

Winter 2002

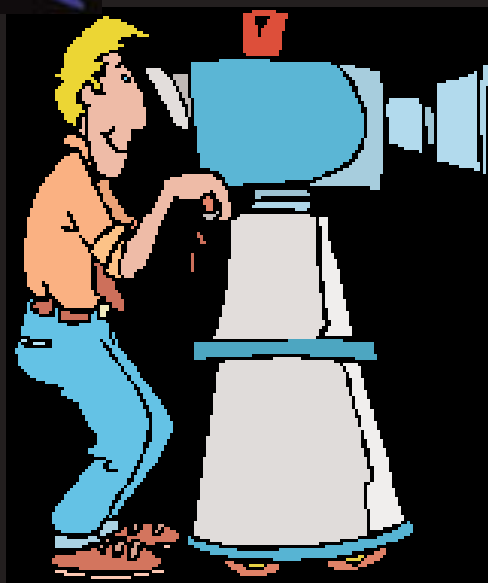
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Amateur Television Quarterly

I LOVE
ATV!

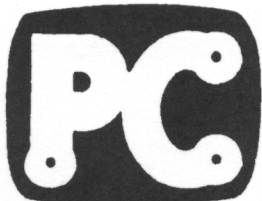


This is winter? Think Spring!



INSIDE:

⇒EVERYONE HAS HAT CAM'S
⇒THE DO-IT-YOURSELF SPACE PROGRAM
⇒SPARKS FROM THE BENCH
⇒VERSATILE PULSE TESTER
⇒IVCA VISION NEWS LETTERS
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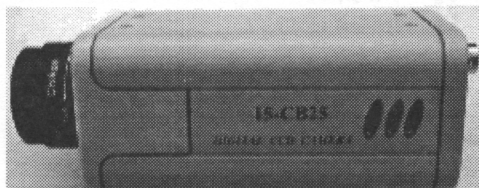
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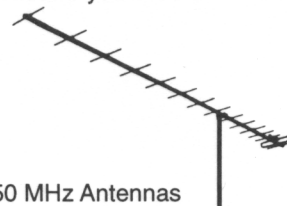
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420-450 MHz Antennas

- see our catalogue page 5

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Diamond F718L Vert omni 9 dBd \$238
Diamond X510NJ Vert omni 9.5 dBd \$199
Diamond X510NA Vert omni 9.5 dBd \$209
Diamond NR-770H mob/port 5.5dBd \$59

Hard Hat Cam, R/C Vehicle, Rocket, Balloon ATV



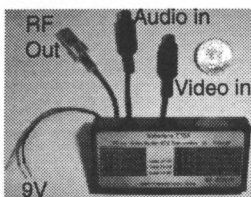
App notes available
on our web page 3



CG35 mini color camera.....\$99
1.5" sq., 3oz., 330 lines, 6mm lens,
Sony CCD, mic/line audio output,
takes just 9Vdc @30ma.

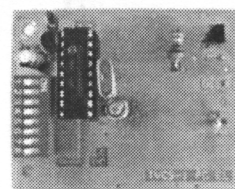
Videolynx 434 MHz Video Xmtr.....\$99
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out, .75x1.5x3.25", 4 oz., 9V@250ma.- two 9V alkalines.

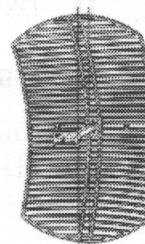


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AMATEUR TELEVISION QUARTERLY

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Everyone Has To Have An Amateur Television HatCam

Seems like everyone needs or wants an ATV HatCam these days, at least if you go by the number that are in this issue of ATVQ!

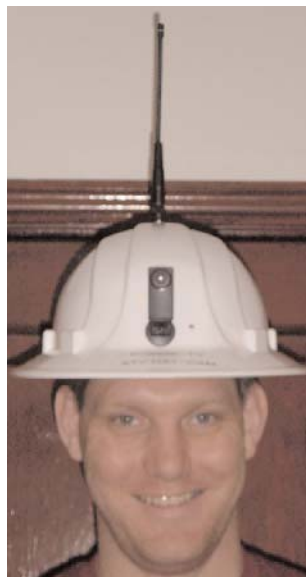
So, G7LTT/KC2ENI, Mark Phillips, is no different. Inside the hat is a Video-Lynx 100mw TV transmitter which outputs the picture on 433.97 MHz so it can be picked up on cable channel 59. The parts came from:

100 mW TV transmitter - PC electronics \$99
Color camera - Ebay - \$49
Caption generator - WuJu - \$49
Hard Hat - Amazon.com - \$15
Rubber Duckie antenna - \$25
Rechargeable batteries - Ebay - \$5

The total cost was about \$250 to build. Must have been the tin foil ground plane on the inside that raised the price!

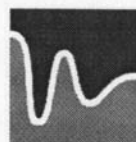
You can see all the switches and sockets on the back of the hat. The 5 pin DIN plug allows external power for longer uses and for charging the internal batteries.

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From WB9MMM

Thanks to all that sent material for this issue. I even had material that I could not use this month. If it makes sense, I may use it next issue.

My wonderful wife, Shari, N9SH, bought me a nice Meade telescope for Christmas. It has been a little cool to use, but I have been out once so far. The moon looks nice and big! What does this have to do with ATV? One of the accessories that I have is a CCD video camera that goes where the lens is. So, now I will be able to show the stars over ATV! This is one that I had not thought of before.

The Meade telescope is the ETX - 70mm with the computer and motor drives in the base. You point it at two objects (that the computer hand display tells you) and then tell it where you want to look and it goes there for you. How easy can it get? Well, I will find out when I really get out and give it a full test. My grandson, Dustin, 8 years old, and I will have a good time.

I am happy to announce that Shari & I have a new granddaughter, Jessica Nicole Harlan, born to my son Shawn (KA9BXA) and his wife Sara. I will wait to talk ham radio until she knows who grandpa is!

Everyone have a great 2002!

Gene - WB9MMM

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 **ASCII text**, followed by **typewritten** or **hand written** (clearly). Diagrams or pictures (B&W or Color) can be sent in hard copy, or if you scan them in, save to PCX or JPG formats (actually I can read about anything). If you send a computer disk, make sure it is PC (not MAC) format.


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

Articles can be sent to: **ATVQ, 5931 Alma Dr., Rockford, IL 61108**
or to our email address: **atvq@hampubs.com**
Also note our web page address: **http://www.hampubs.com**
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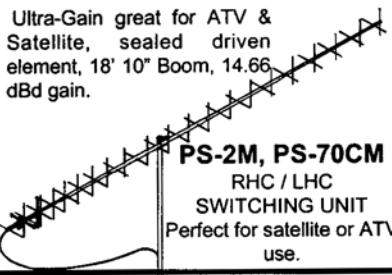


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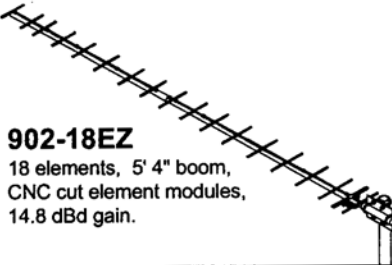



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18 elements, 5' 4" boom, CNC cut element modules, 14.8 dBd gain.





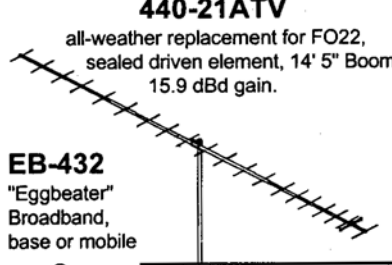
23CM22EZA

22 elements, 5' 2" boom, 16.0 dBd gain. Now




440-21ATV

all-weather replacement for FO22, sealed driven element, 14' 5" Boom, 15.9 dBd gain.






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Amateur Near Space Exploration

The Do-It-Yourself Space Program

L. Paul Verhage - KD4STH - Email: verhap@occ1.sd01.k12.id.us

207 Crestline #3
Caldwell, ID 83605



Many of us would like to build and launch a satellite. However the high cost of launch prevents most of us from accomplishing this. And it's not just the high cost of launch. Our satellite must last long enough on orbit to justify the cost involved. This increases the construction cost of the satellite. In this paper I will break satellite costs into five categories: Building, Testing, Construction, Launch, and Telemetry. I'll look a little deeper into each category before discussing one alternative to costly satellite construction and launch.

Building Costs

One word: quality. To build a quality satellite, one capable of surviving the launch into orbit and performing to spec long enough to justify the cost of launch, requires the use of space qualified components and materials. Usually these items are expensive and are not stocked in your local hardware store. One example is insulation, typically multilayer insulation, or MLI. MLI consists of multiple layers of alternating aluminized mylar and scrim. Space qualified aluminized mylar (space blanket) costs on the order of \$1 per square inch. Compare this to the space blanket available at Wal-Mart that costs on the order of \$1 per six square feet.

Testing

After construction of your satellite it must be tested. Will it survive the sound and vibration of launch? Off you go to find your local neighborhood acoustic test chamber to find out. Will the satellite perform to spec once on orbit? Off you go to your local neighborhood thermal vacuum chamber to find out. With a low demand for these specialized facilities, the cost of time spent inside of them is high (but can be donated in some cases).

Construction Time

You may spend years building your satellite. The time spent in construction and testing has two associated costs; the cost of human labor and the time the satellite is not functioning on orbit (or earning its keep). Construction time is the double whammy of spending money on your satellite while not getting any data from it.

Launch Cost

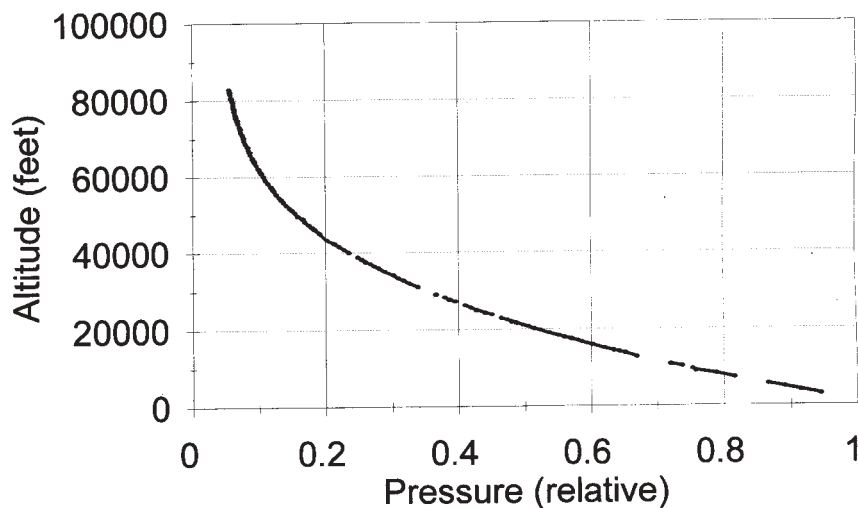
Having built and tested your satellite; it's now time to launch it. You will spend approximately \$10,000 per pound of satellite for a commercial rocket launch. If you're lucky you might get a free lift into orbit as ballast for a rocket, or as the first payload of a new, untested rocket (and risking your creation). However, the opportunities for free launches are far and few between. Beyond the cost of launch, there is also the wait time involved. Since rockets don't leave for earth orbit every day, the satellite must be kept in clean storage (further adding to its total expense).

Telemetry Stations

There is one last cost now that your satellite is on orbit, collecting its telemetry. Will you build your own tracking station or will you depend on others? If you build your own, then will you build several stations for continuous communications, or build a single station? If you use multiple tracking stations to

TV01D

Air Pressure



Graph 1 Pressure measurements made by a PC140 pressure transducer.

record telemetry, then not only will you pay to build them, but also to staff them. If you build only one station, then you need to use a store and dump scheme onboard the satellite. Store and dump telemetry requires the use of memory in the satellite, either a hard drive or solid state. If the satellite or just the memory fails while out of contact, then there is no way to dump the data onboard to uncover what went wrong. An alternative to tracking the satellite yourself is to farm the tracking out to others. Using the amateur radio community is the least expensive way to do this.

The Final Bill

What is your total cost of launching a satellite into orbit? You need tens of thousands of dollars, and perhaps more, for parts and testing. You will spend man-years of labor in design and construction. Finally you'll need tens of thousands of dollars for the launch. How many of you have this kind of money in your bank account? How many readers have enough free time on hand to complete the satellite? Are you still interested in launching a satellite into space?

