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Amateur Television Quarterly

2009 ATV CONTEST

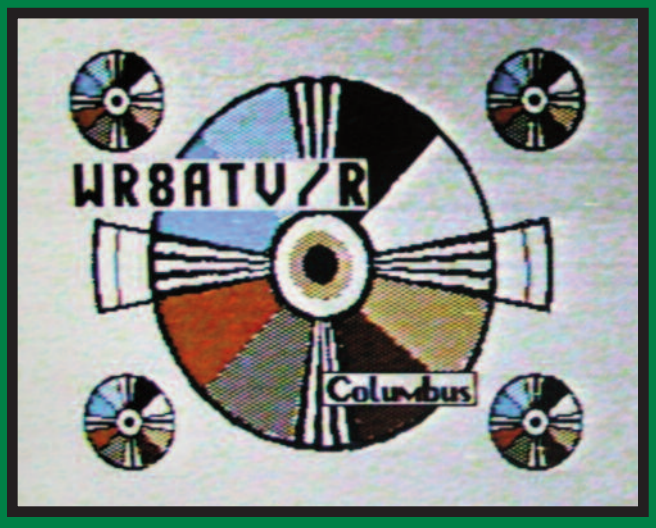
PACKAGING the VM-70X

MOBILE STREAMING VIDEO

COMTECH 1200 RECEIVE MODS

The INVENTION of TELEVISION

The Wu8o CAN ANTENNA



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AMATEUR TELEVISION QUARTERLY

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Amateur Television Quarterly
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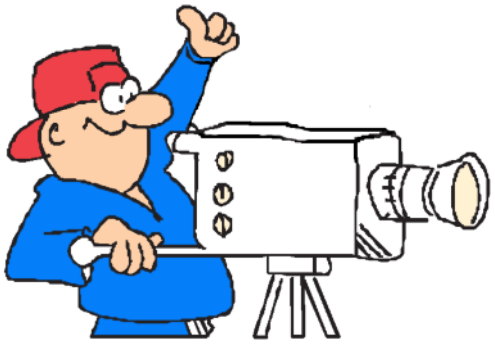

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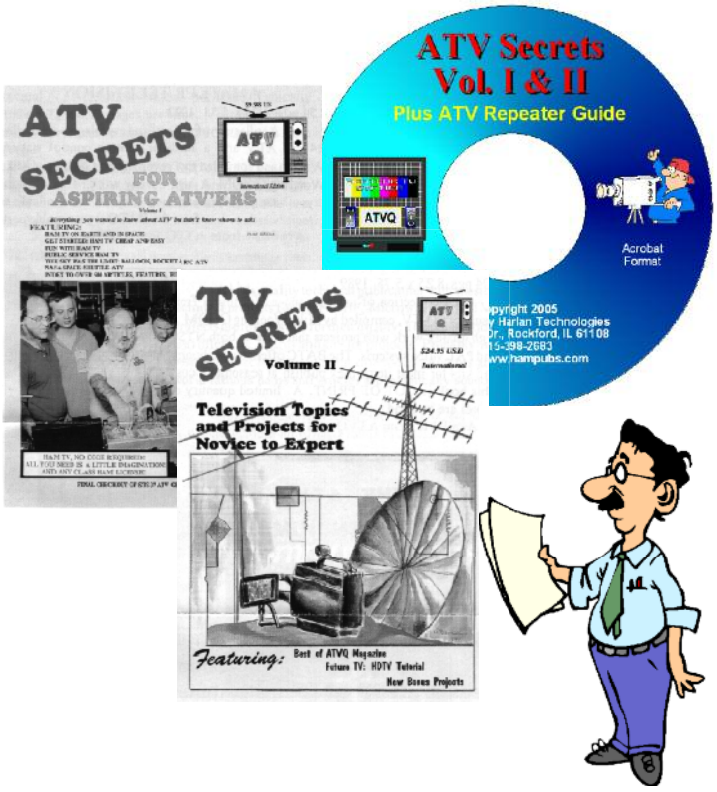

ATV Secrets Vol I & II On CD

ATV Secrets is a great place to start your ATV adventure! Volume I has 64 pages, tightly packed with information covering all aspects of getting started, where to find activity,equipment, how to DX, and answers frequently asked questions about power, antennas, vestigial sideband operation and more. Everything the beginner in ATV needs!

Volume II is a mammoth book with 292 pages of technical material. More than 40 authors present over 90 technical projects and theory topics to fully acquaint anyone from novice to expert in the how and what of TV, video, and ham TV. Divided into 11 chapters, the book presents tested projects for all areas of interest in ham TV including antennas, amplifiers, repeaters, receivers, transmitters, video accessories, and more!

Volume II is sold out in the paper version, but available on CD.

ATV Secrets Volume One (paper) $8.95
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ATV Secrets I & II on CD $25.00
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Television Timeline

- *Denise Camp*

- The Visionary Years 1810 - 1910

As all Amateur Television people know, television wasn't the brain child of one man but of many. This is a timeline of what is known as the "Visionary Age" of Television. Many men in different parts of the world had a vision of sending pictures through wires or electronically. They came up with pieces of the puzzle we know as television today. Some worked independently of one another, a few shared information through papers and at conferences. Each generation of inventors/scientists built upon what others had envisioned or built before them.

Many of these men worked in several areas of scientific discovery and are fascinating in their achievements in the development of television and other areas. Their backgrounds vary. Some are self educated, some formally educated, but all are brilliant in their visions and work.

1817

John Jacob Berzelius (1779-1848) was a Swedish scientist who discovered the existence of selenium. He and three others are considered the fathers of modern chemistry.

1831

Joseph Henry (1797-1878): An American who discovered the electromagnetic phenomenon of self inductance while building electromagnets.

Michael Faraday (1791-1867): There is contradictory information about this Englishman. Some sources describe him as an Englishman with little formal education and almost no higher math skills. He's also listed as a physicist. He's considered one of the most influential scientists of his time. He came out with a paper on electromagnetism before Joseph Henry. He is also who developed the gas burned in laboratories known as the Bunsen burner, benzene, and the laws of electrolysis which bears his name.

1839

Alexander Edmond Becqueret (1820-1891) was the second of three generations of scientists. He discovered the electro chemical effects of light.

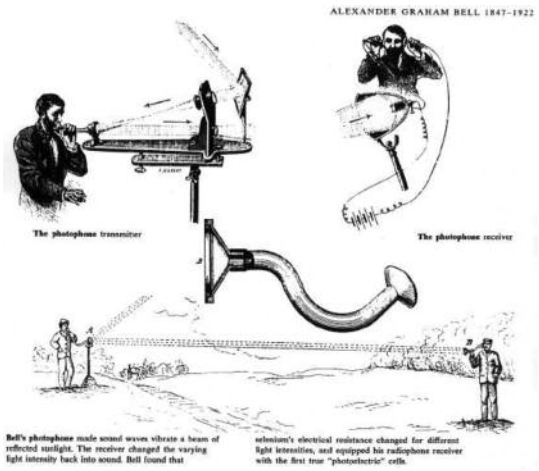
1862

Abbe Giovanna Caselli (1815-1891): An Italian physicist who developed the Pantelegraph, the first still image transferred on wire. Pantelegraph is a combination of "pantograph" which is a tool that copies drawings and the telegraph which is how it was sent over the wire. He and 2 other scientist designed the precursor of the fax machine.

1873

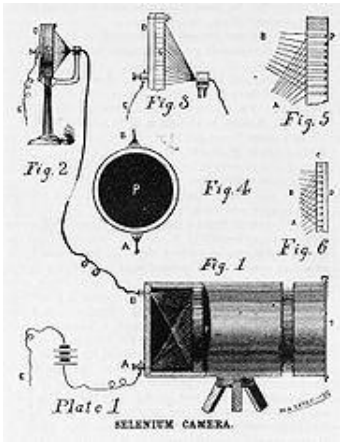
Willoughby Smith (1828-1891): A British scientists who, along with assistant, Joseph May, discovered photoconductivity. This resulted from experiments with light and selenium that proved images can be transformed into electronic signals. This was extremely important in the timeline of the development of television.

Alexander Graham Bell (1847-1922): In 1880 he came up with a device called the Photophone that could transmit sound on a beam of light using a selenium cell. This first practical use of selenium was an inspiration to those attempting to design what we now know as television.



1877

George R. Carey (1851- ?): Perhaps the first true amateur television guy. A civil servant in Boston he designed a complete television system with drawings for a selenium camera that let people see by electricity.



1870's

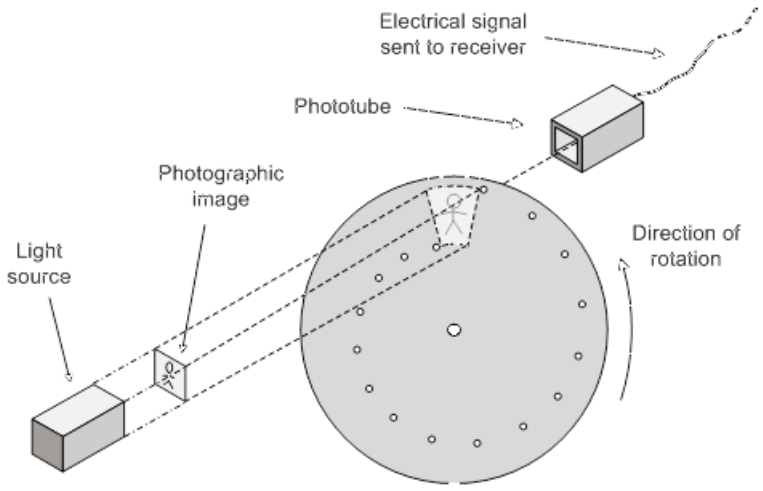
Louis Figuier . His name pops up in connection with the telectroscope. In reality, he was a French writer and publisher who coined the term telectroscope in an article.

Constantin Senclecq: A French scientist and inventor who built the first prototype of television, called the telectroscope. He developed this independently of George Carey who came up with a similar invention at the same time.

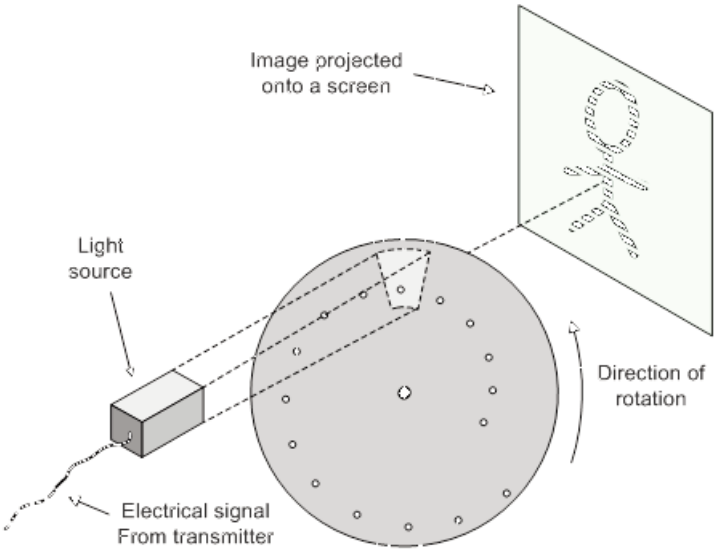
Adriano de Paiva: An Italian scientist who also developed a prototype of the telectroscope, independently of Carey and Senclecq.

1884

Paul Nipkow, a German scientist who submitted a patent application for a way to electrically transmit images using spinning metal disks and eighteen lines of resolution, called the "electric telescope". He successfully sent images over the wires.



