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

ATV In Public Service

ATV can give a real time view of what is happening at an emergency site or public service event just like broadcast news does with their portables, land and air mobiles. The emergency commanders and or event managers can see as well as hear what is happening to better allocate resources and get a feel for the situations.

TX70-5s ATV Transmitter

For portable/mobile local field operations and well as from a helicopter, we suggest the P.C. Electronics TX70-5s transmitter and optional DEMI 7025PA amp. While one might think only a Transmitter might be necessary, receiving gives a better feel for the whole operation by seeing the other transmissions, as well as better timing their switching on and off with other ATV sites. Also, you should watch and listen before transmitting to prevent interference as good amateur practice in any case.

For short distances up to 1/2 mile line of sight, check out our application notes *ATV Hard Hat Cam* and *Belt Pouch* which can be down loaded from the App Note page of our web site. This will enable people at a field command post to see what the on site workers are seeing. This video can also be repeated from the field command post to the Emergency Operations Center.

We have 50-100 mW ATV transmitter modules that can be used for short distance (1/4 to 2 miles depending on antennas and line of sight) applications such as HAZMAT, fires, etc. These lower power 420 MHz ham band transmitters can be received at a mobile command post and repeated to Emergency Operations Center on the 902 MHz , 1240 MHz or 2.4 GHz ham bands if the terrain or distance does not permit line of sight or strong enough video direct to the EOC. If you intend to use ATV from a helicopter, see our Aircraft ATV app note.

The small Old Antenna Lab 5 element 5L-70cm, 31 inch long beam antenna (8 dBd gain) is best for fixed portable, and the Diamond NR-770H for mobile. Vertical polarization is mostly used for mobile and portable emergency service applications because for the same gain, vertical omni directional antennas are smaller and easier to mount and use. The 5L-70cm beam will give some added gain, but more important cut down on multipath ghosting. Its >60 degree beamwidth is very forgiving for aiming. The mobile NR-770H is a dual band antenna and can be used just for 440 ATV or fed with one coax from the MX72 2 meter/440 duplexer for also running 2 meters for ATV talkback and coordination. I used one on my motorhome with 50 watts ATV and 25 watts two meters with no desense receiving on one and transmitting on the other.

At the EOC, a good high gain omni vertical such as the dual band Diamond X510N(x) connected to a P.C. Electronics TVC-4S ATV downconverter a TV set on channel 3 is recommended for local receive. Any other 70cm antenna can be used as long as the reflected power does not exceed 10% (2:1 VSWR) at the operating frequency. If you prefer line audio and video (A/V) connect the TVC-4S to a Rch3 channel 3 receiver to drive a monitor.

Fours Watt from a TX70-5s is usually sufficient for line of sight distances up to a 15 mile radius using the Diamond X510N(x) and OAL 5L-70cm antennas and snow free color video and sound and 30 miles with a DEMI 7025PA amp added. It is important to have line of sight between the antennas as 420 energy is greatly absorbed by foliage, buildings. For this reason, as well as minimizing multipath ghosting, it is best to have the antennas up at least 10 ft above the ground to minimize blockage of the radiation pattern by people or vehicles moving around. Only line of sight is predictable, non-line of sight paths just have to be tried and antennas moved around to find the strongest location. A strong signal on a 2 meter HT from the remote site is a good indication of ATV possibility. It takes 150 to 200 microvolts into the down converter/TV receive system for a snow free picture on ATV. An improvement of 6 dB from higher power, antenna gain or less coax loss can double the distance or raise the picture 1 P unit, but good antennas line of sight will make the most improvement. Always check out the transmission paths weeks before a planned public service event and add to your equipment list as you discover what is necessary.

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ATV In Public Service continued.

The 420-450 MHz band is recommended since the lower the frequency, the farther the distance given the same transmit power, coax loss, receiver noise figure and antenna gains - double the frequency, halves the distance due to antenna area (6 dB). The 902 MHz band goes half the distance as the 420 MHz band.

Directing the camera view and which ATV station should be transmitting is generally coordinated on a 2 meter frequency - 144.340 simplex is most common. The transmitting ATV station can also talk back on the sound subcarrier which comes out the TV sets speaker. The two meter simplex frequency must not have its 3rd harmonic within the 70cm ATV 6 MHz wide passband. Try to select an ATV simplex frequency that will not interfere with

TVC-4S Receiving Downconverter

ATV repeaters that may be in the area - check the ARRL Repeater Directory. 426.25 MHz is most commonly used for local simplex operations and is close enough to cable channel 58 that cable ready TV sets AFC can lock on. Cable ready TV sets can be used if connected to a good 70cm ATV antenna and the signal is strong enough. TV sets are generally not as sensitive as a downconverter designed specifically for the ham bands but worth a try.