A Solution

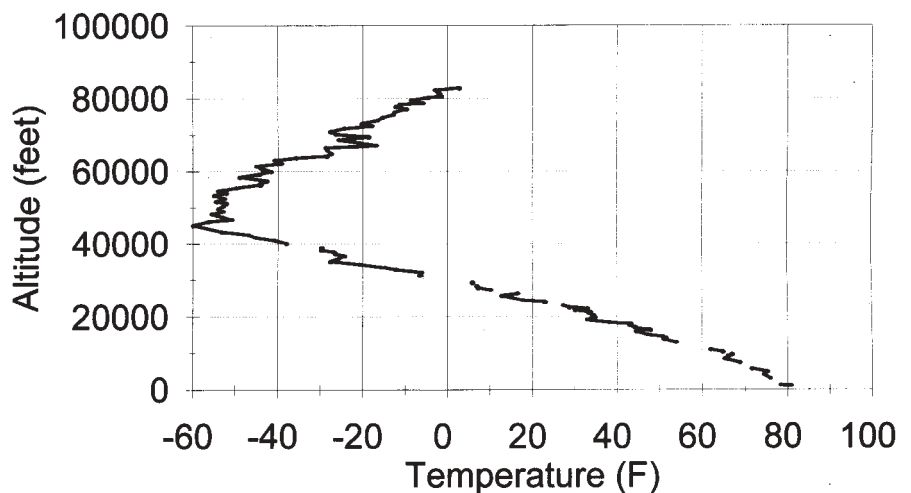
Obviously the problems I have just described are not total showstoppers; after all, many universities have launched their own satellites. But now I want to discuss a different solution that works in most cases while increasing public exposure to space related activities. That solution involves designing a satellite for missions in near space as opposed to space. But first, what is near space? Near space is that region of the earth's atmosphere between the altitudes of 75,000 and 330,000 feet. There are several interesting properties of near space. After a brief discussion of these properties, I'll show how near space is an affordable solution in both dollars and time.

Near Space: Atmospheric Pressure

Atmospheric pressure is the result of gravity's pull on the mass of the atmosphere. The higher up you go in the atmosphere, the lower the amount of matter above you and therefore the lower the air pressure. Here are two rules of thumb useful for estimating the atmospheric pressure at various altitudes. Atmospheric pressure in an ideal atmosphere changes by 50%

TV01D

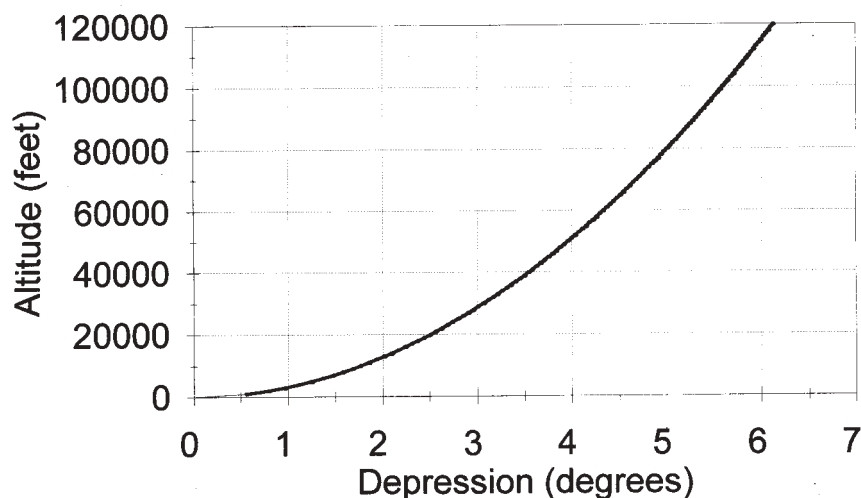
Air Temperature



Graph 2 Temperature measurements made by a LM335 temperature controlled zener diode.

Horizontal Depression

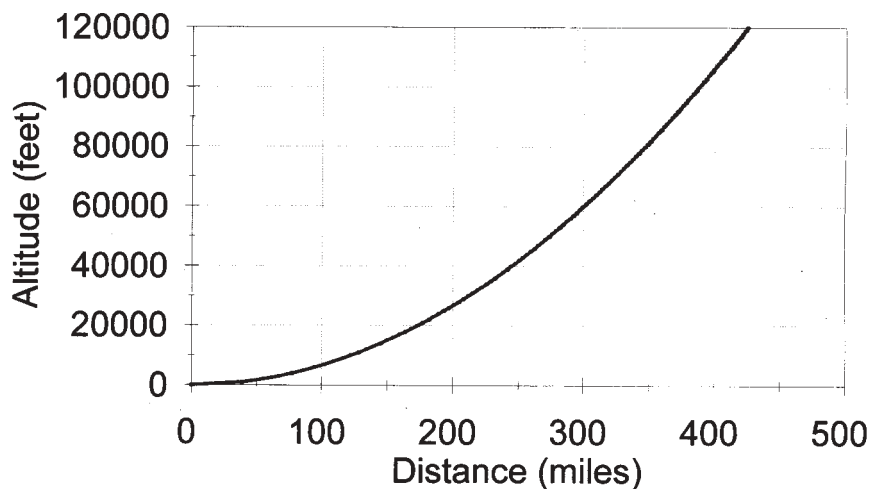
In Near Space



Graph 3 Calculations of horizontal depression

Distance to Horizon

In Near Space



Graph 4 Calculations of distances to the horizon

every 18,000 feet and 90% every 50,000 feet. When the air pressure decreases, so does the air's ability to refract sunlight. As a result the skies turn inky black at altitudes above 75,000 feet. Once in near space, the atmospheric pressure is between 1% and 5% of air pressure of mean sea level and the skies look like you're in space.

Near Space: Air Temperatures

Two layers of the atmosphere are of concern when discussing near space, the troposphere and the stratosphere. Air in the troposphere is warmed by its contact with the ground and not by its exposure to sun-

light. The stratosphere on the other hand is warmed by its exposure to sunlight, as ozone molecules in the stratosphere absorb UV radiation from sunlight. The result is that the air temperature drops with increasing altitude while in the troposphere and rises with increasing altitude while in the stratosphere. It's coldest at the boundary between the two layers, the tropopause, with temperatures between -60 degrees F and -90 degrees F. The altitude of the tropopause lowers during the winter and gets lower with increasing latitude. In Kansas my missions typically detected the tropopause at an altitude of 50,000 feet.

Near Space: Horizontal Depression And Distance To The Horizon

Increasing altitude means moving farther away from a spherical earth. As you do so, more of the earth becomes visible while at the same time occupying less of your field of view. The net effect is that the distance to the horizon becomes greater and becomes lower. Lowering of the horizon is called horizontal depression. In near space the distance to the horizon is greater than 300 miles (compared to three miles for the average adult on the ground) and horizontal depression is greater than four degrees, significantly increasing the amount of sky observable.

Near Space: Cosmic Rays

Supernovae are most likely responsible for the high energy, subatomic particles impacting our atmosphere, the cosmic rays. They are referred to as primary cosmic rays. Once a primary cosmic ray enters earth's atmosphere, it collides with air molecules creating new particles, or secondary cosmic rays. These sec-

ondary cosmic rays are further reduced in number and in energy per particle by later collisions, lower in the atmosphere. The atmosphere protects organisms from exposure to primary and secondary cosmic rays. A geiger counter on a balloon detects increasing cosmic ray fluxes until it enters the region of primary cosmic rays, at around 62,000 feet.

Near Space: The Total Picture

Combining air pressure, air temperature, horizontal depression, and cosmic rays, we develop the following picture of near space.

At an altitude of 100,000 feet horizontal depression reaches six degrees. The angle from zenith to horizon is then 96 degrees as opposed to 90 degrees as we are accustomed to while standing on the surface. The distance to the horizon is just over 400 miles (does your state need a spy satellite program?). The air pressure drops below 10 mb, or less than 1% of the air pressure at mean sea level. The air temperature is -10 degrees F. Cosmic ray counts are at 550 counts per minute (CPM) on the RM-60 geiger counter, after having reached a high of 800 CPM at 62,000 feet (compare this to the average of 4 CPM at mean sea level). This is nothing like conditions on the ground. It's much closer to conditions in space and in fact, is almost identical to the surface of Mars.

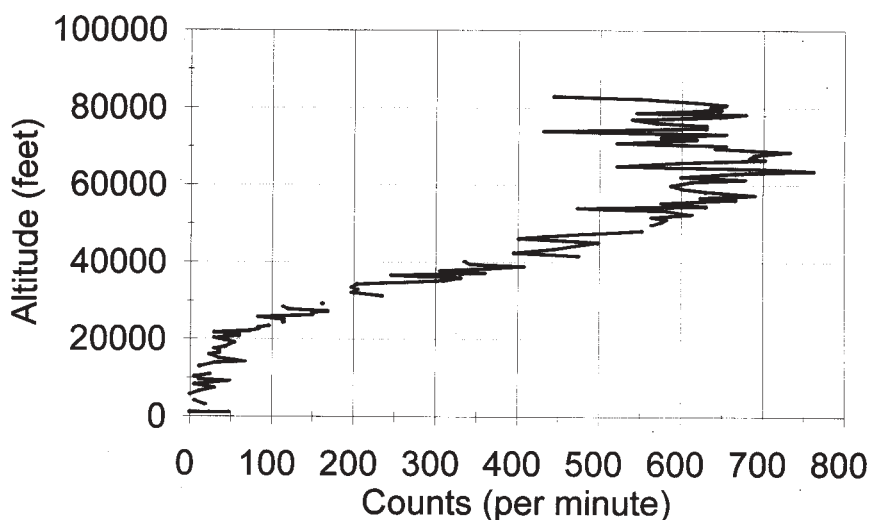
Near Space Is Affordable

Now that you know what it's like in near space, how do you get there? To fly a mission into near space requires a helium-filled weather balloon. But first you'll need to construct a near space capsule, recovery parachute, launch equipment, and a telemetry station. Let's look at a bare bones program, but keep in mind that a meatier program is still very affordable.

Building A Near Space Capsule (Avionics, Airframe, and Recovery System)

I've broken down the costs for constructing a near space capsule. This design is capable of being reconfigured for new missions.

TV01D Cosmic Rays



Graph 5 Cosmic Ray measurements made by an Aware Electronics RM-60

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1. Avionics

Etrex GPS Receiver ¹	\$110
BS2p microcontroller ²	\$80
MIM ³	\$83
MAX186 ADC ⁴	Free
SSC II ⁵	\$45
ULN2803 ⁶	\$3
DJ-S11 2 Meter Radio ⁷	\$80
Printed Circuit Board	\$6
Miscellaneous Parts	\$10

Avionics Total \$417

2. Airframe

Styrofoam Sheet	\$10
Hot Glue	\$1
Space Blanket	\$3
Scrim	\$1
Ripstop Nylon	\$12
Link Rings	\$1
Dacron Ribbon	\$1
Plastic Handle	\$3

Airframe Total \$32

3. Recovery System

Parachute Fabric (ripstop)	\$80
Sewing Tape (twill)	\$5
Link Rings	\$4
Bearing Swivels	\$4
Dacron Line	\$3

Parachute total \$98

Total For Near Space Capsule \$547

Notes:

1. Garmin makes several models of the 12 channel, Etrex GPS Receivers. The basic Etrex is the least expensive model available. Garmin is online at www.garmin.com
2. The BS2p is the Basic Stamp Two Plus by Parallax Inc. This microcontroller is based on one of the Microchip PIC microcontroller and is programmed using the PBASIC language. Parallax is at www.parallax-inc.com
3. The Micro Interface Module (MIM) is a one-way radio modem (a mo rather than modem?) for radios. The MIM is also built around a Microchip PIC microcontroller. A MIM can be ordered from <http://web.usna.navy.mil/~bruninga/mim22.html>.
4. The MAX186 is an analog to digital converter (ADC) IC with a resolution of 12 bits and eight separate channels. An ADC converts analog voltages from a sensor to digital values for the BS2p. Maxim IC will send two free sample ICs if requested. The Maxim website is at www.maxim-ic.com.
5. The Serial Servo Controller II (SSC II) was developed and is sold by Scott Edwards Electronics (Seetron). The SSC II is also based on a Microchip PIC microcontroller. Sending simple serial commands to the SSC II allows the BS2p to position up to eight servos and reduces the workload of the BS2p. Order SSC II's from the web at www.seetron.com.
6. The ULN2803 is an eight darlington pair IC. This IC allows the BS2p to control up to 12 volts at currents of one amp, compared to the 5 volt, 20 mA limit inherit in the BS2p.
7. Alinco is a manufacturer of amateur radio gear. The DJ-S11 is a lightweight, handheld radio with an output power of 340 mW. This is sufficient power for line-of-sight communications of over 300 miles.

Costs To Operate A Near Space Mission

After constructing a near space capsule, ground support equipment and the launch vehicle (balloon and helium) must be purchased and assembled.