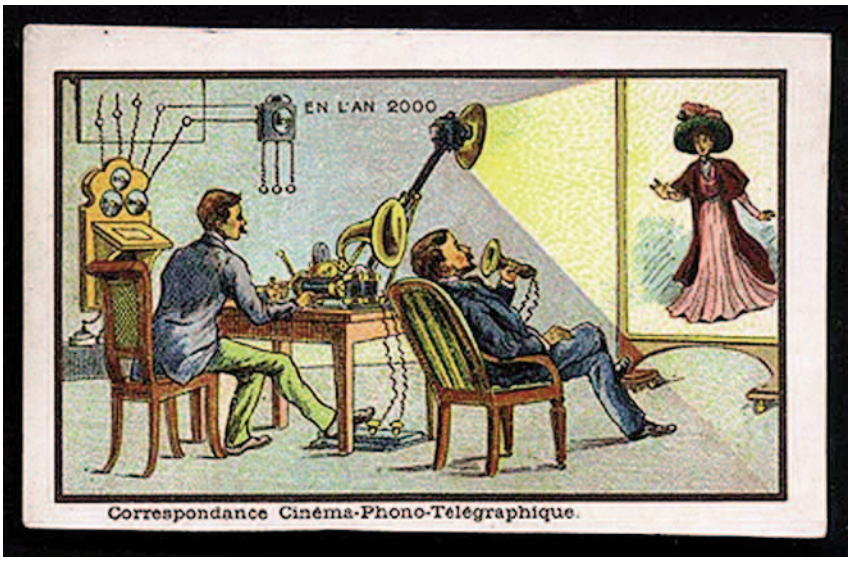
Nipkow disk image transmitter



Nipkow disk image receiver

Television Timeline article continued on Page 8

1900
Paris World's Fair: The First international Congress of Electricity was held there. "Distance Vision" was a major subject discussed. A trading card illustrating the "One Hundred Years Hence" series showed people listening to a live concert at home while watching a projection of the image on the wall. The card shown is titled "In the Year 2000".



Also in 1900:
Constantin Perskyi: A Russian who first introduced the term "television" at the 1st International Congress of Electricity.

1906
Lee DeForest: An American who invented the "Audion" a vacuum tube with the ability to amplify signals.

(*Lee DeForest on left. Edwin Armstrong on right who developed circuits to use Lee's tubes.)*

1907
Alan Archibald Campbell-Swinton (1863-1930) An Englishman who developed the first method of scanning an image. He suggested a cathode-ray tube (CRT) be used to reproduce the television picture on a phosphor-coated screen.

Boris Rosing (1869-1933) A Russian scientist and inventor. Independently of Swinton, he designed a television system using the CRT and filed a patent in Germany. He improved that system in 1911 and did a report to Scientific American with diagrams and descriptions. His invention expanded on Nipkow's designs, combined that with the cathode ray tube and essentially built the first working mechanical TV system. V.K. Zworykin, who later contributed to modern television, was one of his students. Rosing was later exiled by Stalin.

Part 2 of the Television Timeline will appear in the Summer 2009 issue of ATVQ including such wonders as the Baird Mechanical TV shown below - the first true TV system that was available to the public during the 20s and early 30s.

Most of the inventors listed in this timeline have multiple biographies available online. A book titled "*They Made America"* by Harold Evans offers insightful information, too.

www.fcc.gov/omd/history/tv/1880-1929.html

www.Britishpride.org

http://www.teletronic.co.uk/televisiontimeline.htm

http://www.hffax.de/history/index.html

http://www.mztv.com/baird.html

Two of the inventors on page 6 deserve a special mention:

In 2005 at Christie's Auction House, a group of printed and manuscript materials of George Carey's was sold for $19,200. **George Carey** may have been the original amateur television guy. A surveyor in the city of Boston he was among the first to propose the telectroscope using the photo-electric properties of selenium. In other words, he produced a rough version of the first television.

In 1873 Carey learned of Willoughby Smith's discovery of photoconductivity. He used this discovery to devise a crude system for transmitting television. In 1880 he submitted three designs to the Scientific American. The first used a "selenium camera" made up of a circular disc of selenium connected by separate wires to a similar disc of wire points at a receiver. A piece of chemically prepared paper had to be inserted between the points of the metal plate. This was using a visual transmitter as a "camera."

Carey's selenium camera is recognized by historians as the ancestor of both facsimile machines and television. There is no evidence that Carey actually built the devices he designed. In 1895 he published another account of his designs in Electrical Engineer (January 16, 1895).

Sad to say, little is written about George Carey. He isn't in many of the collections of American inventor books or even in the World Book Encyclopedia. The year of death isn't even available in most sources. To glimpse some of his sketches that sold at Christies go to:
http://www.christies.com/LotFinder/lot_details.aspx?intObjectID=4443548

Joseph Henry

Today some readers may know Joseph Henry because the SI unit of inductance, the Henry, was named after him as were the derivative units, the millihenry and the microhenry. During his time, many thought him the most important scientist since Benjamin Franklin. He was also the first Director of the Smithsonian Institution (1846) and one of the founding members of the National Academy of Science. This is a man, self educated and the child of Scottish immigrant parents whose scientific discoveries deserve a timeline of his own.

He was the first to coil insulated wire tightly around an iron core to make a powerful electromagnet which was an improvement on William Sturgeon's, who wrote about it first (his used a loosely coiled uninsulated wire).

Henry also discovered the property of self inductance at about the same time as British scientist, Michael Faraday. As with Sturgeon, British scientist Michael Faraday discovered it as well and, was first to publish his results, so he became the officially recognized discoverer of the phenomenon rather than Joseph Henry.

He served as president of Princeton University from 1832-1846. This is remarkable because of his young age (35) and the fact he was self educated and had never graduated from any institution. While there he continued his study of magnets. He also studied sunspots and rigged a wire from his laboratory to his house on campus to send signals to his wife. This is similar to what S.F.B. Morse did when inventing the telegraph. In fact, Morse used one of Joseph's papers in his invention and consulted with Henry on his work. This later led to problems when Joseph was called to testify in a patent suit against Morse. He stated that he and Professor Wheatstone, of England, had known about the principles behind telegraphy which challenged Morse's originality claim.

In 1844 Joseph Henry was appointed to a committee to investigate the explosion of a gun during a demonstration on a naval ship that resulted in the deaths of the Secretaries of State and Navy as well as spectators. His experiments on gun castings on this committee led him to the subject of molecular cohesion of matter. He branched into the study of phosphorescence, sound, capillary action and ballistics.

In 1860 Joseph Henry became interested in the work of balloonist Thaddeus Lowe and was responsible for convincing Lowe to fly from the Western US to the East coast. This was a sort of practice for Lowe before trying to cross the Atlantic in a giant inflated aerostat. The American Civil War created a problem when Lowe's balloon landed in the new Confederate State of South Carolina. With Henry's recommendation, Lowe formed the Union Army Balloon Corps which served the Union Army for 2 years.

The list of Henry's studies goes on and on. As the first director of the Smithsonian he connected weather reporting stations by telegraph which was the beginning of the U.S. Weather bureau. He also identified room acoustics (direct sound) and reverberation laying ground work for studies that weren't pursued until one hundred fifty years later. ATVQ

ATVQ

The Tech Guy is IN

- Mike Collis WA6SVT

P.O. Box 1594
Crestline, CA 92325
email: wa6svt@atvquarterly.com

Question: How can I get my 70cm ATV receive antenna high on the tower when an existing 70cm voice repeater has that space occupied?

Answer: Frank W5VID contacted me last month with some questions about antenna locations and options on a hospital roof mounted tower. The answer is to use a multi-coupling antenna system. The basic system consists of window bandpass filters connected together with a wide band 70cm antenna usually at the top of the tower with low loss line. For tall towers, the window filters and a preamp for each is tower mounted.

An example of this technique is the ATN repeater at Oat Mt. Filter number 1 is 433-444.5 MHz to cover 434 MHz ATV and 440-444.5 MHz voice repeater inputs. Filter 2 is 450-455 MHz, number 3 is 460-465 MHz and 4 is 470-475 MHz. Each filter has a preamp and a 16 port splitter. This gives all amateur, business, broadcast auxiliary, and government radios top of the tower coverage with good filtering and low noise figure.

I have designed this system as well as other smaller systems for several sites. It works well for all users at the site. Most of these systems use DCI filters because of reasonable cost and custom design of the filter for each window.

In some cases a transmitter can share the antenna too if not adjacent to the RX window filter.

Question: Bob W6KGE asks about a new signal at 927.775 MHz causing QRM to 919.25 MHz ATV reception at Spencer N6IWY's QTH while helping set up a new downconverter. Bob indicated the signal was about 10 dB stronger than the aural carrier at 923.75 MHz.

Answer: The source was a licensed commercial paging for vehicle location service that is primary on the band (amateur is secondary). Our ATV channel is 918-924 MHz so the signal is at least out of the ATV channel by a few MHz thus allowing filtering to remove the QRM. There are three ways to remedy the QRM.

1. Reduce the RF gain or increase the IP3 of the downconverter to avoid intermodulation in the converter and hope the TV set's IF filter can handle the filtering and it's tuner can convert from VHF to IF without overload.
2. Add a notch filter to suck out the 927.775 MHz carrier
3. Add a bandpass filter 6 MHz wide to filter out signals outside of the ATV channel.

A channel filter can be a bit costly but the best solution as it will also get rid of high power paging at 928-930 MHz at the same time. In the 900 MHz band DCI, Celwave, TX/RX and other companies make channel filters that cover this band. A cheaper alternative is a 3 pole filter I published in a prior issue of ATVQ. This filter is not as sharp but may reduce the 927 signal and surly any high power paging in the 928-930 MHz area to reduce the overload. Perhaps modifying the downconverter to could be done with one RF amp only and a good double balanced mixer with +13 or better LO input would work. The above solutions will work on any ham band where brute force overload is the problem.

73s,
Mike WA6SVT

ATV News

GCARES ATV Repeater in Flint, MI

- *Report by Bryan Dygert KC8LMI*

Here are a few photos of the Flint, Michigan (Genessee County Amateur Radio Emergency Service) crossband ATV repeater. (KC8KGZ/R) The ID pictures were taken during a recent opening. It is 439.25 LVSB horizontal in and 1253.250 out running a down east 55 watt amp, but they are only running about 28 watt output at this time. They are using a diamond vertical for 1.2 GHz and a homemade ribcage for 70cm receive. Along with a DCI 8-pole filter. (439.25 lvsb), the system is fed with about 75 feet of 1/2" hardline for both TX/RX. It is located on top of McLaren Regional Medical Center. Approximate antenna height is around 180 feet.

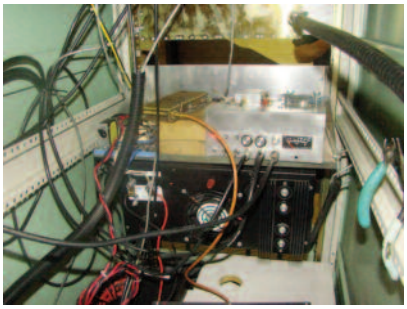
I have worked this repeater many times during band openings. It is 53 miles from the home ATH. They (GCARES) had a emergency drill coming up and after some testing, they discovered their ribcage antenna was over 2:1 SWR and that the receiver (ATVR-4) had degraded in performance.

With only a few days before the drill, I was contacted by Al Smith, WB8YOB who built the system and he asked if we could look at the receiver and possibly repair it. So I said yes, and after some head scratching at our end, we discovered that the 5-pin SAW filter had gone bad. After robbing another SAW filter from a IF board in a 900mhz receiver the problem was fixed, and they were back in business. I went up one weekend before the drill and helped them re-install the receiver and swap out their ribcage antenna with one that I had built which had a SWR of 1.3:1, the system is performing excellent now, with very good results.

They also have repeater room cameras, a SSTV computer on site, and an OSD board.

The GCARES ATV Repeater (KC8KGZ/R)

(I to r): Al Smith WB8YOB and Bryan Dygert KC8LMI install the new ribcage antenna *(photos by Linda Dygert KB8EMA)*



Inside views of the KC8KGZ repeater in Flint, Michigan

Reception of the Flint, MI GCARES ATV Repeater (KC8KGZ/R) by Bryan Dygert KC8LMI from 53 miles distance during a band enhancement.