All ATV transmissions must be controlled by a licensed radio amateur and directed to at lest one other amateur per 47 CFR 97.111 of the FCC Rules. Amateur transmissions cannot be used to further any business purpose, profit or nonprofit per 97.113. However you can do parades, races, etc. if the use is for the purpose of demonstrating Amateur Radio, public safety or part of a Radio Amateur Civil Emergency Service drill (RACES - 97.407). State and local police and fire agencies cannot use Amateur Radio for their regular operations, except as part of emergency preparedness drills or for special events where equipment and frequencies are not available to them. ATV cannot be directly used as a source for local cable companies, they and any other businesses need to use FCC Compliant Part 90 equipment and frequencies. Under the FCC definitions, a business also includes state and local government agencies, schools, churches and nonprofit organizations.

For more information and discussion on the FCC Rules, see The FCC Rule Book from the ARRL (1-888-277-5289). The actual Part 97 section of the FCC Rules is available on the ARRL web site: http://www.arrl.org/. The ARRL Radio Amateurs Handbook and ARRL Operating Manual has good background and technical information on ATV. It's best to first get on the air with local ATVers to ask questions and solicit their help getting setting up and do on the air testing before attemping a emergency or public service event. If you do not know of any ATVers in your area, we can check our customer data base by zip code and give you some. They might also be interested in joining you with your public service work. See the list of down loadable pdf files or emailable ATV subjects available free to hams from us on page 3 of our web site: http://www.hamtv.com/info.html

Equipment for the EOC is often supplied by individual hams, but many cities and counties now have a budget for emergency communications equipment that is also subsidized by the federal government. While we do not accept government purchase orders or go through the red tape, they can use a credit card, mail a check with order or you can either purchase the gear yourself and get re-imbursed. In either case we require the Responsible Ham Curtification form filled out by the amateur who will take the responsibility for the equipments legal use per Part 97. This form is downloadable in the How To Order section of our web site.

Email if you have any questions, we have had a lot of experience doing public service events with ATV.

73, Tom O'Hara W6ORG
P. C. Electronics

(c) Revised 8/2013

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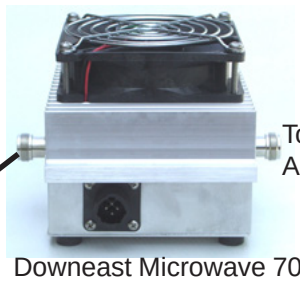
ATV In Public Service - continued

Basic Public Service Block Diagram

At the Incident Site

5L-70cm Antenna($85)
Belden 8214 coax with N plugs
Two to three 5 ft Radio Shack TV mast sections



To Ant.

Downeast Microwave 7025PA 35W amplifier (optional)

TX70-5s ($499) 4+ Watt ATV Transmitterr on 426.25 MHz or local ATV simplex.

CC36irc ($199) Color Camera or Camcorder if you want to be away from the transmitter, record and then replay back to the EOC.

At the Emergency Ops Center

Diamond X510N(x) vertical omni antenna ($219)

TV on CH 3 or 4

RG6 75 Ohm w/F plugs

9913

TVC-4S ($149) ATV Downconverter Converts the 420-450 MHz ham band down to TV channels 3 or 4. Use Belden 9913 coax with N Plugs

Sources:

P. C. Electronics: TX70-5s Transmitter, CC36irc Camera, 5L-70cm Antenna, Diamond X510N (A or J depending on frequency), and TVC-4S downconverter. Prices are shown, but check our Products and Prices web page before ordering. All prices include UPS surface shipping in the contiguous USA.

Downeast Microwave: 7025PA 35 Watt pep amplifier - 908-996-3584

The optional attenuator from DEMI or a fixed 20dB 10W attenuator must be used to drive this amp.

Radio Shack: TV's, TV 5 ft mast sections, RG6/F plug 75 Ohm cable, RCA plug camera cable and RCA/BNC adaptor.

Nemal Electronics: Belden 8214 and 9913 50 Ohm coax cable with type N plugs - 305 893-3924.

Options and comments:

Public service events and emergency communications audio is normally done on a two meter frequency. However you can have full duplex audio or allow the EOC to hear what is going on around the camera site by connecting the camcorder audio input to the transmitter or better, using a low impedance directional dynamic mic plugged into the ATV Transceiver - Radio Shack has a few dynamic mics to choose from.

The 5ft heavy duty mast sections and 5 element beam are small enough to be easily transportable by car. They are quick to set up but you would need to make some kind of a base and clamp to your car bumper or something like the Radio Shack 15-517 3 Foot Tripod Mount. The TX antenna needs to be above head and vehicle heigth and placed for best reception at the receiver end as talked in over two meters. If your area seems to have a lot of multipath ghost locations, try using a beam at both ends and finding magic spots.

You can run the transmit end from a 12V battery or 13.8 Vdc regulated power supply if AC is available. So consider selecting a TV that will also run on 12V. Some use little LCD types, but best to have as large a screen as possible. You may have to make a little sun shield to place over the TV and position it so the screen faces north to prevent washout.