ATCO NEWSLETTER

VOLUME 14 NUMBER1 **JANUARY 1997**

The ATCO newsletter is the official publication of a group of amateur television operators known as AMATEUR TELEVISION IN CENTRAL OHIO Group Inc." and is published quarterly (January, April, July, and October)

ATCO WA8RUT REPEATER UPDATE

The 1250 MHz repeater output is stronger that ever! Reason?.....New antenna. Check inside for particulars.

ATCO HAM IN THE SPOTLIGHT

This month Phil Humphries N8LRG has the front cover spot. Phil takes pride in the appearance of his shack which is very neat and spotless. He had the opportunity to “design in” the hamshack as he designed and built the house. You Gotta see this! The floor is carpeted and, get this, even a Lazy Boy recliner with alternating vibrator sits in the corner for those late night “breaks” to loosen up the muscles between DX contacts. Phil thought of everything down to the heavy insulation in the ceiling so as not to disturb everyone upstairs with the extended CW contacts. Phil’s ATV picture into the repeater is among the best in the area. Hey, check out his tower/antennas below and you’ll get a good idea WHY! Seventy five feet of tower fed with Heliax. Congrats’ Phil!

ACTIVITIES ... from my workbench

OK! Time to add my 2 cents worth. I've put this part off till last 'cause I didn't know what I was going to bore you with this month. Don't feel like talking about the weather...you can get a grip on that one just as well as I. Nuf' said. I've spent many hours on the Internet. Nah, lets cover that one in the internet section. Hey, I've got it! Lets discuss the ongoing repeater project. Here goes.

I guess the most significant thing we've done on the repeater is to put up a new 1250 MHz antenna. Ken purchased a dual slot commercial antenna from Hi Spec in Florida to start it off. Since I usually doubt that any *commercial antenna* for amateur use is worthwhile, I felt from the onset that it was not going to be money well spent! I must confess that I shouldn't take the "if it ain't built here, it isn't any good attitude" but past experience has taught me that even though I may not know how to build it right, most commercial guys don't either, especially when it comes to antennas! My judgment told me that we better test the antenna in my back yard before putting it up. Just as I expected, it tested lousy. This antenna is supposed to have 9 dBd gain and "omni-directional" so I asked, "why does the manufacturer make a big point about where the *front* is"? It says in the instructions that the painted dot on the mast is *front*. Low and behold that's where the major lobe is. They're right! However, some portions of the sides were down about 3-4dB. On top of that the maximum signal occurred with the antenna tilting down about 10 degrees. This is definitely not right. Usually when that is found, the antenna isn't matched right. An investigation showed that the antenna is sealed and we'd have to break it to look inside. I sure wanted to do that but resisted the urge. After all, then we most certainly couldn't send it back. We decided that maybe ground reflections were interacting with the readings but repeat tests at 15 feet above the ground instead of 10 feet produced the same identical results. This convinced me that we had taken good data. The setting sun by this time was telling us that the tests were finished for the day so we put everything away and concluded that it was only about 1-2 dB better than my single slot (3 dbd gain) antenna presently installed and a few dB worse on the sides and back.

Time availability in my schedule as well as Ken's prevented us from trying the dual slot or any other antenna at the site until late, late fall. When we were available, the weather wouldn't cooperate. Finally in early December, we decided we had only one last shot to try anything till next spring. It was going to be warm the next weekend and we were free so we said "Lets do it and see if this antenna is really as bad as we think it is". Guess what? I got to the repeater site and had just installed the mast for the antenna when the wind picked up and it started to rain hard. 630 feet in the air is no place for this activity so I came down...wet! No antenna today. Fortunately, the following Saturday produced sunny skies and 50 degree temperatures so it went up then. To my amazement we measured a 5 dB improvement! (6dB= 1 P unit) Within the next week or so at least 6 people also reported at least 1 P unit signal improvement. One person reported 2 P units better and nobody said it was worse. This I don't understand. Why did it test so bad and perform so good? If any of you have any good ideas, let me know so I can sleep nights!

While we were at the repeater, we adjusted the video modulation on the 1250 transmitter and lowered the audio gain. The video now looks VERY good but the audio level still needs to be backed off. Hope to get to it soon. As I see it, with time, the 1250/1280 portion of the repeater will see increased usage. It's too bad but the intermod on 439 due to close proximity of the 440 repeaters makes the picture poor most of the time. Because of this we encourage the procurement of 1200 MHz equipment **but don't give up on 439**! With time permitting, I would like to try to modify the repeater 439.25 receiver to receive the lower sideband and avoid these signals. We'll have to figure out how to tune the PC Electronics IF detector to the opposite side of the carrier. Also, the sideband filter would have to be retuned to 435-440 instead of 438-443 to filter out the 443 to 450 MHz fm signals.