Reception of KC8LMI's transmission through the GCARES repeater.

Gilbraltar Peak ATV Repeater Fire - Santa Barbara, CA

- Report by Rod Fritz WB9KMO

The Jesusita Fire is the latest of three major fires that devastated large portions of the Santa Barbara area in the last year. This fire started on May 5 and over the next few days, burned through the northern parts of the city, nearby foothills and mountains. By May 8, the fire burned through the KTYD/KTMS radio site on Gibraltar Road which hosts the WB9KMO-ATN ATV Repeater. Due to recent weed abatement, there was virtually no damage to structures and equipment at the site. The fire passed through, scorching the short grass and burning nearby vegetation. Some minor cleanup of smoke and ash was required but other than that, no harm was done.

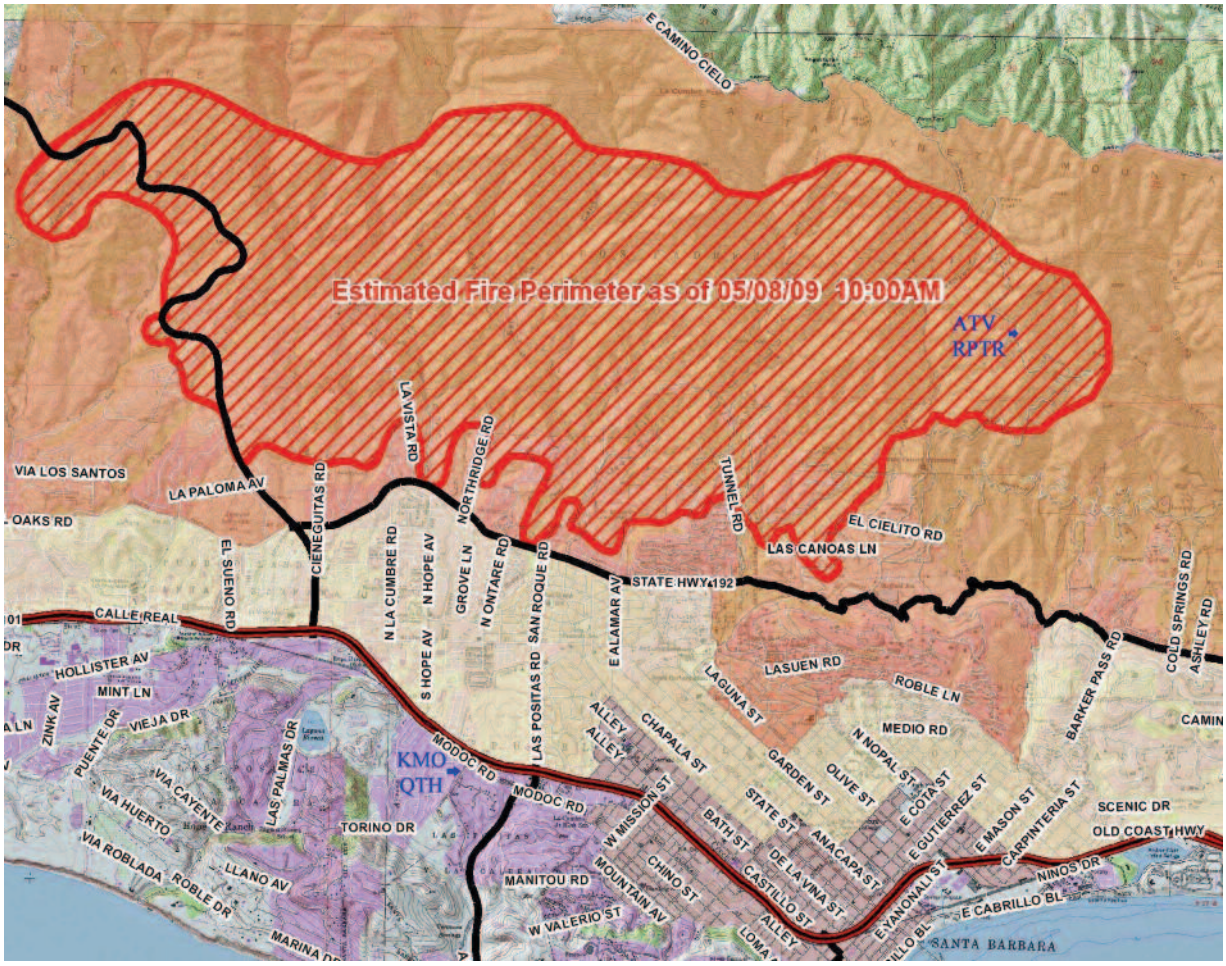
The November 2008 Tea Fire burned the right peak and the right half of the center one, but stayed about 1/2 mile away from the repeater site. The current May 2009 Jesusita Fire burned the left peak and the left half of the center one as well as passing through the repeater site.

Fire engulfs the WB9KMO ATV repeater site.

You might think that we're safe now, but the vegetation grows so fast that we'll be vulnerable again within a year. In the "flatland" parts of the country, I often hear envy about how we can put our repeaters high atop mountains.
As you can see, there's a price to pay. We were lucky this time...

- Rod Fritz, WB9KMO
Repeater Trustee and Member of the Amateur Television Network
Member of ARRL and the Santa Barbara Amateur Radio Club

The "Ham Locations - JesusitaBurnAreaCropped" map is courtesy of County of Santa Barbara, Office of Emergency Services (cropped and annotated by RodFritz WB9KMO). All other attached photos were taken and edited by Rod Fritz WB9KMO.

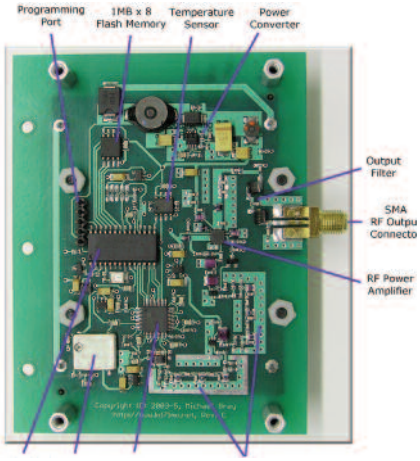


Map showing the vast extent of the Santa Barbara fire. Note the location of the ATV repeater location in the middle of the burn zone.

Scorched earth at the WB9KMO ATN Repeater site. The ATV repeater link dish on the left appears to have survived the fire. On the right, the lower antenna site showing the burn area.

Michael Gray KD7LMO SK

On Easter Sunday, April 12th, Michael was killed by a drunk driver while cycling with two friends to visit his parents. Mike was a true innovator and an engineering genius. His open-source designs on his **www.kd7lmo.net** website have been an inspiration to us all. An avid supporter of the Arizona Near Space Research balloon group, he has designed payloads ranging from custom designed APRS and PSK31 beacons to Amateur Television downlinks.



ATV and APRS payloads designed by KD7LMO

Next issue, we will have a more indepth look at his life and his many innovative projects.

He was a good friend and he will be missed a great deal.
- Bill Brown WB8ELK.

KA8LWR antennas and tower wind damage

Long-time ATVer Mel Alberty KA8LWR from Bucyrus, Ohio sent me these photos of his antenna system smashed to the ground by 70 to 100 mph winds this past March. Mel plans to have things back up and running soon.

Please email us your ATV news, happenings and events along with photos to: Bill Brown WB8ELK at the following email address:

email: wb8elk@atvquarterly.com

ATVQ

Mobile Streaming Video

- Bill Brown WB8ELK

Now that high-speed wireless Internet service is available in most areas of the country, it's now possible to televise live streaming video events while mobile or portable.

I investigated the most popular "free to the general public" streaming video websites Camstreams and Ustreams and although there are many hams and ATVers using these sites, you have to put up with some restrictions (limited number of viewers at one time) as well as advertising.

Alan Sieg WB5RMG demonstrates the very portable wireless streaming video uplink setup. The ASUS EeePC netbook computer is so lightweight and small, you can use it just like a camcorder. Note the Verizon Wireless USB modem on the left side.

For an event that might generate a large viewing audience, I found that the best choice for me was to join the British Amateur Television Club (BATC) with yearly dues of 4 pounds - about $5.50 US. On their website (**www.batc.tv**) you get a dedicated personal "Members Streams" area where your streaming video link will be always be shown on the list whether you are using it or not and will immediately activate once you start your video...plus you get to download the Cyber version of their CQ-TV magazine as part of the deal.

I have successfully used this to televise several University Balloon flights with great results. At one point we had over 100 viewers in several countries. The BATC indicates that their capacity should allow several hundred viewers at one time. One nice feature is their chat room area next to the viewing screen. Please note that to get your callsign or name to show up (if you haven't logged into the BATC website as a member) is to use the command: /nick CALLSIGN. ... example: /nick WB8ELK.

At any given time as you scan through the Members Streams, ATV Repeaters or the special Live Events area, you'll see a number of ATVers around the world sending streaming video.

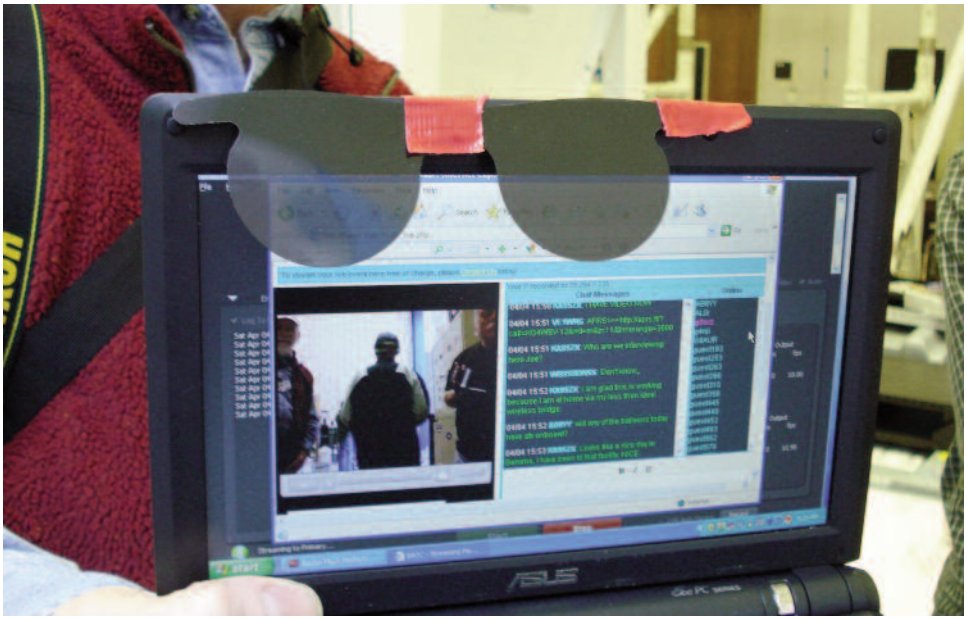
Uplinking your streaming video

The hardware needed to uplink a portable or mobile video

The Verizon USB727 wireless internet modem

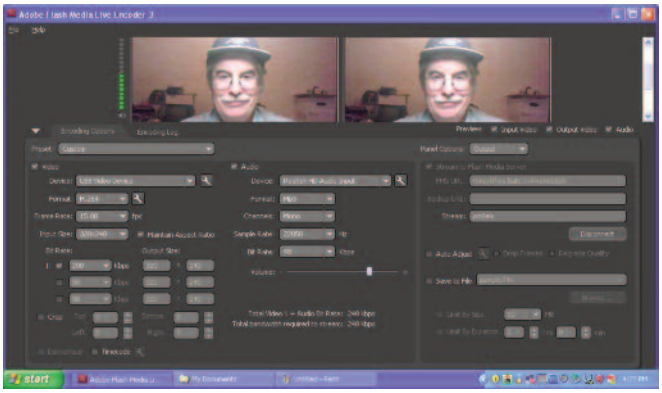
stream is not at all hard to do anymore. I use the ASUS EeePC netbook laptop computer that weighs just a little over 2 pounds. Another good choice would be the ACER Aspire One series. If you are near a WiFi HotSpot, you can link in directly that way

via the netbook's internal WiFi module. However, for more remote areas, I use the Verizon Wireless USB727 modem. It requires an additional monthly service fee but the modem cost is fairly reasonable and sometimes is free depending on the length of term of your contract. They give you 5 gigabytes of uplink bandwidth each month (I recommend not exceeding this limit since the extra charges rack up pretty fast). However, at the streaming video setting recommended by the BATC, it works out to about 80 megabytes an hour usage which in the case of occasional 4-hour weekend events is plenty for my usage. If you are planning to do continuous webcam monitoring, just be careful to monitor your monthly limit or use a WiFi link instead.