1. Cost of Launch Support Equipment

Regulator and Hose	\$50
Electronic Fish Scale	\$25
Bed Sheet	\$5
Folding Table	\$15
Duct Tape	\$5
Kite Winders	\$10

Total For Equipment \$100

2. Cost For Launch

Balloon (1200 gram) ¹	\$60
Helium (300 cubic feet)	\$100
String	\$0.25
Total Per Flight	\$160

3. Cost For Telemetry Free²

Notes:

1. A 1200-gram balloon can carry near space capsules to altitudes of least 85,000 feet.
2. Use your local amateur radio (ham radio) community. Amateur radio uses packet radio to send digital data over the radio. Many hams are excited by the prospect of tracking high altitude balloons.

The Total Bill

For less than \$1000 (plus the cost of your experiments), you can fly two missions (one practice and one real) into near space. Launching a twelve-pound near space capsule, 1.5 pound parachute, and 1200-gram balloon costs \$10 per pound of payload. Compare this to spending \$10,000 per pound of payload into earth orbit.

Near Space Is Quick

So near space is affordable, in fact, it's less expensive than many hobbies. Now let's look at the time required. Instead of spending over a year building and testing your satellite, you spend a few months building and testing a near space capsule. Instead of waiting another year to get your satellite on a launch manifest, you launch a near space flight on any day the weather cooperates. Another time and money saving feature of amateur near space exploration is that an entire mission can be completed in time for lunch

The following tasks are required to develop a program of amateur near space exploration. You can accomplish these tasks within one year of the start date using a small team of people.

Beginning Six To Eight Months Before Launch

- Earn an amateur radio (ham radio) license or recruit hams
- Become familiar with FAR 1011
- Build the airframe
- Build the avionics
- Sew the parachute
- Build a or many experiments
- Program and test the BS2p flight computer
- Assemble the balloon filling equipment
- Learn to use the Balloon Track program²
- Practice launch procedures
- Set a launch place and date

The Day Before Launch

- Pick up two tanks of helium
- Recharge the capsule's batteries

The Day Of The Launch

Arrive early to the selected launch site

Fill the balloon with helium

Prep the capsule

Assemble the stack (capsule, parachute, and

balloon)

Raise and release the balloon

Go on a cross-country adventure chasing the

balloon

Celebrate your victory with lunch at your favorite restaurant

Make plans for your next launch

Notes

1. FAR101 is Federal Aviation Regulation, section 101. This section governs untethered balloon flight.

2. Balloon Track is a program for predicting the flight of a balloon, including its recovery zone. The program is available at no cost from the Edge of Space Sciences website at, <http://www.eoss.org>.

Conclusion

Is near space a good enough substitute for space? In many cases, near space is high enough for the desired science and engineering tests. As an example, a camcorder or 35mm point and shoot camera achieves sufficient resolution and coverage of the ground for useful remote sensing. An atmospheric pressure 1% of mean sea level pressure is low enough to test many satellite construction techniques. Many want to know what's happening with the stratosphere's ozone and winds. What better way to find out than by insitu observation? Using amateur radio for telemetry simplifies data collection and gives you a tracking station at almost no cost.

The lower costs and short turn around time of amateur near space exploration more than makes up for the reduction in altitude and worldwide coverage available from earth orbit. And even if you eventually need to be in earth orbit, near space is an excellent location to test equipment destined to make the trip.

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Great Plains Super Launch 2002 And Mini-Symposium

The Great Plains Super Launch 2002 is scheduled for 5 and 6 July 2002 in the town of Manhattan, Kansas. A mini-symposium will be held on Friday at the Kansas State Library. The symposium is an opportunity for all amateur radio balloon groups to meet and discuss the state of the art. The launch is held at the Johnson Near Space Center Saturday morning.

The 4th of July is on Thursday. All those not suffering from second and third degree burns are invited to participate in the symposium and launch. The symposium will be held at the library on Friday. The doors open at 7:30, which will be our set up time. The symposium will begin at 9:00 AM sharp. Some snack type foods will be provided. Lunch is on your own, but I recommend either the campus cafeteria or a restaurant in Aggieville.

Last year saw the launch of three balloons, one reaching over 91,000 feet. We are trying for six launches this year.

Information is available online at the GPSL 2002 website, <http://users.crosspaths.net/~wallio/gpsl2002.html>

You can also contact the GPSL 2002 lead at: paul.verhage@boiseschools.org



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

Regular Featured Column!

One of the objectives of this column was to explore items that are interesting, items that are “around the edges” of Amateur TV, and go wherever our current projects and ATV interests lead us. Last time we began a discussion of PICs. But, as usual things have changed a little around here and the PIC projects have not progressed much. However, the Houston ATV Society (HATS) had a problem that required solution. It began with a possibility for accessing 550-foot tower as a repeater site. This tower already had two 7/8” hard lines which would be utilized for the transmit and receive antennas. Even though this is a sizable hard line, at 1.2 GHz the feed line loss on the receive side would cut sensitivity. This could easily be offset by placing the preamp at the top of the tower near the receive antenna. Also, it would be best to locate the input filters near the receive antenna.

The with this configuration was it necessary to meet the following objectives:

1. It has to be weather proof
2. It has to be easily mountable by a tower climber
3. It has to provide some electrical protection and thermal stability

While brainstorming about how to package the filters and preamp at the top of the tower, we also realized that the filters were quite susceptible to frequency shifts as a result of temperature. This called for a temperature stable condition at the top of the tower.

The solution we arrived at, was to take military surplus 50 caliber ammo box, which is nicely weatherproof, and add mounting rails and U clamps to allow easy tower mounting. We would then line the inside of the box with styrofoam and heat it. One thing that people often forget is that even though human beings are uncomfortable at

100° F many, if not most, electronic components are perfectly comfortable operating at 50° C or 60° C (122° F - 140° F). We decided that we would then heat the inside of our box to about 125° F (52° C) to hold everything comfortably stable.

This leads us to the project. What was needed was a nice heater (of several watts size) with a non-interference generating temperature controller. The first filter could easily be configured as a bias T to allow about 1 amp of 13.8 volt DC to supply the heater and preamp. The hard line would easily carry several amps so this is not a problem for the line. In other climates you might require more heater capability and so things would need to be upsized accordingly. For our design that 1 amp would give us about 13 watts of heat. In our climate, in an insulated box, that should be sufficient to keep everything “in the ballpark”. Remember the object is to keep the cost down and so absolute stability was not an issue.

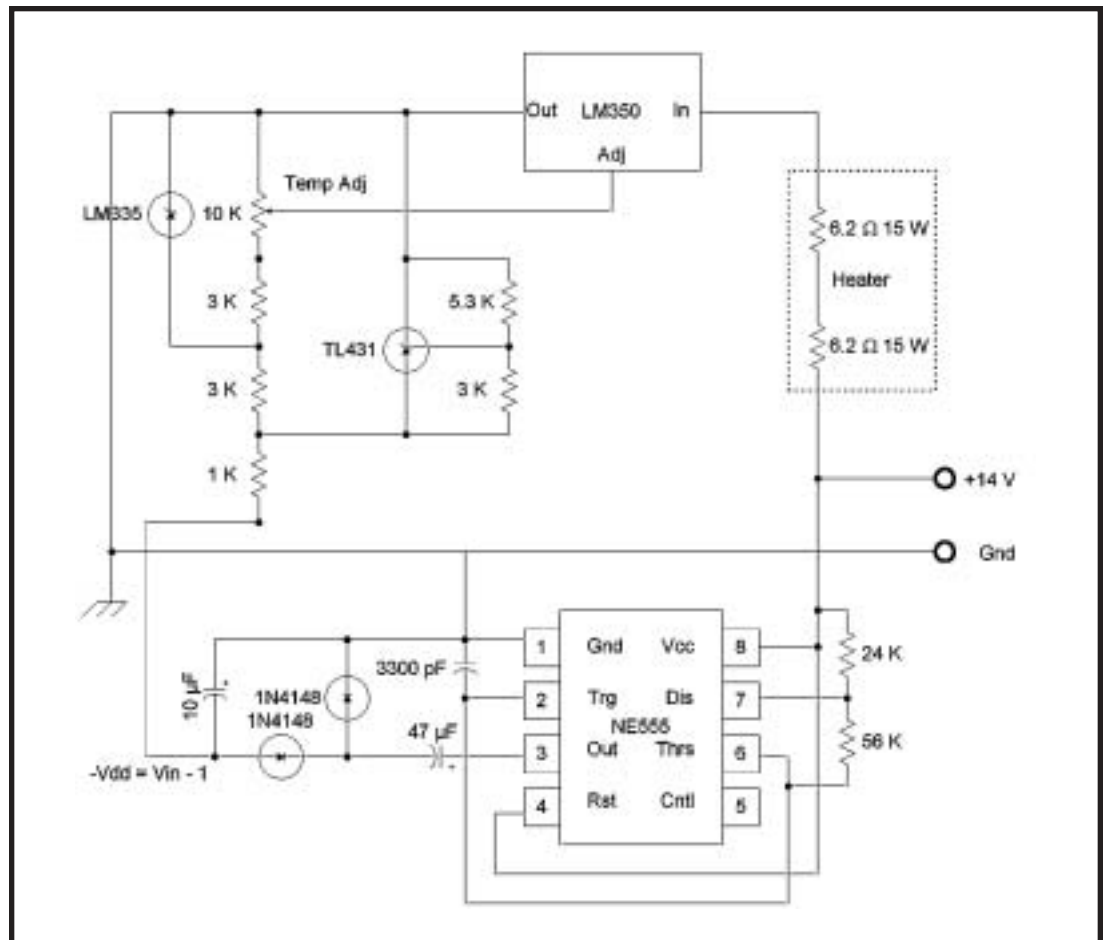


Figure 1 is a schematic of the circuit we decided on. We just built this and in the next column will report any bugs or kinks we might have found during testing. Here's how the circuit works, first the heating element is comprised of two 6.2 ohm 15 watt resistors in series. With one amp of current this should give us the desired 10-15 watts. In order to avoid noise generated by snap acting controllers or switching circuits we decided to control the heater using a linear regulator. In this particular application we want the regulator to be able to shut completely down. That means there has to be a simple negative supply voltage to pull the adjustment terminal below zero. Since very little current is required from this negative source a simple 555 timer is configured to generate a negative pulse, which is then rectified and filtered to generate the negative bias voltage. The other two active elements are for temperature adjustment. This is accomplished by comparing the voltage generated by the 555 and the LM335, which puts out 10 millivolts per degree K. Since $K - 273.15 = C$ the output is also 10 mV/°C. That makes the drop at 20°C equal to 2.9315 volts. This temperature related voltage is balanced against a temperature stable voltage from the TL431 and any difference allows current to flow through the regulator. We have made some adjustments to allow for cost savings and parts availability, but otherwise this is very similar to the circuit presented in the national semi-conductor LM350 data sheet.

One section you might find useful for other circuits are the TL431 and its bias resistors. This device is called a "programmable" voltage reference. In essence it acts like a zener diode, but its voltage can be adjusted by the choice of the external resistors. In the case of the TL431 the reference lead becomes 2.495 volts. So by using the 3K resistor and a 5.3K resistor the output voltage works out to be 6.9 volts. This is calculated using $V_o = (1 + R_1/R_2) * 2.495$. Be sure to limit the total current through the device to below 10mA, just like limiting the current through a zener.

Once complete the box will have bulkhead connectors mounted on the narrow side along with a tiny "weep" hole. This will become the bottom edge of the box when mounted. It will then be painted. The next item to decide was what color to paint the box. This question seems to be the topic of more news group discussion and banter over the last 40 years than one would believe. Such a simple exercise as choosing a paint color creates highly emotional, and often not very scientific, discussions. So, having said that let me present some thoughts for your consideration in this matter.

Many years ago when "real engineers" used things called slide rules; I was asked by an employer to do a heat analysis on some large tanks. These vessels were scattered all over the southern United States, outside, and were operating at approximately 130°F. The general manager explained that a debate had raged for many years (even back then) as to whether they should be painted black, so as to absorb the maximum amount of sun, or some other color "because color doesn't matter that much". After some study I discovered the reason why this debate exists, and why both their answers were wrong.

The secret lies in the fact that the vessel was hotter than the surrounding air at all times. Try as they may no one has yet successfully proven that they can make heat go spontaneously (that is, without energy) from colder objects to hotter objects. It's just one of those doggone laws of physics.

