This is the main reason I'm not that active. I was always playing around with 'weird' experiments!

I successfully detected several UHF TV transmitters via EME back in 1972 to 1975. One of my experiments was detailed in the K2UYH 70 cm EME newsletters of that era.

Although it's been many years I'll recap what I remember of it.

I was using a homebrew 24 foot .6 f/d dish. The 432 feed was replaced with a dipole and splash plate tuned to channel 68. At the time of the experiment there were only two known transmitters operating in the US on channel 68, the main reason why I chose this channel.

I wanted to be able to sort things out easily. Had I picked a more popular channel it might have been difficult to determine just what I was hearing! Another reason was because we had NO channel 68 station (or adjacent channel station) in this area.

One station was in N.J. and the other was in California. I don't remember the exact power levels but I do remember that Al, K2UYH (who lived in NJ) told me that the N.J. station was not running a lot of power by UHF TV standards. However, it was a LOT more than any ham EME station could put out!

By the way I tried just before the experiment to detect the N.J. station by aiming the dish antenna directly at the station. It was NOT out of the realm of possibility to hear this station direct as Al and I were able to work this path (NJ to western PA) nightly on 432 SSB. I was able to detect a very weak video carrier. The exact frequency was noted so that it could be compared against the expected positive doppler of the rising moon.

Moon rise times were calculated for me in Western PA (about the same for NJ) and California. As the moon came over the horizon I immediately detected the NJ station! Fortunately the heading toward the moon was different than the direct route so I think I can rule out any direct signal. Also noted was the fact that the signal now displayed the expected positive doppler shift which confirmed that I was indeed hearing UHF TV off the moon! This signal began to fade as the moon rose higher in the sky and eventually disappeared completely as the moon moved out of the radiation pattern of the transmitting antenna.

Returning the dish to the horizon where the moon had risen I detected NO signal. Pointing the dish back to the direct path to channel 68 in NJ again produced a weak video carrier. However, the doppler shift was now gone.

The real acid test came about three hours later when the moon would rise over California. As the minutes ticked by I slowly began detecting another video carrier complete with 15.75 khz sidebands! This one was quite a bit stronger. I quickly tuned up 4.5 Mhz and although I could detect what sounded like FM I never could demodulate anything. The video carrier was now quite strong so I decided just for kicks to plug the TV into the preamp. I could just barely make out some distorted sync bars! Not strong enough to lock up on. The sync bars also seemed wider than normal. Most likely stretched in time due to the spherical shape of the moon.

I am planning on building a 40 foot dish sometime in the near future. When it is operational I plan to continuing my 'weird' experiments!

John, K3PGP@msn.com

Don't forget to check out the ICDX web site for TV/Radio sites, ICDX TV/FM DX news, DX Articles, TV DX from holiday locations, 'Out and About' and 'Bytes & Bits' archive articles, computer tips, The TV/FM DX FAQ, TV/Radio History (Australia/NZ) and historical sites. -go to:

http://www.geocities.com/icdx_australia/index.html

From: Henry AA9XW

Fantastic. I recall saying at an ARRL meeting in DC when I was working on the WARC effort that it was possible to have EME ATV. The ARRL execs scoffed at the idea. They were proposing back then that ATV be moved out of 70 cm and be on 13 cm and above only. What a waste that would have been. That was the John Huntoon, Charlie Higgenbothem era. FM was just catching on because of 73 mag pushing FM and repeaters.

Because of the rough surface, any signal is "smeared" in time. In video this widens pulses, and causes random phase shifts vs frequency. But in B&W TV, this doesn't matter a whole lot. The wide sync pulse is still detectable, and may be easier to detect from noise because it is longer (better integration time). The video will look like severe ghosting, or severe low frequency smear, but this can be "fixed" with frequency response shaping, and time integration. Since many stations today also transmit the Phillips ghost cancelling signal, if you can get enough C/N ratio, it might be able to decode that and automatically cancel the ghosts. We just added it to our ch 56 signal. The transmit side can help by limiting video bandwidth to .5 Mhz or less. There is a DX TV tuner specially made for this on the receive side. I got one after seeing it in BATC magazine many years ago. It is in the attic right now, but with the garage up, as soon as I can get electric out there I can start assembling my ham station again. FM video should be harder to do than AM video because of the multiple phase shifts (multi-path) and other path distortions. Even though FM would be "constant power" The AM signal needs 2 db to get from sync to blanking and about 6 db to get to locked sync and minimal call sign in the noise from the point where the sync pulse is first detectable. A very narrow (100 KHz) RF filter will make a significant improvement in the C/N ratio and still be wide enough to see very large call letters. Even sending them sequentially, not all on the screen at a time. i.e. Send "A" for 15 seconds, short black, "A" for another 15 seconds, "9" for 15 seconds, "X" for 15 seconds, and "W" for 15 seconds, with the letters full screen. (Keep a safe title area). In the true spirit of EME you likely would send only 9XW until you got an HF acknowledgement of the reception. If the receiving station can get one letter at a time, then you could try smaller font, and two letters per row,
AA
9
XW.

I no longer have a tilt rotor on my array, but after September 1, I should have enough stuff back together to make a megawatt ERP signal and point it at moon rise every night. and run sequential letters if anyone wants to look for it. I can do it on AM video and FM video on 70 cm. I would be on 434.00 to avoid clobbering the regular ATV on 439.25.

ATVQ

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Amateur Television Quarterly!

ITVLP - Some Videoconferencing Software Links...

Possible candidate application for ITVLP?

Just been reading the docs for ohphone. Seems it supports full screen SVGA modes - no X. Definitely worth a play. It's also commandline driven, so perfect for ITVLP applications.

Here's the main page.

http://www.openh323.org/docs/ohphone_man.html

These may be of use to the video gurus and coders. Enjoy!
http://myhome.hananet.net/~soonjp/vclinux.html

http://myhome.hananet.net/~soonjp/vid-conf.html

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-Tom O'Hara,W6ORG,of PC Electronics in Amateur Television Quarterly -Spring 2001

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Frequencies courtesy of Scanning USA, Feb. 2001 -Something new to monitor, by Tom Filecco

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