Cool laptop shades. The built-in webcam doesn't allow adjustments for bright outdoor scenery. To compensate for this, sunglasses were attached over the camera which worked great.

All you have to do to setup your computer intially for streaming video via the BATC website is to download Adobe's free Flash Media Live Encoder 3 software. This software shows your live camera video on the left and the outgoing streaming video on the right hand viewport.



Adobe Flash Media Live Encoder 3 software needed to uplink streaming video. Left image is the local camera...right image is the internet output stream.

Various uplink speed options can be configured for both the video and the audio. Depending on the quality of your WiFi or cellular wireless connection, you might have to reduce the speed setting for optimal results for both the video and audio uplink. Once you have joined the BATC and requested your own streaming video area, you'll get an email from the BATC with their recommended settings for the Flash Media Encoder software. You'll also have to enter the FMS server path provided by the BATC as well as the stream name (usually your callsign).

To start your stream, all you do is to connect to the internet via your wireless cellular modem or via a WiFi Hotspot. Then start the Flash Media Live Encoder software and click the Connect button. Once connected to the BATC server, just simply click the green Start button on the bottom to start your video stream.

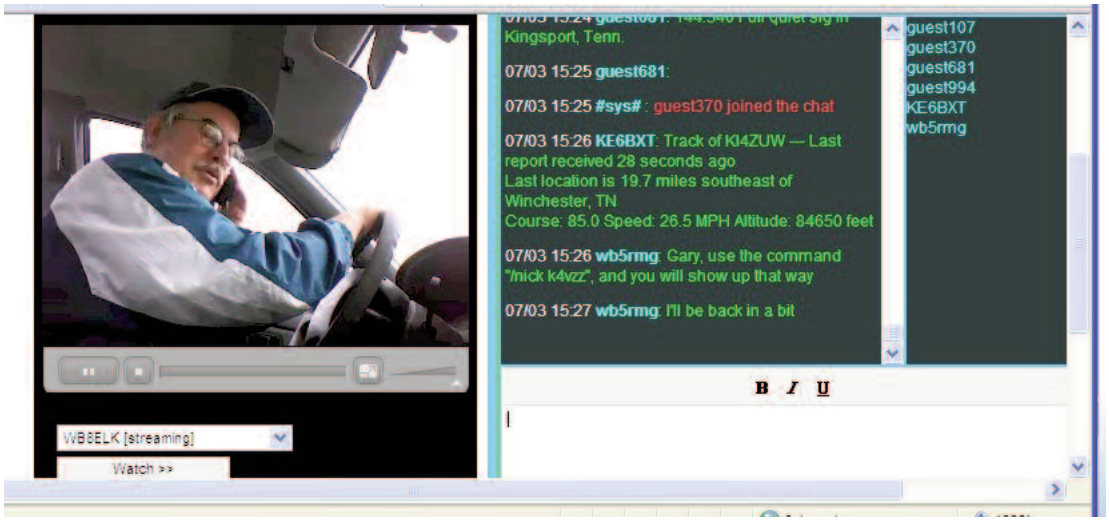
With the stock battery pack in my ASUS EeePC, I get about 2 hours runtime while walking around filming an event. Some of the newer ASUS and ACER units come with larger battery packs with much more lifetime but at the expense of making the laptop a bit heavier. Of course, in a mobile application, you can use a DC/AC inverter to operate using the existing external AC power supply.

You can use a larger laptop computer as long as you have a camera attached to it....but for true portability, you'll appreciate these lightweight netbook computers that seem custom-built just for this purpose.

Note that the BATC has a special "Live Events" section on their streaming video website as well. If you expect (or would like) a large audience for your event, you can email them and they may be able to add you to their list of upcoming events with a special link in this section.

The quality of the video and the clarity of the audio is suberb. If you're looking for a way to include the world during your event, this is the way to do it.

An actual example of the live mobile streaming video as seen by viewers on the BATC website is shown at the top of the next page.



WB8ELK's mobile streaming video as observed on the BATC.TV website.

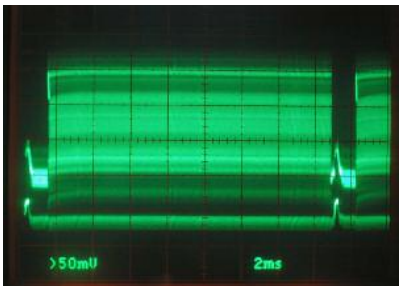
ATVQ

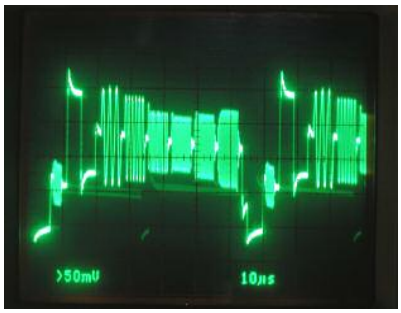
Comtech 1200 MHz Receiver Improvements

- Art Towslee WA8RMC *email: towslee1@ee.net*

Now that the transmit modules are modified (ATVQ 2009 winter issue) it's time to tackle the receive module. The deficiencies here are not nearly as severe as they were on the transmit module so the modifications needed are reasonably simple (except one).

The G1MFG or related modules are not perfect by scope analysis but do present a received picture well without modifications even though the existing de-emphasis circuitry is not correct for an NTSC system. Adding a standard de-emphasis network results in either no improvement or a further degraded signal so instead I concentrated on simple modifications. The existing filter combines a low pass filter (to block the 6 & 6.5MHz sound subcarrier) with PAL equalization so a simple modification is not possible. The waveform trace photos show the revised circuit better than the original, but not optimum. The received picture, however, is surprisingly good.



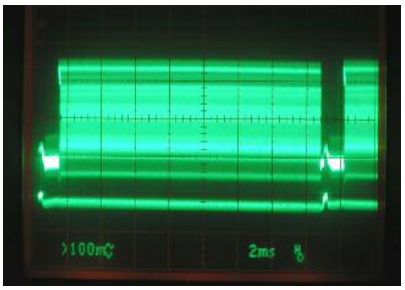


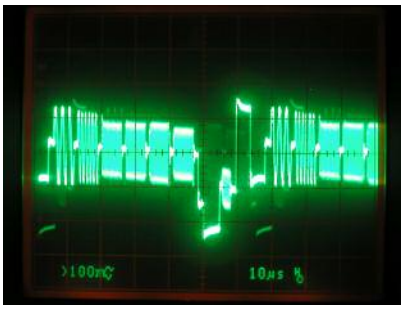
The left waveforms are before modification and right waveforms are after the mods. are made. All photos are with a multiburst receive signal.

Note the "spike" in the vertical interval in the upper left waveform. Also the lower left waveform horizontal frequency response is severely non-linear.

The upper right vertical waveform shows an "improved" reduction in the "spike" but it's still there. I was unable to reduce it further.

The lower right horizontal waveform now shows a more linear response but not perfect. A complete re-design of the de-emphasis filter would be needed to improve it more. Since it would not make the viewed picture better, it's not worth the effort!





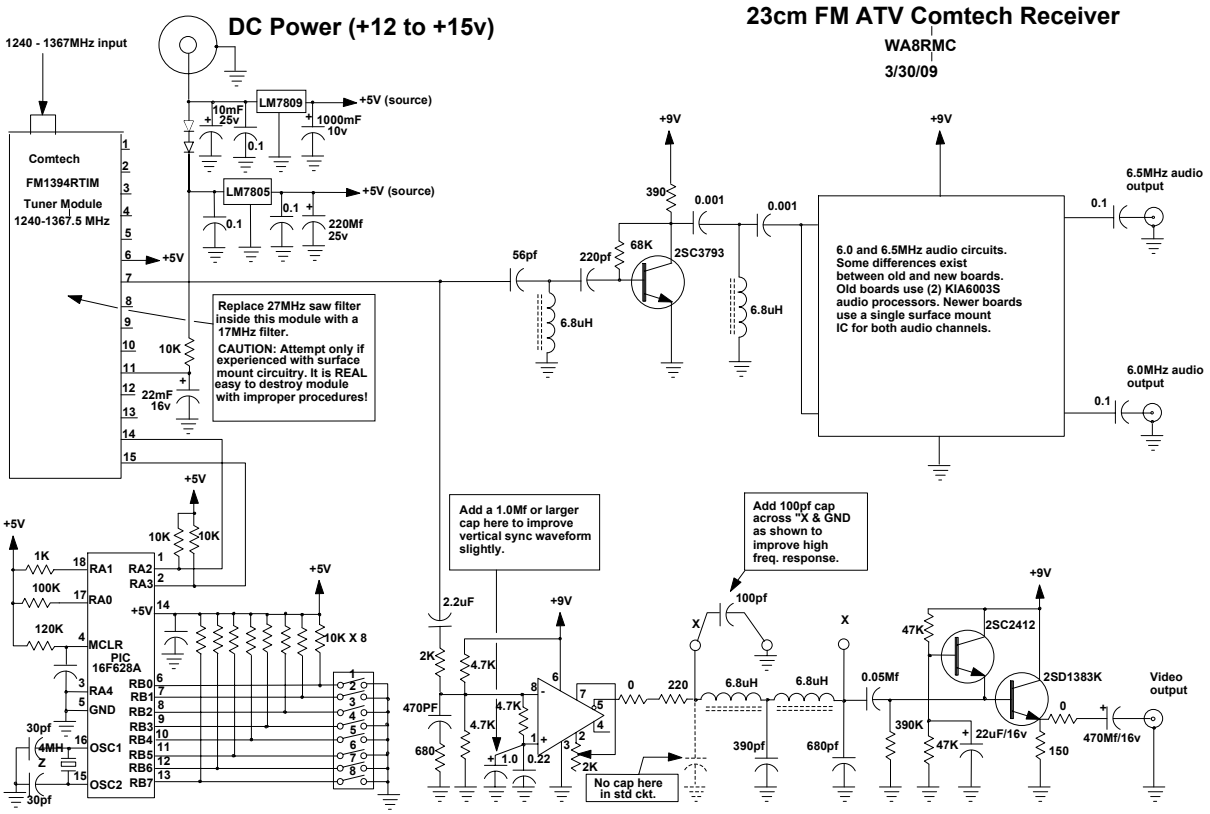
There are 4 basic modifications I consider worthwhile:

1.) Add a 1Mfd or larger bypass capacitor to pin 1 of the NE592D op amp. Add it directly across the existing 0.22Mfd cap. You can easily test for the need for additional capacitance here by putting a scope probe on pin 1 of the NE592 video op amp. If **any** AC signal is seen there, added capacitance is needed.

2.) Check the value of the surface mount resistor just downstream from the NE592D op amp pin 5. There is a zero ohm resistor directly on pin 5. The surface mount resistor in question is between the zero ohm resistor and a 6.8µH coil. The G1MFG boards have a 150 ohm resistor here and the unmodified board from Taiwan use a 220 ohm resistor. If it is 220 ohms, leave it alone. (Increase to 470 ohms for a slight improvement.) If it's 150, replace with a 220 or 470 ohm resistor.

3.) There are 3 solder pads in a row on the board that have no parts on them. Add a 100pf capacitor across the first two pads. See photo and schematic. This improves the high frequency response making it a little more linear.