With that in mind it makes things easier to calculate and understand. There are two characteristics of any object when it comes to heat transfer from radiation. One is called the emissivity, which is how well the object will emit or radiate heat. The other is called the absorptivity, which is how well the object will absorb heat. As it turns out, for every paint where I could find the absorptivity and emissivity numbers, they are within a couple of percent of each other. And all of them are clustered in about the same range plus or minus a couple of percent around 91 percent. With one exception, aluminum paint runs about 80 percent. What that means is that for all nearly all paints of all colors, the amount of heat gained or lost is about 90 percent of the heat present.

So, remember the surrounding air in all normal operating situations will be colder than our boxes are. If we paint them a dark color to absorb sunlight energy then for a few hours each day they will be absorbing sunlight at about 93 percent efficiency. For 24 hours of every day they will be radiating (losing) heat at the same 93 percent efficiency. So you don't even have to do the math to see that the higher emissivity paint will loose several times more heat than it can possibly gain. Therefore, if the object is to keep the box insides warm, it is better for it to absorb less for 4-6 hours per day, but also radiate less over the full 24-hour period every day. This will cut energy consumption.

In the case of our 13-watt heater that may not be a significant issue, but in the case of very large, heated vessels, it certainly was. For the tanks we repainted long ago, the measured savings was several tens of thousands dollars a year. So, the answer is - if the object you want to maintain at temperature is hotter than its surroundings you should paint it with the lowest emissivity paint available. That nearly always turns out to be 20 percent aluminum paint. So now you have a nice silver box with a linear temperature controller holding everything stable and sitting neatly at the top of the tower. The total cost including, the housing was less than \$30.

In the next column we will explore how the controller was built, how it worked, and hopefully have time to get back to our discussion of PICS with the object of doing ATV control and display with these nice little microcontrollers. As always I would like to receive your questions at ATVQ@sparkles.com.

ATVQ

Versatile Pulse Tester

From CQ-TV #195

By John Stockley, G8MNY

This tester based on ideas in recent magazine articles [1 & 2] and has been developed to have several useful functions.

- ⇒ Coax or Balanced Cable Fault Locator.
- ⇒ Coax or Balanced Cable Impedance tester.
- ⇒ Wideband Crystal Calibrator.
- ⇒ Spectrum Analyzer Calibrator.
- ⇒ Filter Plotting (like a Tracking Generator).

Needle Pulse Generator

The heart of the unit is transistor T4 using its avalanche characteristics, which is actually just an ordinary high speed low voltage switching transistor run well over its voltage. A 100-ohm base resistor keeps the transistor off, but with high voltage applied to the collector, the transistor will conduct in avalanche mode. With a transmission line capacitance and pulse quenching reflection from the length of unterminated coax on the collector and a high value charging resistor, the transistor can be made to generate a stream of very narrow pulses on its own. These can be used as they are for coax cable time domain reflection testing, with just a suitable T4 emitter network and a good scope. With a 6 inch length of 50-ohm coax as the capacitor and very short wiring to the output socket, I found that the pulse width was around 3 ns wide [1].

A very narrow pulse has wide bandwidth and, if repeated with precise timebase, can provide good RF markers up to the 1 st null frequency determined by the pulse width. A 3 ns wide pulse gives a 1st order null at 333MHz.

Crystal Clock

Using a 1MHz crystal oscillator and divide chain to obtain clocks of interest (other crystals & divide options can be used) to trigger the avalanche transistor T4, enables the output to be of more use than a free running circuit. As the transistor can be made to free run as a pulse generator with just high voltage, only low energy pulses are needed to start the avalanche effect, so a low power CMOS 4040 divider IC can be used as a driver. Trigger sensitivity is a function of both the supply voltage and the size of the trigger pulse.

With 250kHz pulse repetition. frequency, cable lengths of up to 500m can be pulse tested and with a wide 300kHz IF filter in a spectrum analyzer reasonably smooth graphs could be drawn of VHF filters etc.

High Voltage

A stable voltage from a 30-100V is required for the avalanche effect. This comes from a voltage controlled DCDC converter driven by a medium speed clock. A 64kHz clock output feeds narrow edge pulses through a 1nF to a 12k pull up provides light bias, then via a diode, to stop problems with the negative going pulse, on to the base of a BFX84, T. This has a small choke of around 1mH as the collector load. When T 1 turns off, high back emf from the choke goes through a high PIV diode to a 0.1 gF capacitor to store the positive HT volts. A 100k potentiometer samples some of this voltage, which is applied via a 24V zener to the base on an NPN transistor that shorts out the base drive of T1. The result is that the drive pulse length is shortened giving simple but very efficient voltage control.

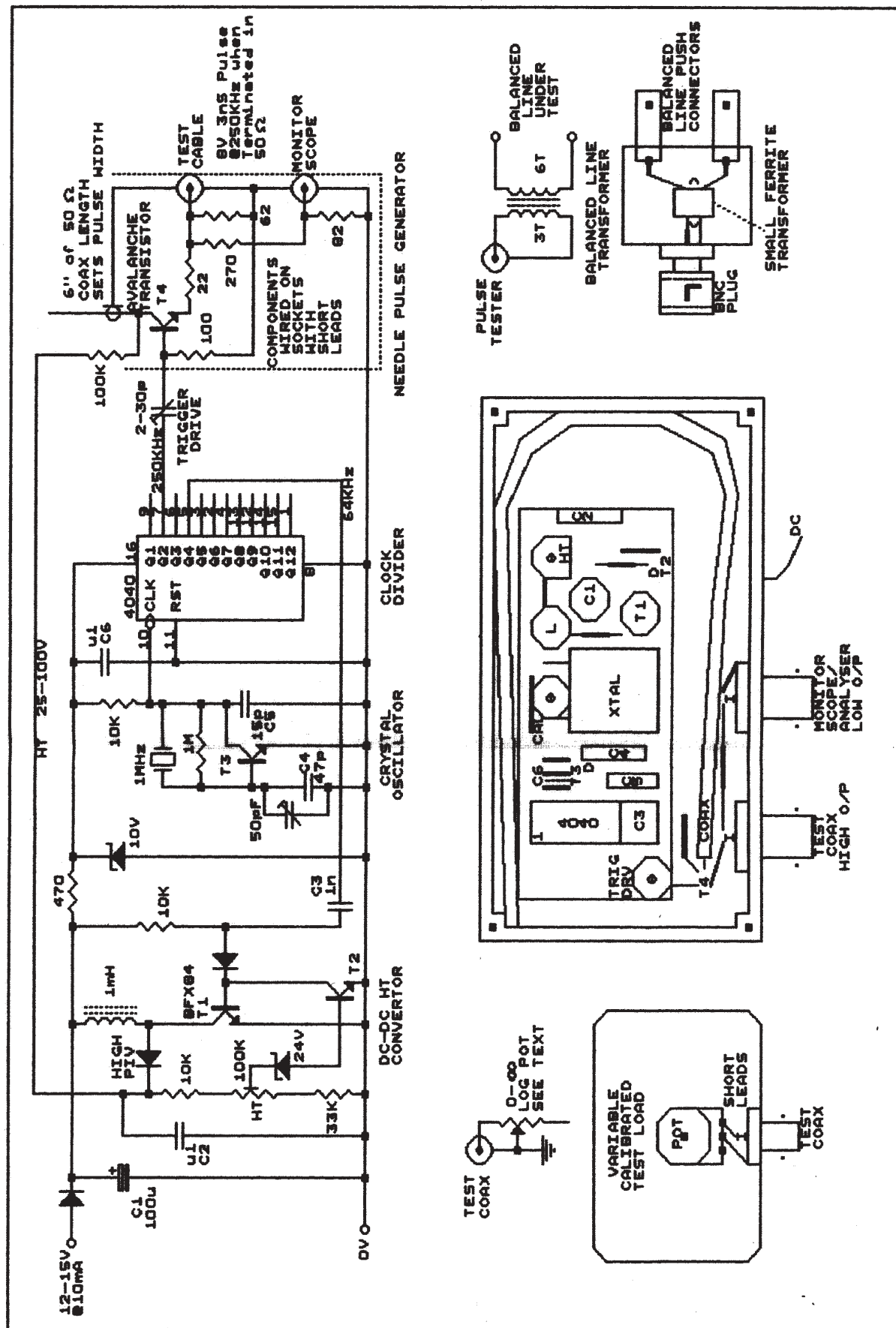
Testing and Adjustment

The project takes only 10mA when working correctly. So with a current limited supply, check the oscillator is running with a scope, then the divider IC. The BFX84 should have high voltage pulses on it to give an adjustable avalanche DC HT from 25100V. With the trigger drive trimmer set to minimum, connect the scope probe to the test coax port (not directly on the avalanche transistor's emitter). Adjust the HT (40-80V) to make the narrow pulses start up; the scope should be set for 5V pulses and a fast or maximum timebase frequency. If there are no pulses check the HT is present at the transistor and coax capacitor. If it is still not firing up, then change the transistor for another fast switching NPN one. Adjusting the voltage higher should increase the free mn repetition rate. Now mm down the HT until the pulses just stop (30-40V); turn up the clock drive trigger pulse trimmer, the pulses should re-appear, but at 250kI-Iz (4us) period. Adjust the HT voltage and drive trimmer for best pulse reliability.

If the spectrum analyzer/scanner shows any "in-between" frequencies [2] (narrow analyzer filter needed), or a properly locked scope pulse display has other pulses faintly present, then there is some false triggering, or the oscillator is being affected by the HT DC-DC converter etc. Align the crystal trimmer so that the RF marker frequency zero beat with a known RF source or measure the pulse frequency on a good counter.

Cable Fault Location

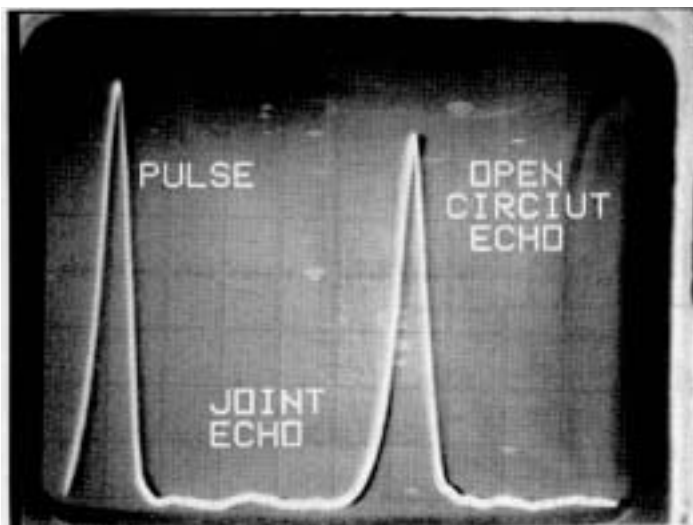
Using the pulse source, faults can be seen on the monitor scope as positive pulse reflection for high impedance fault (eg breaks) and negative pulse reflection for a low impedance fault (eg shorts). To minimize false echoes the scope should either have a good 1:10 probe connected to the monitor port or be connected with a terminated cable teed to the scope input. How well the fault pulse echo can be seen and time measured will depend of



your scope's pulse performance; small height display can be more accurate, but generally a 20MHz scope can see down to about 2 meters, a 100MHz 20cms etc. The location is the time difference between the initial pulse and the fault pulse, multiplied by the cable velocity, times 2 (there and back). Cables have velocity factors of between 0.66 of the speed of light (300m/ps) for solid coax, and 0.78 for semi air spaced types. Open balanced line velocity factor can be as high as 0.95.

If the fault is intermittent or not extreme (not O/C or S/C), or an identical cable length is available, then a calibration of the scope can be done with the far end open and shorted representing 100% cable length. Then the fault location can be measured off as a percentage of that length; this can be more accurate than unknown velocity factor and scope timebase accuracy.

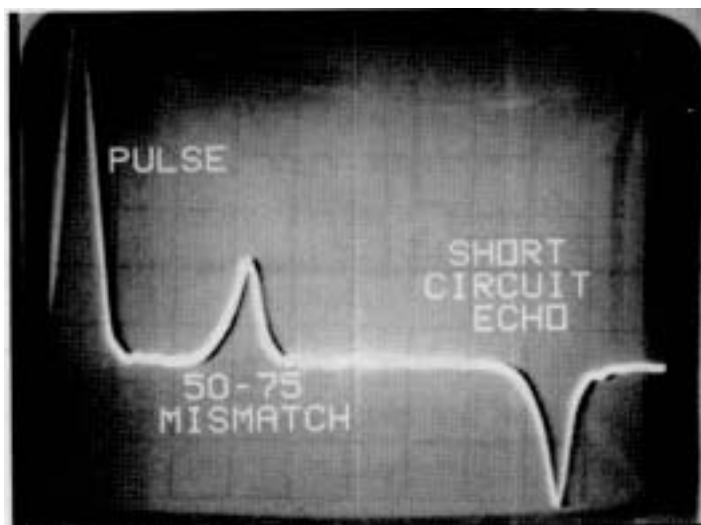
Coiled up cable and odd dram lengths up to 31~s (500m) can be measured, but only if the cable loss is not too great as the reflection pulse weakens and spreads out.