4.) The last and most difficult is to replace the 27MHz SAW filter inside the module can with a 17MHz filter. The original one degrades the signal to noise ratio of the received signal because it has a wider than needed bandpass. I do not know of anyone transmitting an FM signal wider than about 14MHz so narrowing the filter down as low as 14MHz or so would be best. Theoretically the video signal is 4-5MHz wide with a 6 or 6.5MHz sound carrier that takes it to at least 7MHz or so. Double that for the double sideband carrier and you get a ~14MHz wide signal. Digi-Key stocks a 17MHz wide filter at a 480.0 MHz IF frequency so it is ideal. The Comtech IF frequency is actually 479.5MHz but being 0.5MHz off will not be noticed especially when the bandpass is still wider than needed. The S/N ratio improves by 3dB when the bandpass is halved so changing from 27MHz to 17MHz should yield a 2dB improvement. This will be noticed only at very weak signal conditions so if you use the module only to view a repeater, no improvement may be noted. In that case**, do not attempt to replace this filter!** It is located among other close fitting components so damage is likely for inexperienced people. In addition, one of the pins connects to the PCB ground plane sucking up heat when a de-soldering attempt is made. This makes it easy to damage the circuit board traces.

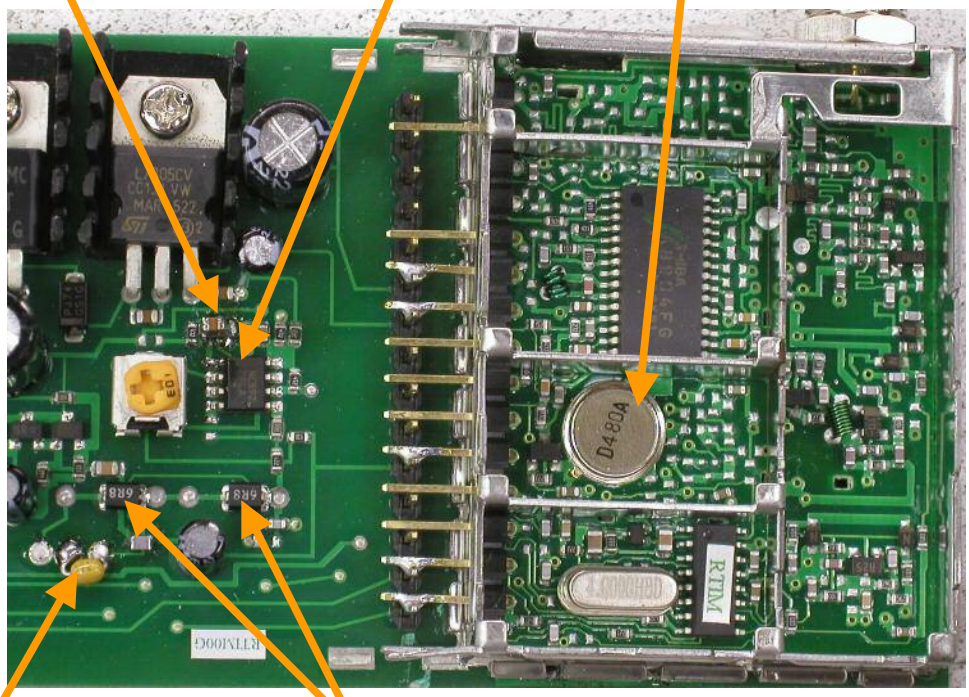


Added 1Mfd capacitor across the existing 0.22Mf cap. from pin 1 to ground. Do not remove the existing cap, but simply solder a 1Mfd unit on top of it.

NE592D op amp. Pin 1 is at the upper left.

This is the SAW filter inside the module can. Replace with DigiKey part number XC993-ND filter only if you have worked with surface mount circuitry.

DO NOT ATTEMPT IF INEXPERIENCED!!!



Add a 100pf capacitor across these circuit board pads. This modifies the existing de-emphasis circuit enough to improve the high frequency response.

Note the 6.8µh inductors here. Newer Comtech boards (shown) have surface mount inductors (and revised audio circuit). The older boards have through hole components here.

Wu8o Can Antenna Review

- Bill Brown WB8ELK

I imagine that many of you have tried to build a coffee-can antenna for 1.2 GHz at some time or another. They work just fine but it sure would be nice to have a more rugged and precisely tuned version that can survive the elements as well as portable operations. Tom Walter of Wu8o Antennas has done just that and came up with a ruggedized version of this tried and true antenna design that is constructed with a waveguide of custom-made deep-drawn 3003 H12 aluminum that even includes a machined outer flange to hold the UV-resistant radome in place. The feedpoint N-connector has a gold center pin and the mounting bracket is constructed of high-quality 6061-T6 aluminum.

straps attached to the mounting bracket wrap around the can and are tightened with a screwdriver which makes for a very secure installation. The mounting hardware is all stainless steel and can mount easily to a mast pipe or tower leg. The radome fits snugly on the end of the waveguide can due to a convenient flange and is UV resistant. There is also a small drain hole in the bottom of the can to prevent moisture buildup.

Since everything is machined to optimal dimensions for the 23cm band, the gain of the Can Antenna has been measured at the 2007 Central States VHF conference at 8.7 dBd. The SWR is less than 1.2:1 from 1250 to 1280 MHz and is usable on the entire 1.2 GHz band.

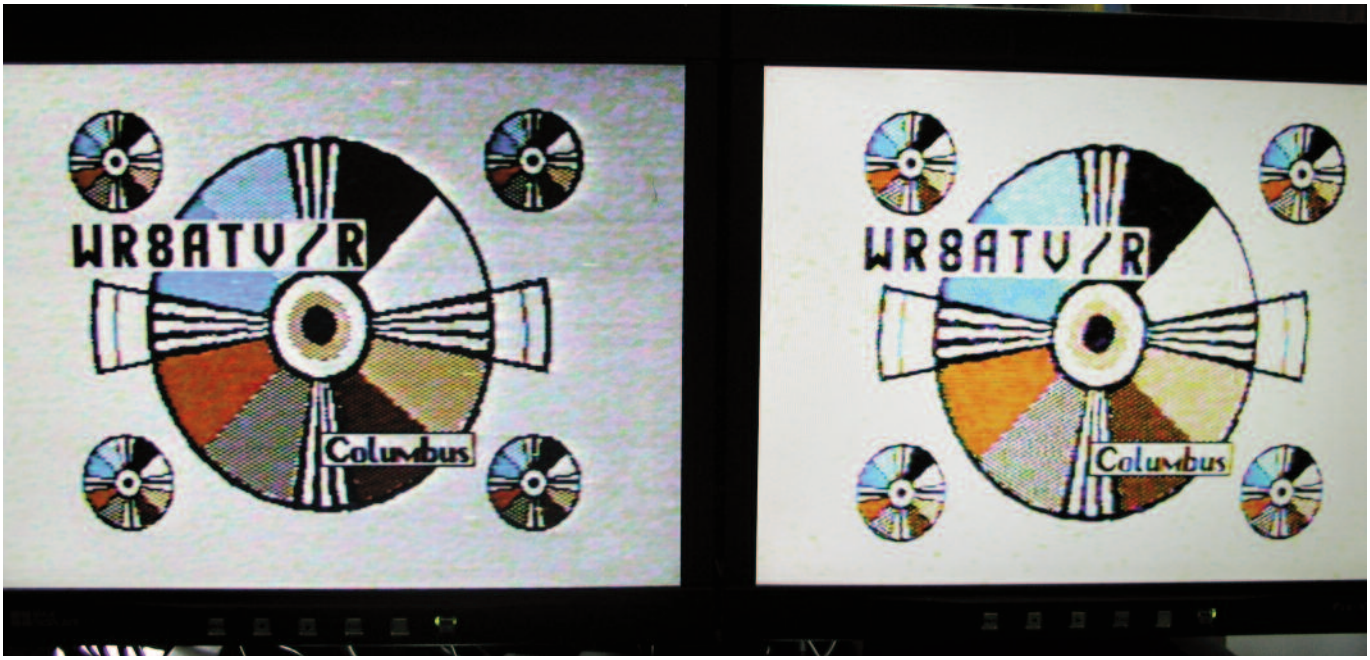
I've compared the performance of the Can Antenna against a high-gain loop yagi over a 22-mile line of sight path and it certainly does seem to live up to it's advertised 8.7 dBd gain performance.

When I first received my Can Antenna in the mail, I was impressed with the quality of the material and workmanship. The can waveguide is beautifully constructed with very thick walls and looks like it could withstand tons of abuse without a scratch and appears rugged enough to withstand a nuclear blast. This is the perfect antenna to carry along for special events and emergency situations where you'd like to quickly set up a portable antenna as well as more permanent tower-mounted use.

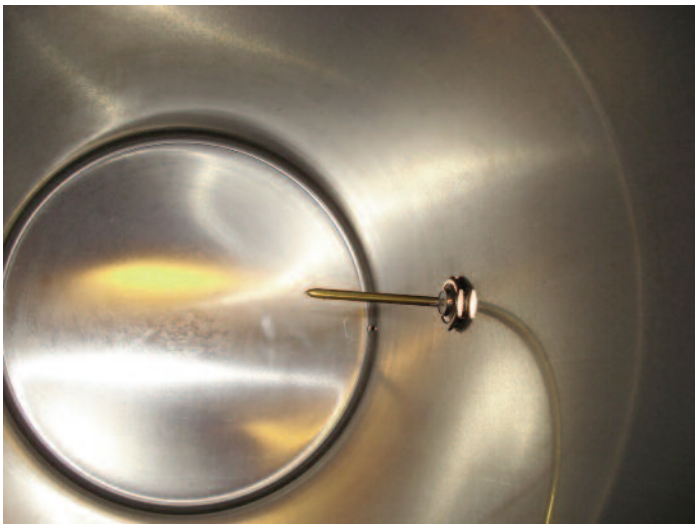
The feedpoint connector is a high quality N-connector with a gold center pin and the internal antenna element is solidly built.

I particularly liked the way that the unique mounting bracket is attached to the Can Antenna itself. Two adjustable metal

The Can Antenna mounts easily on a tower leg and takes very little space.



Reception from 22 miles away of the WR8ATV repeater. 1.2GHz is on the left with the Wu8o Can Antenna at 16 feet above ground. On the right is 2.4GHz is shown with a 65 element yagi at 40 feet.



Internal view showing the antenna element inside the Can Antenna.

This antenna is the perfect solution for my portable operations on 23cm and takes up very little room inside my vehicle when traveling.

The Wu8o Waveguide Can Antenna can be ordered from: *Wu8o Antennas, 15704 SR 161 W Plain City, OH 43064*.Tom's email is: **wu8o@emec.us** and he can be contacted at: **(614) 309-7134**

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1.0 Lux - F1.2
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S/N Ratio - More than 46 db
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Lens - C/CS Mount - 6-15 mm - f1.4
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Electronic Shutter - 1/60-1/1000,000 Sec
Lens - C/CS Mount- 6-15 mm - f1.4
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Small size - 40x40x54mm
Power supply and cables not included.

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Minature Pinhole Color Camera

Color CCTV Camera - DV-3225CP1
Sharp 1/3 CCD
NTSC - 420 Line
1.0 Lux - 1 Vp-p 75 Ω
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S/N Ratio - More than 46 db
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Power supply and cables not included.

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Color CCTV Camera - DV WX-3334C
Four Frequencies on 2.4 GHz
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1.0 Lux - 1 Vp-p 75 Ω
Auto White Balance
S/N Ratio - More than 46 db
Electronic Shutter - 1/50-1/100,000 Sec
3.6 mm board lens
Power - 12V±10% DC - 100 ma.
Small size - 34x34 mm
Power supply and cables not included.