Variable Coax Termination

This is needed to measure coax impedance. The requirement is for a zero to open circuit variable load that is good to VHF; this is not that straight forward. I used a small 500-ohm carbon tracked potentiometer - large ones and wire wounds are too inductive. I took it apart and modified the start of the track with silver conductive paint to give a good zero ohms and about 75 ohms half way around; I also slashed across the far end track with a sharp knife several times to make the high resistance end more resistive. The potentiometer is mounted in a tin box, wired up with short leads to a BNC socket with the low resistance track end to the BNC centre and the rotating wiper to ground. Then it is a simple matter to DC calibrate the knob with an ohms scale.

With this variable load it is easy to check the impedance of any coax cable by either making the reflected pulse disappear on a scope trace for long cables, or for short cables where the close in pulses merge, then the uneven spectrum ripple due to end mismatch echo on an spectrum analyzer/scanner will flatten out at termination matching point. Cable impedance is then the value of the termination; it is nearly always resistive unless you



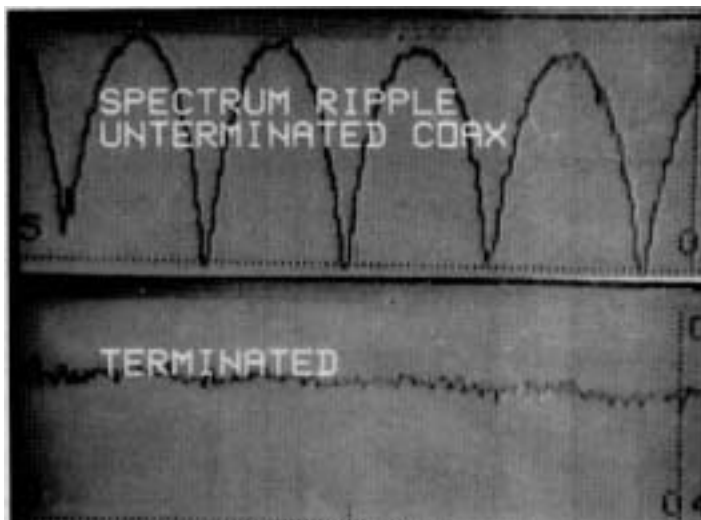
have a lapped screen cable! With a cable made of mixed impedance coaxes no null is possible. This will stop you using bits of non 75-ohm cables for video feeds!

Balanced Line Testing

This needs a small pulse transformer in an add-on box to isolate and match to a balanced line. A turns ratio of 1:2 will drive the line with about 200 ohms floating source. This is quite correct, as most balanced lines are around 140 ohm at HF, even if used as 600 ohms at AF. For the transformer I used a small 2 hole ferrite core testing it with 1/2/3 roms to see which did not reduce the overall height of the DC pulse (not saturating) and did not cause too much negative pulse response (L too low); 3 roms was what I ended up with for the primary and therefore 6 turns for the secondary in slightly thinner enameled copper wire. Avoid too many turns as this will reduce the magnetic coupling, increase winding capacitance & cause unwanted ringing etc. The same variable termination as above can be used to find the Z of any balanced line.

Crystal Calibrator

As the narrow pulse has very high harmonic content strong signals can be heard into the GHz bands. The use of 250kHz as the pulse rate give 4 markers per MHz. Do not put the pulse output into a radiating aerial, as it will cause wideband QRM locally!



Spectrum Analyzer Calibration

In theory the pulse spectrum is in the form of $(\sin x)/x$ [1] and if the terminated DC pulse height is measured with a peak detector (fast diode & cap, mine was 8V which is 1.28 Watts of peak pulse power!) the true power level of any of the RF markers is then: -

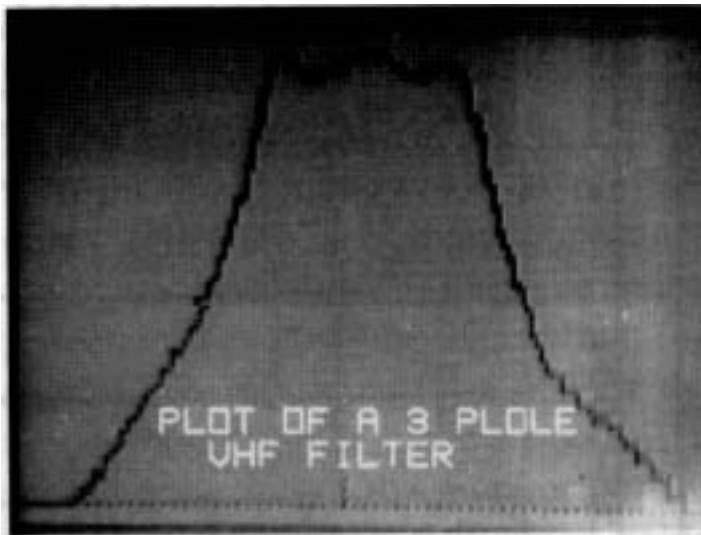
HV =

$$\frac{V \times T \times Fr}{0.707} \times \frac{\text{Sine}(Fh/Fn)}{Fh/Fn}$$

- HV = Harmonic Voltage
- Fh = Freq of a Harmonic
- Fn = Freq Null = $1/T$
- Fr = Repetition Frequency
- T = Pulse width
- V = Pulse height

A spreadsheet can be loaded with this formula and pulse data, and then graphs can be plotted of the ideal spectrum for comparison. This assumes perfect terminations and ideal pulse shape etc. but is a good starting point.

For UHF-SHF use, surface mount components “chip Rs and Transistor” are soldered directly across threaded BNC sockets with no wires or tags, this does give better results but with a lower pulse size of around 4V peak with a sub 0.6 ns pulse length with 2” of coax, with no visible spectrum null up to 1750MHz.



Filter Plotting.

When this fairly broadband signal source is put via a VHF/UHF filter into a spectrum analyzer with a 300kHz wide IF, the shape of the filter can be seen immediately and the filter performance easily adjusted. This is normally only possible with a tracking generator or a high power noise source. Although this noise source should not be put into an effective radiating aerial, hand-held $\frac{1}{4}$ wave & helical whips do immediately give their frequency band away where they match the RF.

Be aware that this broadband pulse can easily overload wide-

band equipment (often only 2 tone calibrated), so a band-limiting filter should be used before testing response of preamps etc.

[1] Rx Calibrator and Tx Mon, by G4COL, Radcom June 1998.

[2] Cable Fault Locator, D.Huddart, Electronics Word March 2001.

ATVQ

FCC, Part 15, Ham Radio In Dallas, TX

DALLAS, TX: The FCC wrote Darwin Networks Inc on February 8, 2001, requesting that the company inform the FCC within 10 days what action it is taking to eliminate harmful interference to the Amateur Service in the Dallas area resulting from its deployment of Part 15 devices in an apartment complex. The FCC said Darwin Networks operates Part 15 devices in the 2.4 GHz band at the Post Townlake Village property in Dallas “apparently installed in an apartment house complex for Internet service using wireless 2.4 GHz nodes” FCC Special Counsel for Amateur Radio Enforcement Riley Hollingsworth wrote. Hollingsworth said the devices were causing harmful interference to Amateur TV systems in the area. He noted that operators of Part 15 devices are required to cease operation should harmful interference occur to authorized (ie, licensed) spectrum users. “Darwin Networks is obligated under Commission rules to locate the source of interference caused by its equipment and make necessary corrections within a reasonable time,” Hollingsworth said. Darwin’s chief technical officer, Jeff Wellenmeyer, had written the complainant stating that the devices were operating under Part 18 Industrial, Scientific and Medical rules, which would not obligate the company to resolve amateur complaints. But Hollingsworth said it appears that Darwin is not operating Part 18 ISM devices but Part 15 devices that are not covered by the same sort of exception, and he pointed to a statement in the Darwin letter stating that the company is operating under §15.249 of the FCC rules.

From ARRL

Another Hard Hat Cam!

Bill McLarty, KM5GE goes video mobile and showed it at the September 20th Jackson Amateur Radio Club (JARC) meeting. He is looking forward to the Boy Scout Camporee and Jamboree for the scouts to enjoy.

Better watch out though - I hear that he likes to look at himself in the mirror with the hat on!



Say you saw it in ATVQ!

Do you have these yet?

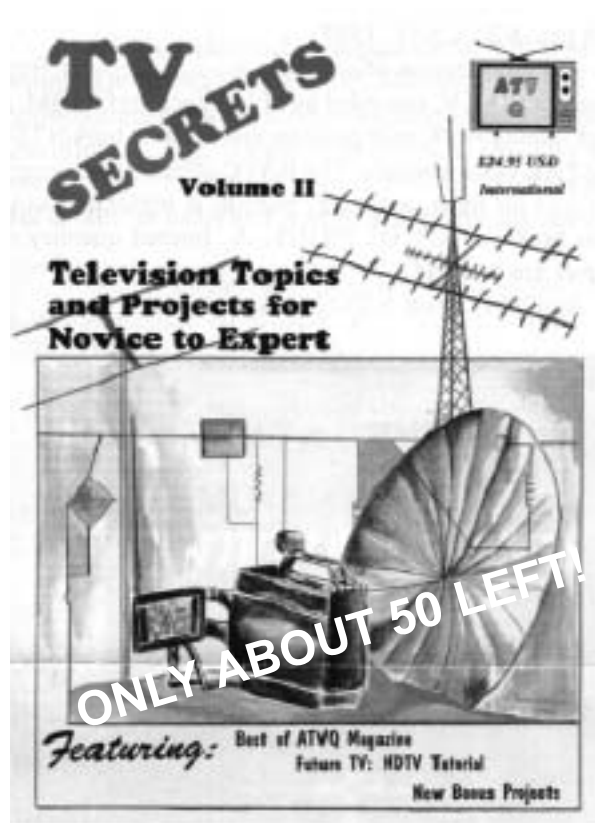


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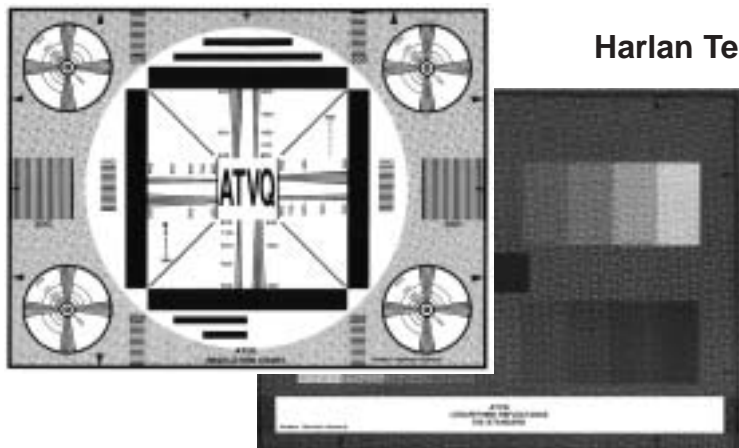
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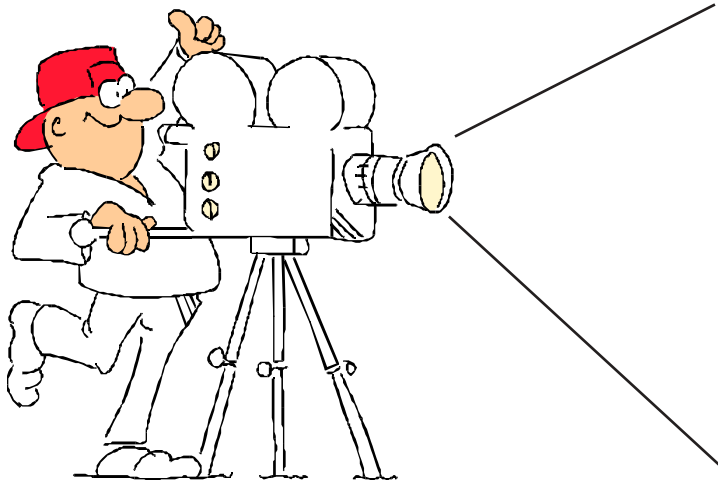
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Gene Harlan - WB9MMM - Editor/Publisher

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SPRING	April 1	April 15	May 1
SUMMER	July 1	July 15	August 1
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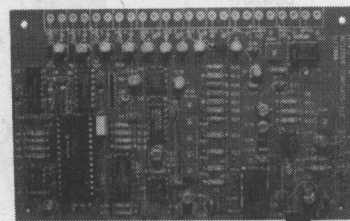
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V13 #1 ARCC/CAATN BAND PLAN MEETING W3SST