Water-Proof Color Camera

Color CCTV Camera - DV-262CW
Sharp 1/3 CCD
NTSC
420 Line
1.0 Lux
1 Vp-p 75 Ω
Auto White Balance
S/N Ratio - More than 46 db
Electronic Shutter - 1/50-1/100,000 Sec
6.0 mm - F1.2 lens
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Small size - 25x25 mm
Power supply and cables not included.

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(815) 543-0894

Email: **atvq@hampubs.com**
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Total	
If in Illinois add tax 7.25% (No tax on name tags or subscriptions)	
Shipping	
Final Total	

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City _____ **State** _____ **Zip** _____ **Country** _____

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VISA - M/C - AMEX

Credit Card # _____ _____ _____ _____ **Expires** ____ ____ **Approved** _____

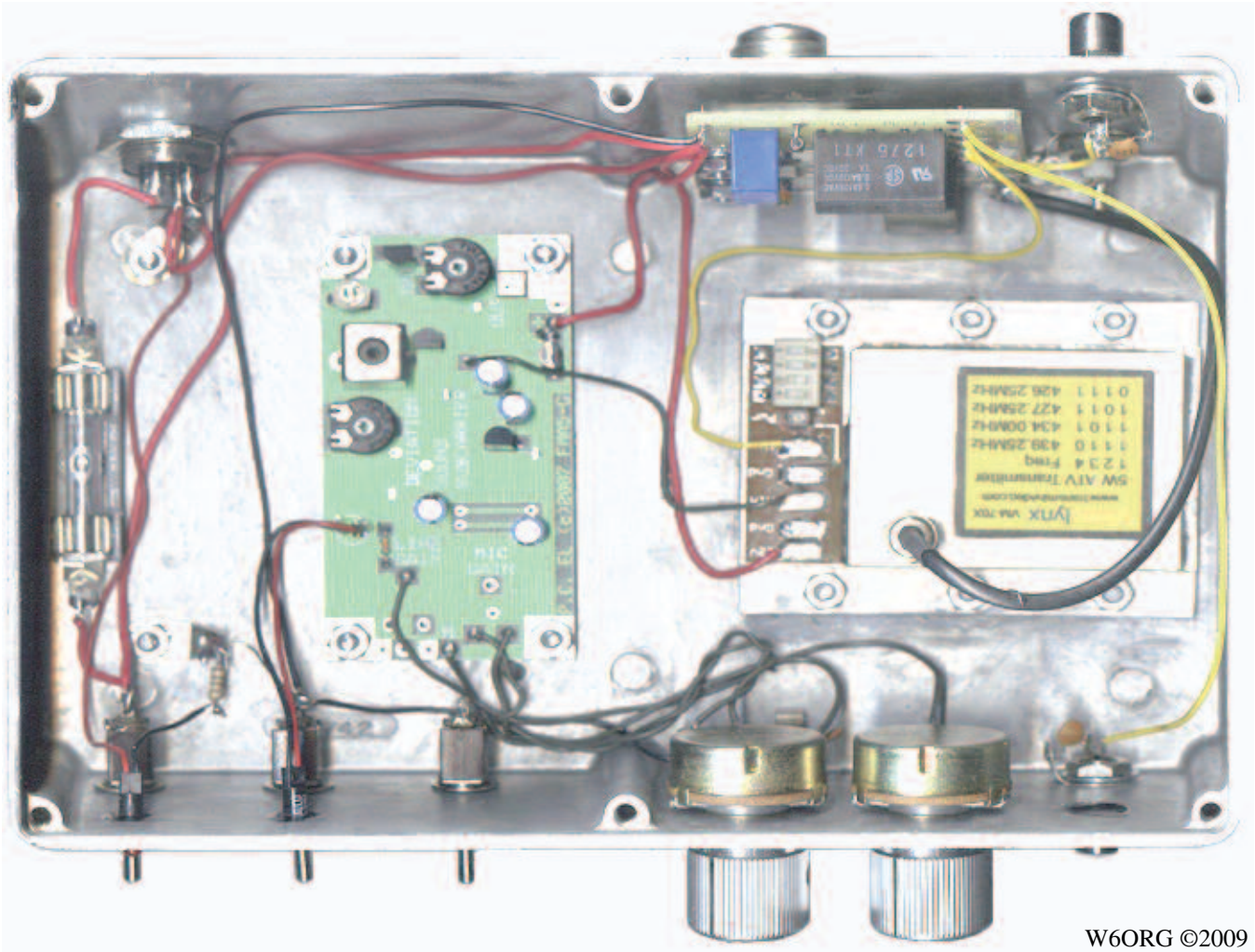
Signature _____

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

Packaging the Videolynx VM-70X ATV Transmitter

This configuration is great for making a home or portable ATV station where you need to switch the antenna and power between the transmitter and downconverter and also have mic and line audio input with low distortion deviation limiting. The Videolynx VM-70X is adjustable from 0 to more than 4 Watts pep output on 4 selectable channels in the 420-450 MHz ham band depending on applied DC voltage from 11 to 14 Vdc. For power levels above 1/2 Watt some way to remove the heat is necessary. We have an app note that describes mounting a computer fan on the modules mounting plate, but this app note will describe packaging the VM-70X in a Hammond 1590D diecast aluminum box along with the PC Electronics TR-1b T/R relay board and using the mic and line deviation compressor section of the FMA5-G sound subcarrier board.

The die cast aluminum box with the module built in as shown below is an adequate heat sink, without a fan, to continuously run the transmitter up to 5 Watts pep with video and 13.8 Vdc applied in a 75 degree F ambient room per our tests. The VM-70X must be placed on a perfectly flat side of the box with no raised or embossed lettering or logo and a film of heat sink grease - RS 276-1372 - spread in between the box and the module.



W6ORG ©2009

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

Packaging the Videolynx VM-70X ATV Transmitter - continued

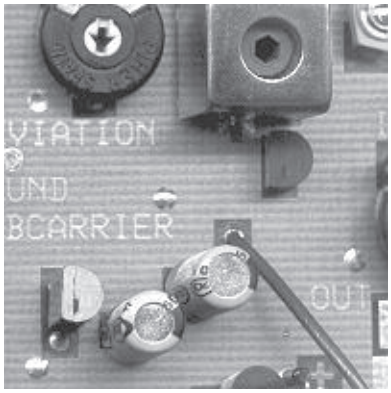
The wiring schematic on the next page has the lengths to cut the #22 insulated wires so you can solder them to the TR-1b and FMA5-G boards as well as the pots, switches, mic and PTL jacks before mounting. This makes it easier to assemble and interconnect later.

Cut out the drill templates on the edges, center on the box and then tape it down. On the bottom, make sure the 6 VM-70X mounting holes are not going to be drilled on the side that has any raised logo or lettering. The mounting surface must be perfectly flat and the holes debured for proper heat transfer and, to not stress the internal boards between hot and cold cycles. Center punch in the center of the circles and drill each one with a .125" dia drill, then redrill those with larger diameters. Check alignment with each board and the N jack. Rat tail file if necessary and debur each hole. Paint and letter the outside surfaces as desired.

Mic and Line Audio: The VM-70X is designed for a single line level audio input of 200-250 mV RMS and does not have an internal 25 - 40 kHz deviation limiter. Adding the P. C. Electronics FMA5-G sound subcarrier boards mic amp, line mixer and volume compressor type of deviation limiter will let you adjust proper sound levels and use a low impedance dynamic mic if desired. The transmit LED also doubles as an over deviation indicator. Before mounting the FMA5-G board, the 4.5 MHz VCO must be disabled by applying a solder short across the base to emitter solder pads of the 2N2222 surface mount oscillator transistor - see photo.

Oscillator solder short

Set Up: The VM-70X comes preset to 1/2 Watt output. Leave it at this setting for the tune up. Check your wiring for shorts using an Ohm meter before applying DC power. Connect a 50 Ohm load or 70cm antenna of known low SWR to the RF output and through a Wattmeter. With no video plugged in, turn on the transmitter and quickly peak the trimmer cap on the TR-1b for maximum power out. Then you can adjust the power pot on the VM-70X for no more than 5 Watts output. You can key down for up to 5 minutes with no video connected. Plugging in video will now show about 3.5 Watts for an all black picture and 2.3 Watts for an all white picture. Do not be tempted to crank up the power pot, you are still getting 5 Watts on the sync tip. An average reading Watt meter reacts this way normally with AM video modulation. If you use this transmitter to drive a higher power amplifier, start with no video connected and the power pot turned down before connecting to the amp. Then turn both on and slowly raise the power to 1/2 the rated power of the amp, or to the 1 dB compression power level, which ever is higher.



Deviation TP is the output

The sound deviation limit needs to be set for between 25 and 40 kHz. This can be done with a tone applied to the line input, line level pot raised to the point where the transmit LED is off, then setting the deviation pot in the middle of the FMA5-G board for about 35 kHz with a communications monitor. What? You don't have one of those? OK, preset the pot to about half way and you will be about 25 kHz. Note the sound level on a TV of a commercial broadcast station, then switch to the cable channel you are transmitting ATV on, and adjust the deviation pot for about the same volume - that's close enough.

If you only use one channel in your area, you need not remove the digiswitch. Most use two channels, but with this transmitter the selected channel is open, the others ground. A SPDT switch can be used per the box schematic, or you can run wires to 4 toggle switches on the front panel.

1-626-447-4565 Y

@

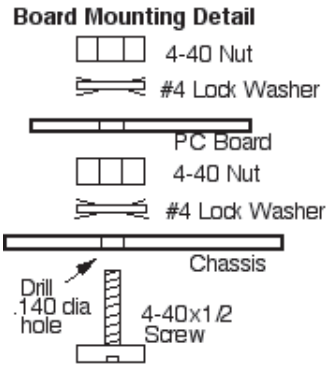
Packaging the Videolynx VM-70X ATV Transmitter -

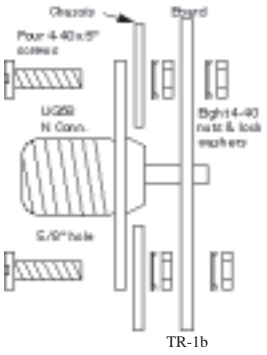
Parts list for packaging the ATV transmitter:

RS part numbers = Radio shack, the alternates after are from Mouser - call: 1-800-346-6873

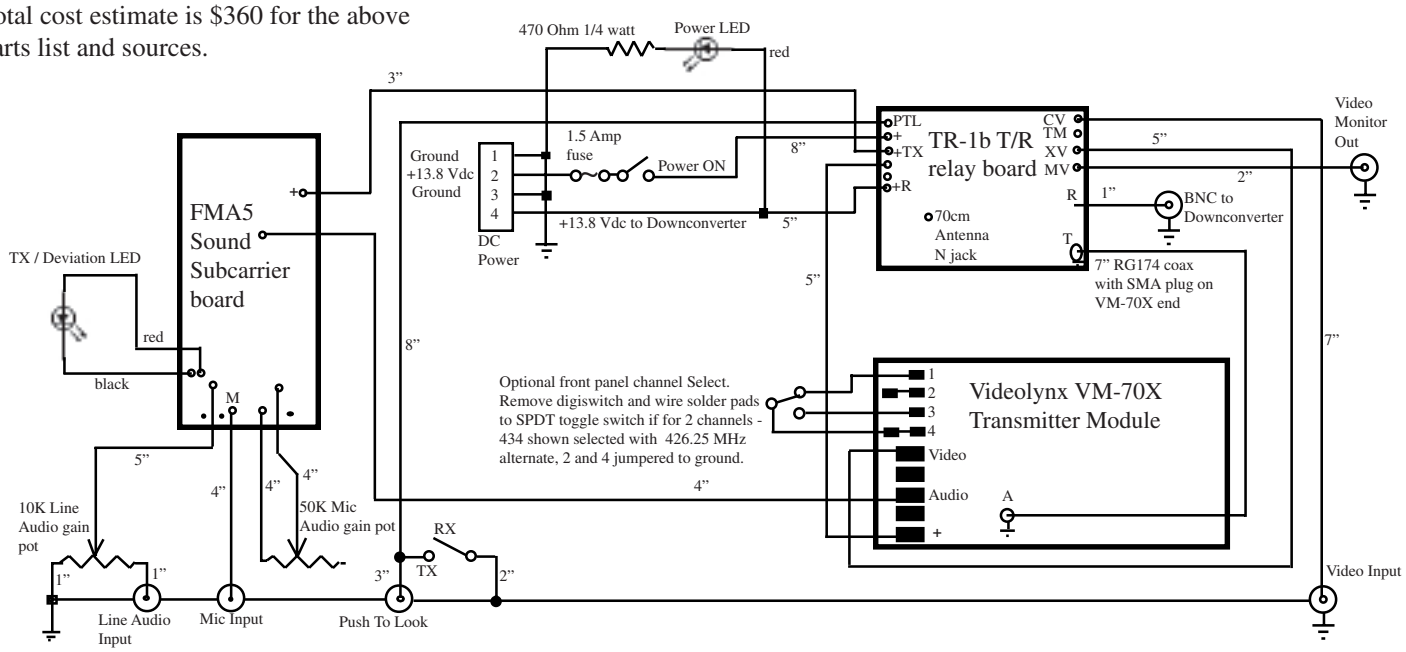
1 VM-70X ATV transmitter module, P. C. Electronics
1 FMA5-G sound subcarrier board, P. C. Electronics
1 TR-1b T/R relay board, P. C. Electronics
1 UG-58 N chassis jack, P. C. Electronics
1 Hammond 1590D die cast aluminum box, 546-1590D
1 10K line audio pot, RS 271-1715, 31VA401-F
1 50K mic gain pot, RS 271-1716, 31VA405-F
1 UG1094 BNC chassis jack, 523-31-221
1 4 pin chassis DC power jack, RS 274-002
1 4 pin DC power plug, RS 274-001
1 3AG fuse holder, RS 270-739
1 1.5 Amp 3AG fuse, RS 270-1022
3 RCA phone jack, 161-1052
1 Mini mic jack, 16PJ011
1 Sub-mini PTL jack, 16PJ100
2 Knob, builders choice, ME 450-6015
2 Toggle switch SPST, RS 275-612, 108-MS550K
1 Toggle switch (opt) SPDT, RS 275-613
2 LED, red with wires. 645-558-0101-007F
1 470 Ohm 1/4 watt resistor, RS 271-1317, 291-470
14 4-40x1/2" pan head screws, RS 64-3011, 5721-440-1/2
24 4-40 nuts, RS 64-3018, 5721-440
23 #4 internal tooth lock washers 5721-Lwi-4-ss
2 #4 solder lug, 534-7311
4 Rubber bumpers, RS 64-2346, 517-SJ-5007BK
Misc #22 hookup and buss wire, #18 for DC power leads
Total cost estimate is $360 for the above parts list and sources.

Check all parts for fit, then clean the box with isopropyl alcohol prior to painting. Spray paint the outside surfaces of the box and cover. After drying, rub on letters can be applied and then a coat of clear paint. After the box is completely dry, assemble all the parts and wire.



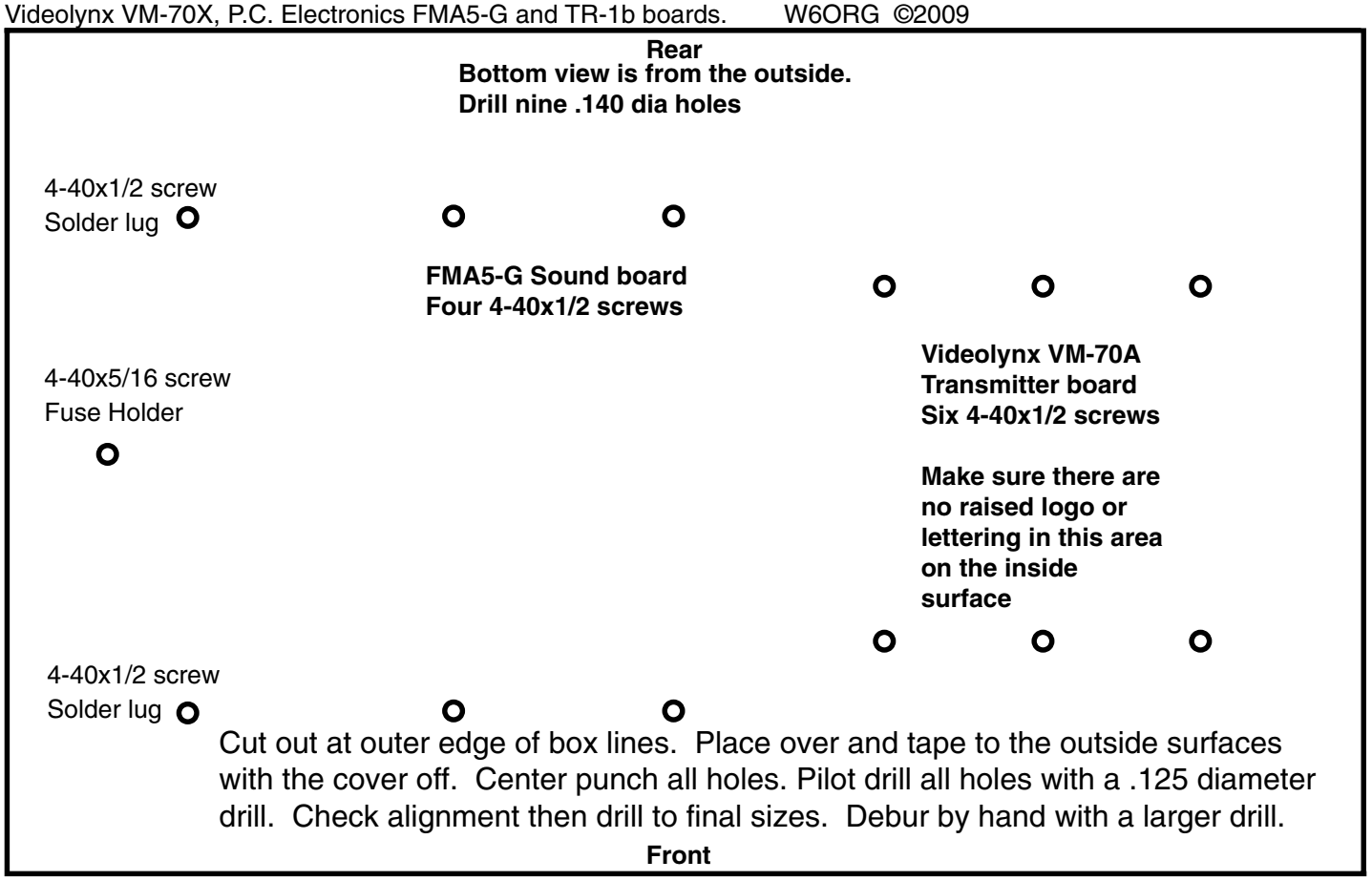


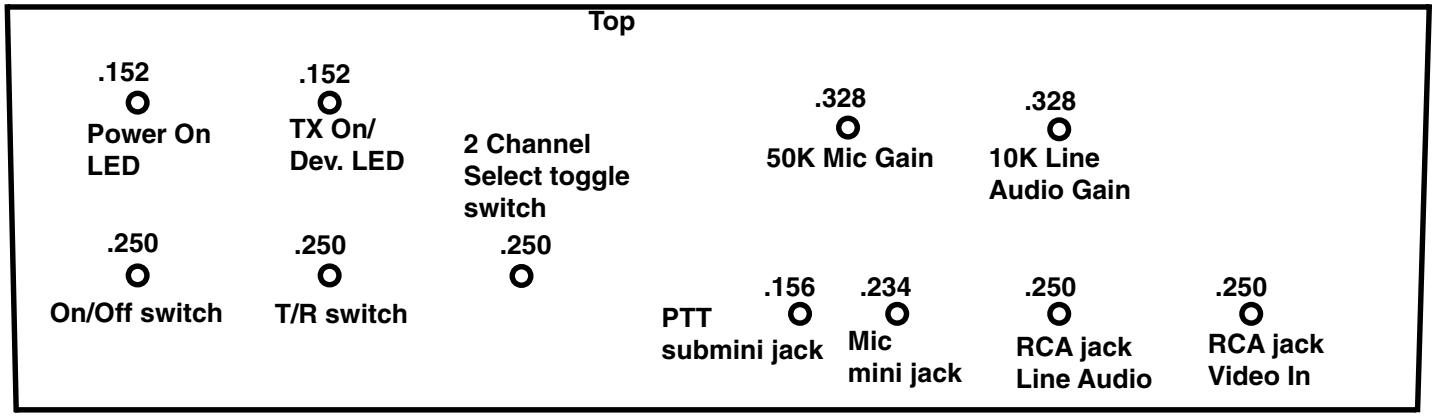
Place screw through hole in chassis, drop on lock washer or solder lug, then finger tighten the nut. Then place the PC board on the nuts and check for fit. Check the wire protrusion on the bottom of the boards and cut close so as not to short out to the chassis. Push down on the board near the mounting hole while tightening with a screwdriver to lock in the alignment. Then put on the final lock washer and nut.

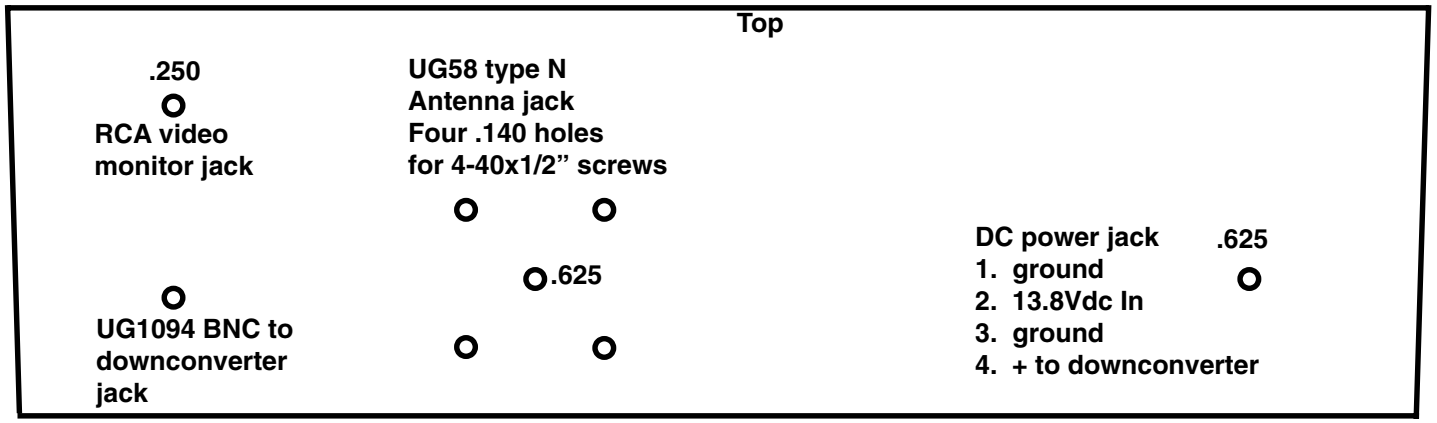


5 Watt ATV Transmitter drill drawing using a Hammond 1590D die cast aluminum box.

Videolynx VM-70X, P.C. Electronics FMA5-G and TR-1b boards. W6ORG ©2009







Amateur Television Contest 2009

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

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

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

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

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

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

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

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

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

CLASSES: There will be 4 classes for participants:

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

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

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

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

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

70cm = 2 points per mile
33cm = 4 points per mile
23cm = 6 points per mile
13cm and above gets 10 points per mile!