Topic 2300 MHZ

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V14 #1 Lew Tepfer, W6FVV, SK ATVQ

V14 #2 AO-40: Plans For April-June 2001 DB2OS

V14 #2 Texas Tower HB1148 Public Hearing Outcome N5IUF

V14 #2 Will The RF Storm Drown Us By Incremental Microwatts? WA2ACU

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V14 #1 Sue Miller, W9YL, SK ATVQ

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V13 #3 Bright Ideas For Monitors - Light Bulb As A Dummy Load Fromm
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V14 #2 Easy, Creative, Digital Video Editing In Your Own Home! WB9MMM
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V13 #1 PACKAGING THE 900MT 33CM FM ATV TRANSMITTER W6ORG

ATV In New England - Hat Cam

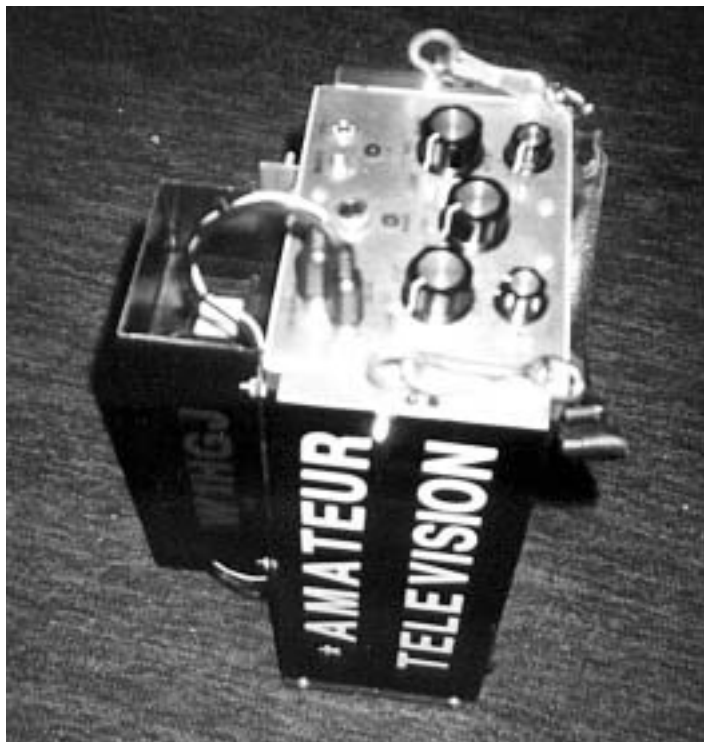
I thought you would like to see what we have been doing with ATV over the last couple of years.

Hat Cam

The Hat Cam puts out 100 mw on 426.25 MHz, Power is provided from 10 rechargeable alkaline batteries.



Hat Cam



Porta Cam

Porta Cam

The Porta Cam gives one watt out and runs on a 7 amp hour gel cell. It has a built in one inch monitor, ID generator with timer, grayscale generator, and ground plane antenna.

Both have been used at ham flea markets, field days, demos, Big E (New England State Fair), club meetings, Mt. Holyoke College girls regatta and the Westover field air shows.

This has been keeping us busy!

I enjoy your publication!

Regards,

Chet Kruczck - W1HGJ
29 Brookhaven Dr.
E. Longmeadow, MA 01028-1406

Editor: Thanks Chuck for sending in the photos and information on what the ATV'ers are doing in your area. I welcome this from everyone.

ATVQ



Camera and Transmitter

Central Atlantic A.T.N. Had Its Quarterly Meeting

The C.A.A.T.N. had its quarterly meeting on December 2, 2001. It was held at the C.A.P. meeting room at the New Castle County Airport in New Castle Delaware. After breakfast Ron, K3ZKO, started the meeting with introductions from everyone in attendance. There were reports from the following areas. Bob, W3WCQ from Baltimore, MD, Ron, K3ZKO from Philadelphia, PA, John, W3SST from York, PA, Harry N3KYR from Lancaster, PA, Dave, KC3AM from Wilmington DE. and Bob W3VCO reported about the Washington DC area but not as an official representative.

There was talk about the status of the link between Baltimore & York and when we might be able to start testing again and what band to use to see if it can be established again. 900 MHz AM was working in the past but that band now has problems. There is the possibility of another site at the midway point that may work better if the site could be secured. There was an announcement about the new link between Wilmington and Philadelphia but due to vehicle problems I was unable to demonstrate it.

The link from Wilmington is 1 watt from an HFT transmitter on 1.255 GHz into a wheel antenna at about 120' above ground level. The wheel antenna is used because this signal is received at another site in the Wilmington split site system. There is a loop yagi at the receiving end in Philadelphia. The return link from Philadelphia is from a Clearline Concept transmitter that feeds a 1-watt amp. The transmitter and amp are mounted in a Cable TV amplifier housing, which is mounted directly at the rear of the Paraflector antenna. Wilmington is using another Paraflector antenna and the matching receiver. There are P-5 signals at both sites over a 24-mile path without receiver pre-amps.

Baltimore will host the next meeting on February 10, 2002 and all are invited to attend.

Dave KC3AM - KC3AM@aol.com

Henry Goes Tractor Mobile

Henry Ruh, AA9XW, sent me a few pictures of his new "toy". Actually, I am sure it will get lots of use at the kennels. I responded with, "Yes, nice tractor! Looks like you have all the attachments. Bet you even have a snow blade."

And, Henry said:

I also have a front loader, post hole digger, 72" mower deck (all shown), also 59" snow blower (one pass clears the driveway!) and a back hoe with 13' bucket. 4WD, cruise control, 3 speed ranges, diesel (no ignition noise in the radios!). Unfortunately the hood is plastic, so I have had to mount the antennas on the rear fenders. I use a Kenwood 741 for 6-2-450 and have 439 MHz ATV (25 watts - tx only), 900 MHz Fm ATV, 1 watt (tx



only) and 1200 MHz ATV RX, Parabolic RX direct to baseband video FM (full duplex). Using a Radio Shack (Casio) LCD with PC Electronics downconverter for ATV RX video velcro mounted on dash.

Camera is weather mounted ball cam with mic built in from ATV Research. Everything runs from 12 volts except Radio Shack TV which has AA cells and no 12 V DC input.

Just got a 12 volt powered Panasonic VHS recorder-player to record QSO. Haven't figured out where to mount the cell phone or bigger TV set, don't want the HV near the diesel fuel port which is about a foot forward of the dash on the hood.

73 Henry Ruh - a9xw@cs.com

Note: Recovering from heart surgery. 11 inches of stents holding my arteries open. Everything going OK. Had 3, 80% blockages.



IVCA VISION NEWSLETTER

No. 7, 8, 9, & 10

Keeping Amateurs Informed On Developments In Visual Communication Around The World
Ray Glidden, W5NOO EDITOR - Email: ray@junct.com

RR1 Box 145
Vinita, OK 74301

Vision Newsletter #7

Help Wanted

I wish to remind every one we still need news of activities of the members around the world to put in the VISION news letter. Send any thing you are doing or know of including graphics in JPG and GIF format including diagrams etc. to me Ramon Glidden W5NOO Editor at ray@junct.com We also would like to learn of any good informative SSTV web page URL's links that we can include in VISION. I would also welcome any suggestions, Ideas and comments you may have. Thank you for your inputs and contributions.

Google Image search

I did a Google Image search for my picture on the web using only my call sign and found I was listed on a very nice SSTV home page put up by Wayne E. Donnelly KB1HJ at www.conknet.com/~kb1hj/links.htm (Nice job Wayne)

SSTV Interface Hardware

As we wrote in the first VISION news ! I find some of the new comers asking how to connect the computer to the Xceiver. I'm not sure if you have had a problem connecting mic, sound cards and amplified speakers etc. to your Xceiver and PC to permit normal computer and SSTV functions. (Out of necessity I designed a special switch box interface some time back to solve this problem) If you want the diagram e-mail me at ray@junct.com We also now have several new commercial Interface Box devices to use for the digital and SSTV modes, The newest one is by TigerTronics the SL-1 Signal Link at \$49.95 see QST Oct. 2001 for details we also have similar devices by the Rig Blaster Co, and MFJ Enterprises Note: you can down load digital and SSTV software programs for Windows and DOS from the Rig Blaster folks at <http://www.westmountainradio.com>

Video Cameras Digital and Web Cams and Scanners

When I think of the difficulty we encountered trying to construct a vidicon tube type video SSTV Cam and also trying to modify a commercial blk&wht video cam into a scan converted SSTV cam, over 30 Years ago. Even 5 years ago I was unable to purchase a digital cam in Tulsa, Oklahoma, today the stores and catalogs have a large number of digital mega pixel and web cams and digital camcorders. The Intel Co. has a new line of inexpensive digital/web USB and web USB cams that will operate even with Windows XP. The charged coupled device

CCD invention has made the small low cost cameras practical. My construction of an early CRT Flying Spot SSTV Scanner did work but was sure crude compared to today's high resolution flat bed scanners, The new applications for cameras seems to be unlimited, now used for conferencing, security and surveillance and facial recognition etc., video cams are in use by the thousands at locations around the world. (I find pioneering however is just not a piece of cake)

Vision Newsletter #8

Japan QTC SSTV Contest 2002 By JA1XVY M.Harano
The contest period is Wednesday 2 at 0000z through Thursday 3rd 2400z January 2002. The contest exchange is RSV+001 (consecutive number starts from 001) to be exchanged with a contest number exchange is calculated as 1 point. Multipliers is the number of prefixes worked with a completed contest number. Scoring is score X multipliers = sum total score. General No cross band contacts permitted. Only one transmitter to be used at any time. no "round-table" style operation allowed. Stations that operate outside the terms of license will be disqualified. Log submission please send your summary and log sheet to QTC-Japan.com editor@qtc-japan.com The deadline is Sunday January 20th.2002 Details. <http://www.qtc-japan.com>

The Good the Bad and the Ugly

It's difficult to understand why some folks create and send damaging virus, Trojan, worms, etc. I find I am asked to update my Norton AntiVirus program every few days for all the new viruses now on the web and also arriving in e-mail. If the junk or "spam" mail was just not bad enough. I am happy however to announce my local web service provider "ISP" is now providing a virus and junk mail filter that is stopping this problem.(Several have unknowingly got and sent the "Badtrans B worm to me). We also have those that at times like to interfere with SSTV on the popular frequencies that occasionally the FCC is able to catch and remove and give fines to etc. If you don't have a virus protection, pick up a free copy of Norton at <http://www.symantec.com/downloads/> (Note: for lids and Jammers no fixes or filters are available yet)

SSTV INTERFERENCE by A.J Claude KC5RW

To minimize the QRM on the popular SSTV frequencies I suggest we do not start a transmission using a picture but instead use a voice message first to identify and even give the mode to be used. (some times several are sending a picture at the same

On-Screen ID Overlay



OSD-ID (PC) is an on-screen display board that overlays user defined text onto either an incoming video source or self generating background screen. Every position on the 28 column by 11 row screen (308 characters total) can contain a user selected character. All information is stored in non-volatile eeprom memory so even with loss of power OSD-ID (PC) retains all screen information. The on-screen text is created using a robust editor called IdMaker which runs under Microsoft Windows. IdMaker includes an integrated upload utility which sends the user created screen to the OSD-ID (PC) board through a supplied RS-232 serial cable. OSD-ID (PC) has two screen modes, a "mixed" (black and white text overlaid onto an incoming video source) mode and a "full page" (OSD generated color background) mode. OSD-ID (PC) supports screen background, character border, and character background color selection. Character border and pixel offset can be set for each of the eleven rows. In addition, programmable character zoom levels, horizontal and vertical pixels positioning, individual color and blink character attributes can also be set. And finally, the user can define OSD-ID (PC)'s text triggering method. 3.5" x 2.5" \$139 includes serial cable and 3 1/2" diskette.

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Vision Newsletter #9

IVCA General Information

The IVCA is a non profit organization operated by volunteer members that provide the various functions and services. The following is a list of the current board members and Net operators.

Dayton Coordinator.....Don Miller W9NTP.
Treasurer.....James Gaither Jr. W4CR
IVCA Web Page.....Doug Alspaugh K3DUG
IVCA Reflector.....Dave Jones KB4YZ

time and we have only interference with out a proper picture (During weak signal or poor band or noisy conditions the VIS detection will not select the correct mode!).

Digital Voice/SSTV the Next New Mode?

Have you seen the new January 2002 QST magazine article explaining the use of digital voice and possible digital SSTV communication. They indicate that digital video is perfectly legal on the HF phone bands designated as "J2F" Note: the baud rate for digital phone transmission is unlimited! (For more information see the ARRL web site at <http://www.arrl.org/tis/info/digivoice.html> You will need the PDF reader installed to view the site. (PDF read only download is available free) Can this be the next big break through for voice and visual communications?

VISION News e-mailRamon Glidden W5NOO
IVCA Director.....Ramon Glidden W5NOO
IVCA Saturday 14.230 MHz SSTV net operators.
Charles B. Grant.....K4ZET
Clarence H. Fowler..... WA0TSL
Michael L. Pratt.....AB4DE
Ray Glidden.....W5NOO
Doug Alspaugh..... K3DUG
Thomas Hamilton..... KA4P

Membership and Dues

As we are no longer providing a printed VISION News letter, only this e-mail version. We have reduced operating expenses. We do however request members to provide the membership dues to the treasurer James Gaither, W4CR, to help cover the Dayton Ohio meetings and other operation expenses. Contact James, W4CR, at w4cr@cs.com

Get on the IVCA Yahoo reflector! (Just to remind new viewers) Any one that would like to receive and exchange e-mail information with the IVCA members can do this by going to the Yahoo group page, i.e. <http://groups.yahoo.com/group/ivca> and on the right side of the page click the "Join this group" and fill in the details. The Yahoo IVCA reflector lets you receive all the mail that members are sending and you can also send mail to them at ivca@yahoogroups.com This is a free service that members can take advantage of for information exchange. It also permits file attachments with size limits.

Large Video Display

We all know displays are getting brighter, sharper , larger and cheaper all the time but have you seen the one the German computer club "GCC" has that uses the lighted windows of an office building to display moving graphic pictures and messages, that can be controlled with a Cell Phone? Check it out at <http://www.blinkenlights.de/> If it's still up! (They also have live web cams) Now that's what we call a big dot pitch pixel display! (What next, more pixels and with color?)

SSTV & Digital Audio The Almost Best Kept Secretes in Amateur Radio

There has been very little written to date on SSTV and it has not been easy to get any thing published in the amateur journals. I now find it is starting to get easier. With the web any one can publish and every one reads. Even the editor of QST magazine has written some good recent articles. The ARRL/QST is posting articles on the web in the Adobe PDF format that permits simple color printing on any computer system. Even my old QST article of Sept 1997 "Getting Started in SSTV" is available in PDF format. (The PDF reader is available free even for WinXP operating system at the Adobe web site at <http://www.adobe.com> (with the free PDF reader installed when you click a PDF link it displays.) After you have installed the PDF reader be sure to check the ARRL web site on Digital Voice/Video transmission and scroll down and play the sample digital audio files etc. at <http://www.arrl.org/tis/info/digivoice.html> You will find that

digital audio was developed during World War 2 for secure voice communications but may soon find some new applications.

What is the Best SSTV System? (easy question difficult answer)

Of the numerous e-mails we have received from folks wishing to start operating with SSTV, the most frequent question is "What is the best SSTV system or software? As we now have an increasing number of hardware and software programs and more arriving almost daily along with upgrades. I'm not able to give a simple answer. As several considerations must be made including price and functions or features etc. I have personally had experience with only fifteen of the various software; DOS and Windows programs and several stand alone hardware systems. I do find they all run and are all fun to operate. In general the newer software sound card programs have more features and I find are easier to configure. I usually suggest the new operator try several programs as we still have individual personal preferences to consider. (I would like to congratulate all the designers and programmer's for their efforts to improve and make SSTV systems easier and more fun.) But what do I know? Ray W5NOO

Vision Newsletter #10

New SSTV Modes (How many is enough)?

Quite some time back I counted over 27 of the various SSTV modes. It seems like each time some one creates a new SSTV program or even hardware it includes new SSTV modes. If some one can convince me of any improvements or advantage of adding new modes this seems to only make a Babylon type band condition and we are forced to continuously be up grading to get the big picture. I would like to receive any comments on this. Ray W5NOO

Saturday IVCA SSTV Net

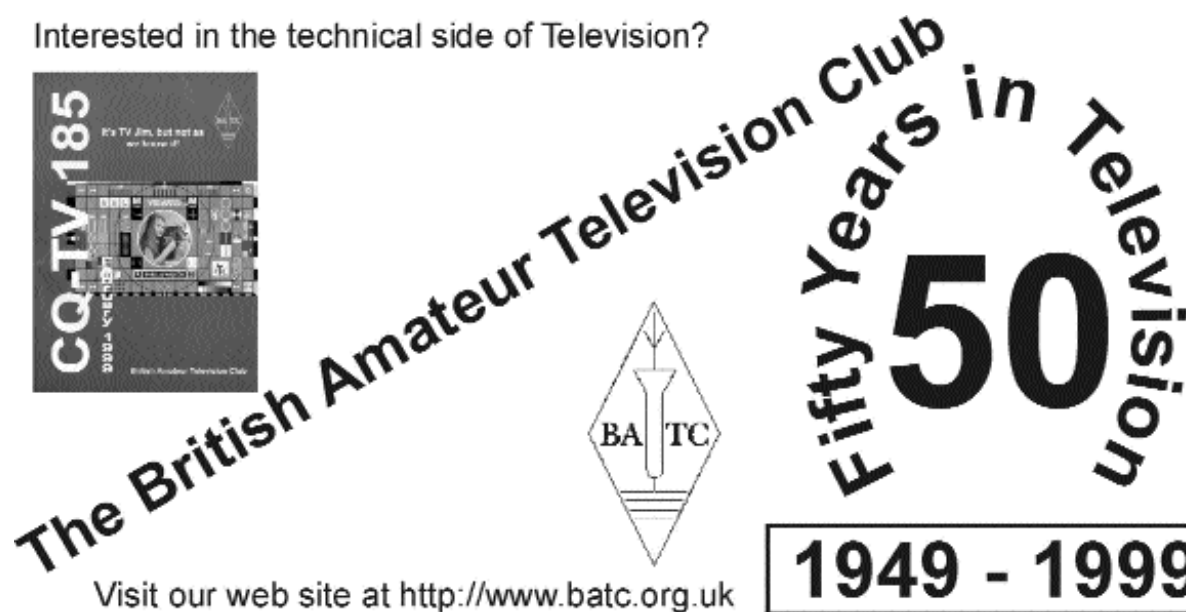
The Saturday SSTV net on 14.230 MHz at 15:00 UTC has been in operation for more than 30 years and I believe is still a very useful way for amateurs to locate each other and communicate, especially for the new operators. As computers have now made SSTV popular and easy and inexpensive to get started with. The net is one way to help eliminate QRM on the week- end, crowded band conditions. As the net control receives and replays pictures usually in Scotty 2 mode, your picture will also usually be received over a different area. As we can successfully only receive one station at a time this is a practical approach and if stations are impatient they can simply move to a different frequency. The IVCA net control operators are only scheduled for net control once every 6 weeks. If you would like to be a IVCA net control, contact me, Ray W5NOO at ray@junct.com (It's fun..... every one sends you pictures and you feel like a big time TV program director)..

Voice SSTV Program Control? (look no hands)

Has anyone considered computer voice control for SSTV Windows programs? I usually use an optical 5 button mouse or keyboard to control most of my SSTV programs. I do however use the older IBM speech recognition program "Strictly Speaking Gold" to dictate and read back e-mail and word processor text etc. I am also able to run and control several Windows programs using primarily voice control commands with programs like the Paint Shop Pro and the Windows Calculator etc. The current sound card SSTV programs however use my single computer sound card and perhaps a second sound card could provide voice SSTV system control. Faster computers and large memory and storage with improved speech recognition are just likely to make us lazy or handicapped operators that don't type or spell; look and sound good in the future!.

ATVQ

Interested in the technical side of Television?



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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.tal-lahassee.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)

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Category "C" Club is 25 members or more and dues are \$30.00 per year.

Signature of Applicant _____

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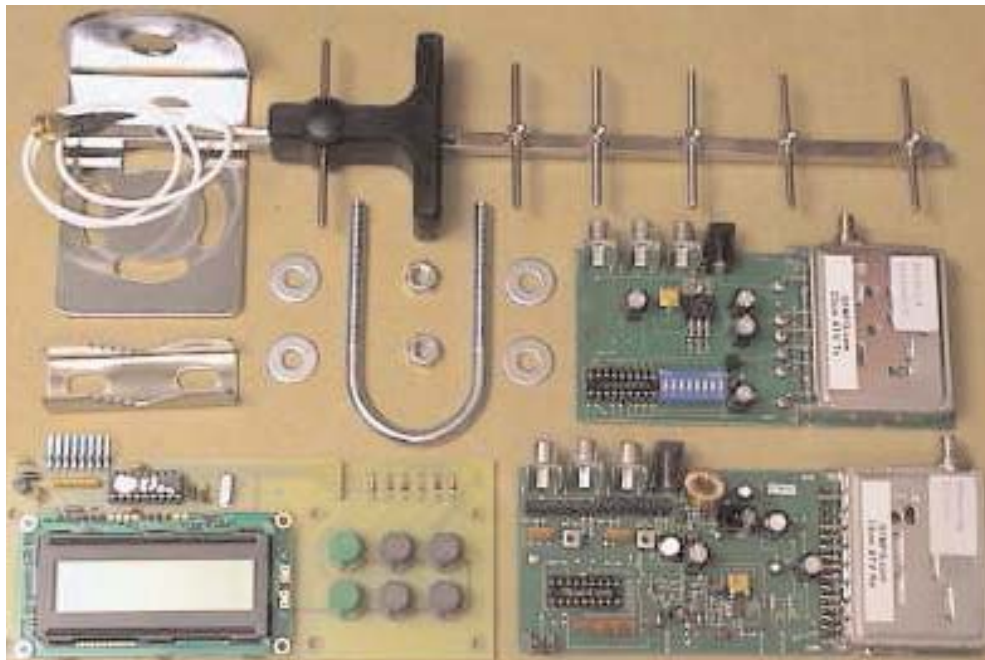
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Fixing Scratched LCD Displays

The radio displays of recent radios are pretty tough, including the FT817. When I first bought my FT-50RD HT, before I had a case for it and before I taped the display, I dropped it on cement getting out of a car. The display was scratched :(

This really works. A pure silk tie. Pure silk is supposedly more abrasive than steel, yet is very very fine. It takes a while and a bit of thumb grease, but the scratches come out pretty nice. It takes a while and a lot of rubbing in a circular motion, but it really works. Use your old ties—the ones with the chili stains!

Rudy Marcelletti, K8SWD

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2001 SIXTEENTH ANNUAL ATV BANQUET

LITCHFIELD, ILLINOIS 11-4-01

by Scott Millick - K9SM - Email: smillick@cilnet.com

907 Big Four Ave.

Hillsboro, Illinois 62049

With clear, 72 degree weather, it didn't seem like winter was approaching when the Central Illinois/St. Louis Area Amateur Television Club held its sixteenth annual banquet. With the great weather this dedicated group of ATV operators and their wives met for another night of fellowship and meeting new members. The banquet was held at the Ariston Restaurant in Litchfield which is the central point for the club with members attending from the Champaign, Bloomington, Mt. Vernon, Springfield, Illinois and St. Louis, Missouri areas. There were 30 members attending.

Activities began at 4 PM with Happy Hour. Upon arrival from their distant points members made and renewed acquaintances telling stories about their last years activities and a great six meter opening that day.

At 5 PM Scotty, K9SM, called the group to order. After a few announcements the clatter of dishes, glasses, and utensils and chit chat continued during the course of the main meal and dessert.

The eleventh annual Central Illinois/St. Louis Area ATV Operator of the Year was presented to Mark Osborn, WA9SXX from Hillsboro, Il. Mark has been a lot of help with the local ATV operation during Old Settlers for several years is always around to help those who need it.

Each area attending made a report about the ATV activity in their location and who was on and who was not. This proved quite interesting as some of the areas did not know about some of the happenings in other areas.

The prize portion was next with the random draw for prizes and the famous heads and tails game for special restaurant certificates providing a lot of fun and laughter as well as exercise.

With all the prizes passed out farewells were said and everyone made their way home with the next banquet scheduled for November 2002.