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

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

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

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

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

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

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

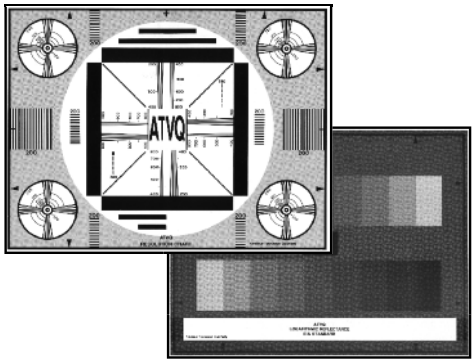
ATVQ Contest - P.O. Box 1594, Crestline, CA 92325 - or to: **wa6svt@atvquarterly.com**

If you use the **ATV Contest program** written by Charles Beener, WB8LGA, which is at **http://home.columbus.rr.com/cbeener/** , please email me the data file to **wa6svt@atvquarterly.com.**

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

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

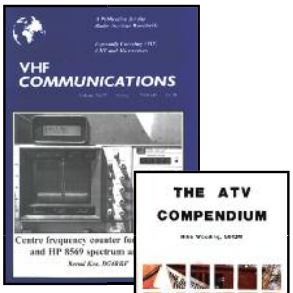
FULL COLOR TEST CHART



Four charts including:

COLOR BARS
RESOLUTION
GREY SCALE
REGISTRATION

Only $5.00 plus free shipping (USA)



VHF Communications

A quarterly publication from KM Publications in England that is a must for the technically minded. Lots and lots of articles for those that build projects in the VHF and above range.
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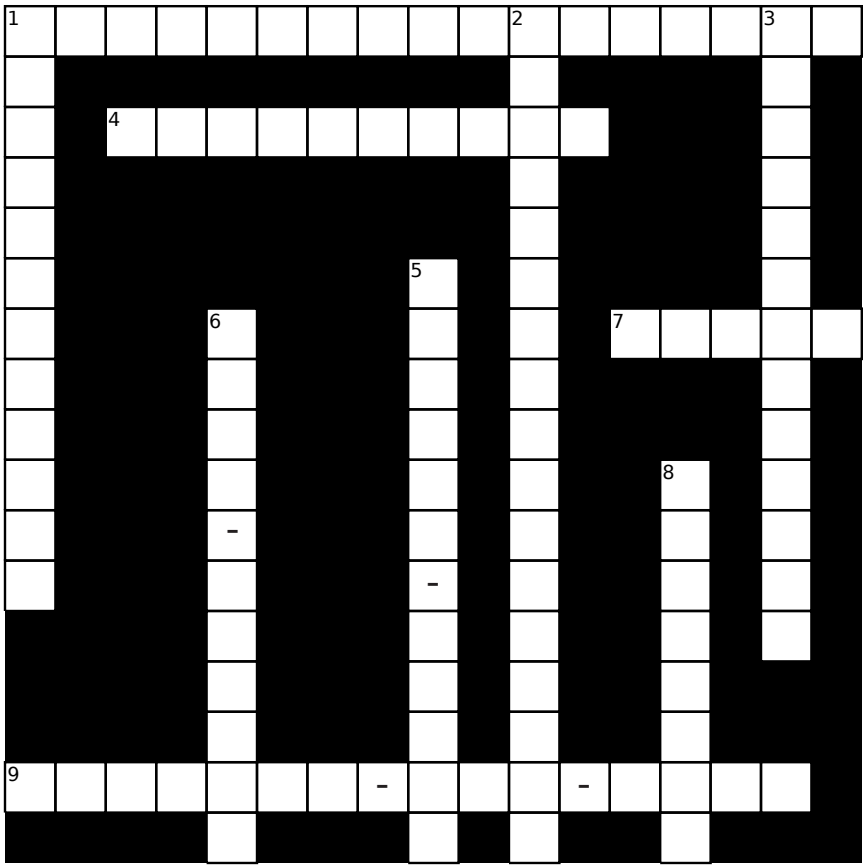
The Visionary Years

Denise Camp

Every invention and discovery contributed to the development of Television. See if you know some of the names of inventions, discoveries, and inventors.



Across

1 Images transformed into electric signals with light and selenium
4 Alexander Graham Bell's device that transmitted sound on a beam of light
7 Unit of inductance
9 CRT

Down

1 Combination of a tool that copies drawings and the telegraph
2 1st to use the term television at the International Congress of Engineers
3 One of the 1st prototypes of television
5 Considered greatest American scientist since Ben Franklin
6 He patented the idea of using light and disks to send pictures but did not build it
8 Chemical element Se

Note: The answers to this word challenge can be found in the article on page 6.
You didn't know there'd be a quiz, did you?

Answers will appear in the Summer issue and for those who can't wait: ***www.atvquarterly.com***

Video ID proms

CBAR 1 ❑

CBAR 2 ❑

CBAR 3 ❑

CBAR 4 ❑

HR 1 ❑

HR 2 ❑

HR 3 ❑

HR 4 ❑

HR 5 ❑

HR 6 ❑

HR 7 ❑

HR 8 ❑

HR 9 ❑

HR 10 ❑

HR 11 ❑

HR 12 ❑

HR 13 ❑

HR 14 ❑

HR 15 ❑
(Choose State)

HR 16 ❑


HR 17 ❑

HR 18 ❑

For the VDG-1 Video ID board

HR 19 ❑

HR 20 ❑

HR 21 ❑

Limited quantities of the original VDG-1 video ID are still available (shipped with one programmed ID prom)

$20 each (includes postage)

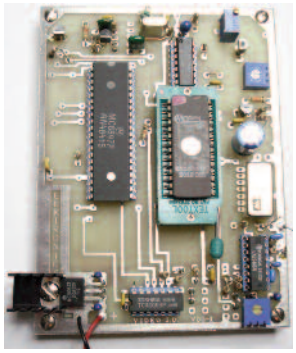
WA6SVT Proc Amp
- $30 assembled
- $20 kit

Please visit our website:

www.elktronics.com

ELKTRONICS
107 Woodlawn Dr.
Madison, AL 35758

email: wb8elk@aol.com
256-772-6000



VDG-1
Video ID
$150

Thanks to all the fine stores that carry Amateur Television Quarterly

Burnaby Radio Comm Ltd.
4257 E. Hastings St.
Burnaby, BC
Canada V5C 2J5

Gigaparts, Inc.
1426B Paramount Drive
Huntsville, AL 35806

Ham Radio Outlet
1939 W. Dunlap Ave.
Phoenix, AZ 85021

Ham Radio Outlet
6071 Buford Hwy
Atlanta, GA 30340

Ham Radio Outlet
224 N. Broadway
Salem, NH 03079

Ham Radio Outlet
2492 W. Victory Bl.
Burbank, CA 91506

Ham Radio Outlet
933 N. Euclid St.
Anaheim, CA 92801

Radio City
2663 County Rd I
Mounds View, MN 55112

The Radio Place
5675 A Power Inn Rd.
Sacramento, CA 95824

Do you know of a store that would like to carry ATVQ? Please let us know and we will contact them.

ADVERTISERS INDEX

Please mention that you saw it in
Amateur Television Quarterly!

CONTRIBUTORS GUIDE

Preferred method of receiving articles is from **Microsoft Word**, **Open Office** or 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 TIF, JPG or BMP formats (actually I can read about anything). If you send a computer disk, make sure it is PC (not MAC) format. When sending in digital photos or scanned photos, please send us the highest possible resolution for best quality when we print it.

Article submissions can be sent to:

Bill Brown WB8ELK
107 Woodlawn Dr.
Madison, AL 35758

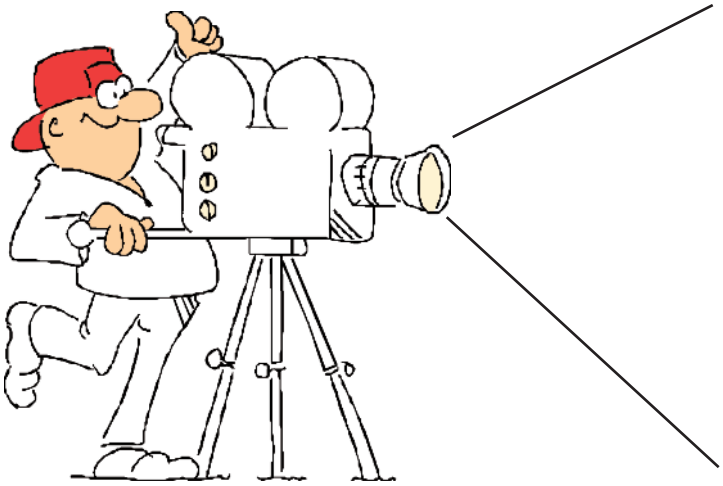
or to our email address: **wb8elk@atvquarterly.com**
Also note our web page address: **http://www.atvquarterly.com**

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!



ADVERTISE IN ATVQ!

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

Please call TODAY!

Mike Collis - WA6SVT - Advertising
RESERVE YOUR SPACE TODAY!
1-909-338-6887 - voice
email: wa6svt@atvquarterly.com

AD RATES

Effective November 19, 2004

	INSERTIONS PER YEAR	
SIZE	**1-3**	**4 up**
FULL PAGE COLOR	$650	$500
FULL PAGE B&W	$160	$140
ADDITIONAL COLORS/PAGE	$100	$100
1/2 PAGE B&W H or V	$110	$80
1/4 PAGE B&W H or V	$85	$55
1/6 PAGE B&W H or V	$55	$38

Multi-page ads are billed at the combined rate based on frequency.
Covers are reserved for COLOR ads.
All typesetting and layout charges for non-camera ready ads will be added.
Covers II, III, IV $30 extra.
If negatives are not provided for color ads, add $50.

DEADLINES

COVER DATE	COPY DEADLINE	TO PRINTER	MAILING DATE
WINTER	JANUARY 1	JANUARY 15	FEBRUARY 1
SPRING	APRIL 1	APRIL 15	MAY 1
SUMMER	JULY 1	JULY 15	AUGUST 1
FALL	OCTOBER 1	OCTOBER 15	NOVEMBER 1

While we will try to adhere as close as possible to the above dates, we reserve the right to adjust as needed.

If material is going to be late, please call to check if it will meet our schedule. We will try to accommodate everyone as best as we can.

Camera ready art or negative film right reading down is acceptable.

Trim Size: 8 1/2 x 10 7/8
Bleed Size: 1/8" beyond trim
Live matter: 1/4" within border

ATV Quarterly reserves the right to reject any advertising which is not in keeping with the publishers standards. Previous acceptance of any ad will not prevent ATV Quarterly from exercising the right to refuse the same advertisement in the future. Advertising orders are subject to the terms on the current rate card. Advertisers assume all responsibility and liability for any claims arising from advertisements and will protect the publisher from same.

ATV Quarterly will position ads in ATVQ at its discretion except in the case of preferred positions specifically covered by contract or agreement.

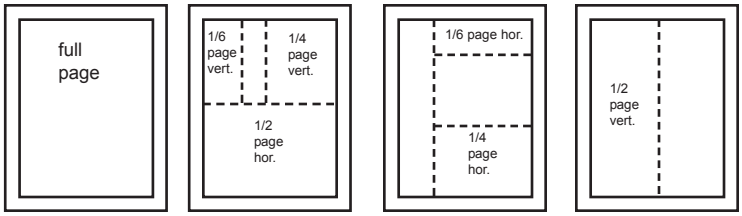
If, for any reason, the publisher fails to publish an advertisement, it will not be liable for any costs or damages, including direct or inconsequential damages.

Terms: All accounts not pre-paid are billed net 30 days. All accounts over 30 days are billed at 1 1/2% per month. Prompt payment is always appreciated.

RESERVE YOUR SPACE TODAY!
1-909-338-6887

AD SIZES

	VERTICAL		HORIZONTAL	
	Width	**Height**	**Width**	**Height**
FULL PAGE	7"	10"	---	---
1/2 PAGE	3 1/2"	10"	7"	5"
1/4 PAGE	3 1/2"	5"	5"	3 1/2"
1/6 PAGE	2 1/4"	5"	5"	2 1/4"



Amateur Television Quarterly

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