ATVQ



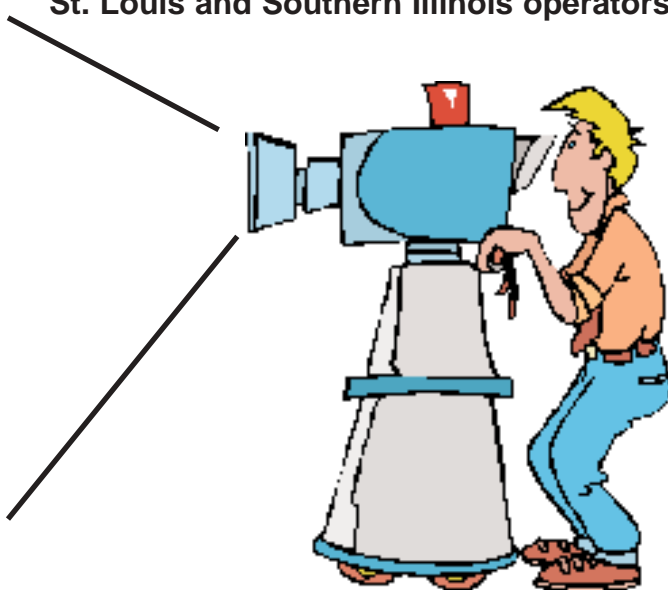
Champaign and Bloomington operators



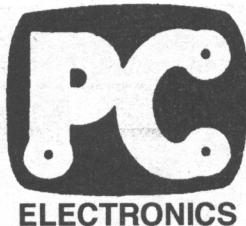
Springfield and St. Louis operators



St. Louis and Southern Illinois operators



Mark Osborn, WA9SXX - ATV Operator Of The Year



ATV DX VARIABLES

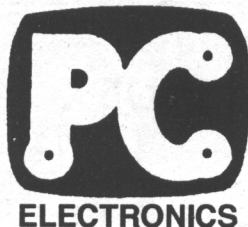
By Tom O'Hara, W6ORG

What kind of distance (DX) can I expect with AM ATV on 70cm or higher is the most asked question from new people coming into this facet of the hobby. There are a number of variables such as band, antenna gain, transmitter power, receiver noise figure, bandwidth and coax loss, and only when you define these variables and have line of sight between the two antennas can you come close to predicting the distance for a snow free picture.

Line of Sight - The most important variable of all is having line of sight between the two antennas. If you theoretically have any obstacle in the path that prevented you from looking through a high powered telescope placed on the boom of the antenna and seeing the antenna at the other end, you don't have line of sight conditions. Without line of sight, it is very difficult and beyond what most amateurs can practically determine and calculate. Most effort then should be spent on antenna height and placement to get line of sight. Just one tree or person blocking the path can give 20 or more dB of attenuation (20 dB is the same as going from 1 Watt to 100 Watts). If you do not have line of sight, or can't see that far, a rough approximation can be made by seeing if you can communicate from the exact same antenna location with 2 meter walkie talkies. If the signal is noisy or nonexistent try moving around looking for the magic spot; you never know where the signal might have a hole through the obstacle or get a reflection off a metal object that does have line of sight between both locations. However, non-line of sight paths are more subject to multipath ghosting from the reflected signals being significantly strong and/or out of phase with the direct signal. The bottom line is that it is much more significant to add antenna height or optimum tower placement in order to get line of sight than any added coax length and its few dB additional loss. Line of sight over perfectly flat terrain for 10 miles takes an antenna at 50 feet above ground due to the curvature of the earth. The RF horizon miles is roughly two times the square root of the height in feet.

Band - Basically, the lower the frequency, the farther the distance all else being equal. What this means is that given the same transmitter power, coax loss, etc., due to antenna area, the signal strength arriving at the receiver input will be higher at lower frequencies. Since antenna capture area is two dimensional, the antenna size will decrease by 1/4 if the resonant frequency is doubled for the same antenna gain. The lowest amateur band with enough bandwidth to support ATV is at 420 MHz. Therefore, all other variables being equal, the 900 MHz band goes 1/2 the distance of 420 MHz band and the 1200 MHz band 1/3. To make up for the 6 dB for doubling or 9 dB difference for tripling the frequency, you can get some back by increasing antenna gain, antenna mounting a preamp, transmitter power or a combination. Coax loss increases with frequency as well as moisture effects.

Bandwidth, Noise Figure and Coax Loss - These somewhat all go together to determine the video to noise ratio seen on the screen. Most TV sets, VCRs, cameras, and camcorders themselves don't do better than 40 to 45 dB video to noise. So with ATV we define snow free as any video better than 40 dB S/N. The wider the bandwidth the higher the noise floor power from all those agitated electrons crashing around in a resistance. At standard temperature the noise floor is about -174 dBm (174 dB below 1 milliwatt into 50 Ohms) for 1 Hz bandwidth. The noise floor power goes up linearly at the rate of 10 dB every time the bandwidth is increased by 10 times. The nominal 3 dB bandwidth through a TV receivers IF and detector is 3 MHz which works out to be a noise floor of -109 dBm or .9 microvolts if there were no other factors. So a snow free picture as we have defined it and in this perfect receiver would have to have a signal strength of at least 40 dB higher than the noise floor or -69 dBm (80 microvolts). But we then have to add in the receiver system noise figure as determined mostly by the noise figure of the first preamp stage, its gain, losses of connectors, tuned circuits and mixer noise figures of the following stages. Bottom line is that the typical AM P5 picture will take between 100 and 200 microvolts at the ATV downconverter antenna input jack and even more with just a cable ready TV tuner. The coax loss from the antenna also reduces the signal strength. Below the snow free power level, the video will decrease one P unit for each 6 dB that is lost due to coax loss or first stage noise figure. Bottom line is use a downconverter with a low noise figure, minimize coax and connector loss by using the larger quality coax or hard line with N connectors and no adapters. You can also almost eliminate the coax loss with an antenna mounted low noise preamp. However, they are expensive if you also intend to switch the preamp out during transmit.



ATV DX VARIABLES cont.

Antenna - Unless you know you don't need or ever use a lot of gain to make the path, most hams get the highest gain antenna they can afford and practically put up - it is a factor in both transmit and receive and to a point, a less costly increase in dB than adding a transmitter amplifier. The trade offs are gain vs. size and beamwidth with beams, but more important for ATV is bandwidth. The antenna needs to have a low reflected power as well as gain over the whole 6 MHz AM ATV channel which can be somewhat independent. It is best to stay with reputable antenna manufacturers that have proven gains at antenna measuring contests and data to support the advertised bandwidth. Whenever you put up a new antenna, it is a good idea to verify with a RF power meter that the reflected power at the ATV video carrier frequency is no more than 10%, even if you have to get with local hams to borrow the meter or come over and help you. Most of the time, when a new system is put up and one is not getting the expected results it is due to a problem with the coax, connectors or antenna construction or moisture getting in and ruining the coax. Don't be surprised if during periods when the antenna is wet that signal strength significantly decreases. It is not path attenuation from rain so much as it is moisture conduction on the antenna and changing its tuning and characteristics - a quick check with a power meter usually shows a drastic change in reflected power. Above 300 MHz, antenna polarity is not significant unless you are opposite of everyone else in the area which can cost you about 20 dB. Polarity is usually determined by who was first on ATV in the area, but technically, the polarity should be chosen to be opposite of the neighboring mode. For instance if using 439.25 for ATV, horizontal would give the most rejection from FM voice repeaters above 440 MHz since they are vertical. If using 434.0, your neighbors are the weak signal people at 432 MHz who are horizontal and therefore you should use vertical. Beams are preferred over omni directional antennas to minimize multipath ghosting for home station use. However, at repeater sites or at emergency operations centers, omni's may be more practical. Vertically polarized antennas are more commercially available and smaller in size than the same gain horizontal omni's, but most areas polarity has long since been determined before a repeater goes on the air. Make sure to check with local ATVers as to antenna polarity per band and frequency before putting up the antenna system.

Power and Path loss - OK, we are finally at transmitter output power. As the RF energy gets out more than 20 to 100 wave lengths from the antenna it spreads out linearly over an increasing area such that the amount that can reach a distant antenna decreases by a 1/4 as the distance doubles. Below is a table which shows the expected snow free line of sight DX on the 420 MHz band given transmitter power output levels in the order of 100 mW, 1.5 W, 20 W & 100 Watts p.e.p. and for antenna gains of a dipole, OAL 5L-70cm beam or antenna with 8 dBd gain, and 16 dB with a DSFO-ATV25 beam and the respective antenna at the receive end. The other assumed variables are a 2 dB system noise figure, 3 dB loss in coax at both ends and greater than 40 dB video to noise ratio.

Antenna dBd gain	Xmit	Dipole 0 dBd	5L-70cm 8 dBd	DSFO-ATV25 16 dBd	Distance in miles on the 420-450 MHz band is shown in the order of .1 / 1.5 / 20 / 100 watts for the respective antennas and their gain in dB over a reference dipole. This assumes P5, line of sight, and the major lobes of the antennas are pointed at each other. P4 is twice the DX.
Receive Dipole		.24/.9/3.4/7.7	.6/2.3/8/19	1.5/6/21/48	
5L-70cm 8 dBd		.6/2.3/8/19	1.5/6/21/48	3.8/14/53/120	
DSFO-25 16 dBd		1.5/6/21/48	3.8/14/53/120	9/37/133/300	

Bottom line is get line of sight and highest gain antenna you can. If you can put a 1 dB NF preamp at the antenna to eliminate the 3 dB coax loss in the figures above, you can multiply the distances by 1.4. For R/C you can double the distances shown since the coax in the vehicle is very short and if you use a 3 dBd ground plane to receive. A cable ready TV will probably be at least 6 dB noisier than the TVC-4G downconverter and 1/2 DX. If you want to know a different band you can scale the distance by multiplying the ratio of 434 MHz divided by the new frequency. If you have different variables you can multiply by 2 for every 6 dB power increase or less loss, and times 1.4 for every 3 dB. For a comparison of AM vs. FM ATV, see the ARRL Handbook.

(c) 10/2001

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Digital ATV Test

Right now we have started a first field test with DATV 3rd generation at the ATV repeater, DB0KO, in Cologne. The universal coder from Uwe Kraus, DJ8DW, is set to QPSK mode with SR 4167, FEC 5/6, Video PID 0033, Audio PID 0049, and the exciter is feeding a linear PA with 2C39 tubes running only about 10 Watt ERP on 23 cm. The horizontal TX antenna (nearly circular radiation characteristics) is switched by DTMF control between normal FM-ATV and the experimental DATV output.

Until now around 26 stations up to 50 km from Cologne have received excellent quality video with their Sat-TV set-top boxes and a normal directional antenna. DJ8DW will set up another test sequence with GMSK modulation later on, but then special receivers are needed (some experimental 19 inch frame devices are in preparation). Pictures of devices in use now can be found on our website:

www.darc.de/g/datv/fotos.html,

technical explanations under

www.darc.de/g/datv/intro2.html.

Best Regards,

Klaus, DL4KCK - DL4KCK@t-online.de
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"It [IC-R3] is perfect for general monitoring or testing purposes in the shack as well as portable and mobile ATV applications such as R/C, finding downed balloons and rockets and public service events. This receiver is also very handy for repeater owners to track down interference from legal and illegal Part 15 transmitters or other services too. It does surprisingly well for viewing in bright sun light too."

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

"The IC-R3 communications receiver is more than just another scanner. With live video reception-of broadcast and amateur television, and short range RF-based video systems-icom opens up a new frontier for the progressive wide spectrum scanner enthusiast."

-QST, 2/01



IC-R3

World's First Audio/Video Scanner!

Never before has this much excitement been in the palm of your hand. The IC-R3 brings you more than the usual audio you get from an ordinary scanner. Wide tuning range allows you to see and hear the excitement behind the scenes. Large easy to read color display for frequency settings and video reception. All in a compact easy to carry package.

Whether you're a hobbyist wishing to go beyond regular voice communications or a professional who does wireless video security or counter-surveillance - nothing else comes close to the 'R3 in price or versatility. Clearly, the IC-R3 represents a quantum leap in monitoring technology.

Here are just a few of the many video signals to monitor.

- 420-440, 902-928 & 1240-1300 MHz: Amateur TV frequencies
- 902-928 MHz: Part 15 video equipment; "VCR Rabbits"™ & wireless security cameras
- 2150-2162 MHz: Omni-directional transmission of point to multipoint video signals

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



0.5-2450 MHz† • 450 Memory Channels with Alphanumeric Names • CTCSS with Tone Scan • 4 Level Attenuator • Telescoping Antenna with BNC Connector • Four Way Action Joystick • Lithium Ion Power • and a 2" Color TFT Display with Video/Audio Output

Limitless uses • The worlds first audio scanner/pocket TV combo

†Cellular frequencies blocked; unblocked versions available to FCC approved users. ©2001 ICOM America, Inc. 2380 116th Ave NE, Bellevue, WA 98004 425-454-8155. The ICOM logo is a registered trademark of ICOM, Inc. All specifications are subject to change without notice or obligation. R3ATVQ701

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