To help promote 1250 activity, I've started work on a 1250 MHz transmitter that accepts audio/video directly and outputs about 2 watts on 1250 MHz. It is essentially the same circuit presently used in the 1250 repeater transmitter now so no unproven technology is at stake here. I had planned to finish it so it could be presented here at this time but learning HTML code so I could create a new internet ATCO web page took priority. Sorry! It will be easy to build using a blank copper circuit board about 3" x 6" with all components "dead bug" wired directly to the copper foil. It will have mostly easy to obtain components and will require a single 12 volt 2 amp power supply. If needed, I will buy extra parts for additional constructors if there is interest. In the meantime I could send the schematic with my sketches so far for a head start to anyone interested. Let me know on the 147.45 NET, phone or internet (towslee@ee.net).

Oh, one more thing. My machining interest also got in the way of the 1250 amp construction. For some crazy reason I decided to try and machine my own Bird wattmeter sensing element that will accept standard Bird slugs and in order to do this I had to fix my milling machine. Well, the milling machine now works, the wattmeter element is 99% complete and the amp is still only on paper. Go figure! Funny how some of us prioritize our activities? Oh well, enough for now. Time to take a break and enjoy a Pepsi (beer).
More next issue. By the way...don't forget that your $10 membership dues are needed at this time. Help our club grow!!!
Art...WA8RMC

FALL EVENT MINUTES

We had our annual "Fall Event" on Sunday October 20, 1996 at the ABB picnic grounds. Thanks to Ken for the facilities. For a change this one turned out to NOT be cold or rainy! There were 22 people who attended. All seemed to have a good time. As usual, we swapped "stories" about that elusive band opening that nobody knew was there and those rare DX contacts. After much discussion we had excellent food brought by Rick WA3DTO so none of us went home hungry. After eating we pulled names out of the hat for door prizes which were outstanding this year! For all of you that didn't attend, we want you to know that EVERYONE went home with a prize!!! Some were better than others but let's face it, your odds of winning were MUCH better than at Dayton. The main prizes were a 1280 MHz loop yagi won by John WD8AOW (W8STB's son) and a 1280 MHz preamp won by Frank KE9SX. Many thanks go to Down East Microwave for the donation and prize discount. (I highly recommend them for UHF / microwave transmitters/receivers and antenna purchases.) Highly valued donations also were provided by Universal Radio. Afterwards we had a short business meeting where I outlined some of our current activities and plans for the future. Ken WA8RUT gave a rundown of his new weather monitor system located at his house and linked into the repeater. The pictures below were taken at the event.

THE NATURE OF VIDEO...a good video primer

OK guys, you have to absorb a little theory along with the fun stuff (the theory is also fun if presented right) so I searched for someone to do the job. Voiala! Henry Ruh KB9FO to the rescue. He also discusses more on the same topic in his ATVQ magazine published quarterly so we won't cover that part here. To subscribe or obtain a copy of ATVQ, Email Henry your name, address and money ($16/year-4 issues) to atvq@aol.com or phone 219-662-6396 & leave info on the machine. I hope you enjoy Henry's analysis...there will be a quiz about this on a future Tuesday night net. (Just kidding)...WA8RMC.

It seems the most perplexing aspect of video modulation and transmission is that video has both AC and DC components. The AC portion is easy to see, the DC portion a little less obvious. When I wrote the NATURE OF VIDEO a couple issues back, I had to decide if each topic should be brief and concise, a "this is the important stuff" or should I include a lot of supporting theory behind each. I opted for simple explanations so it would fit! So here is a little more detail on a couple of topics from the first segment.

Video modulation is unlike any other mode in a couple of distinctive ways. Besides being composed of higher frequencies (up to 5 MHz, even more if you use computer graphics /character generator) the modulation is applied in a different manner and modulation itself is a strange animal if we compare it to analog voice AM modulation. Fourier analysis projects that any complex waveform can be defined in as a combination of sine waves of various harmonically related frequencies. Rather than get into a lengthy math discussion which readers tell me turns them off, here is a practical example. Start with a simple sine wave. Pick one, any one. Draw it out on paper and visualize it. Now on a second sheet, draw the second and third harmonic of the first using the same scale.
Now cut the pieces apart and lay each over the other so we can see all three at the same time (by holding them up to a light). Besides three sine waves, we should also be able to trace out the additive function of the shapes which now begins to look like a worm, or soft rectangle. If we ignore the bumps, and draw a line across the tops of all the bumps and the bottom of all the bumps, the rectangle takes on more shape. Add more harmonics and the dips fill in and the valleys smooth out, and the start and stop points become more vertical i.e.: a 20th harmonic would have a very steep beginning and ending waveform. What we call a square wave, is really never square since a signal cannot instantly go from a zero state to some voltage state (say one volt). There is always a rise time. This rise time can be defined in either frequency or time domains. That is , it can be said the waveform has a rise time of 1 microsecond, or 1 MHz (1 microsecond is the inverse of 1 MHz & vise versa. 1/.000001sec = 1 MHz - ed.). Either defines the slope of the waveform as going from zero to one volt in a particular way. In video, for the NTSC system, the max. modulation frequency is defined as 4.5 MHz. So the maximum SINE WAVE modulation would be a signal of 4.5 MHz, or roughly .2 ❍s also known as 200 nanoseconds. This is also known as the aperture limit or Nyquist limit of modulation. A square wave of 4.5 MHz could not be passed since to be a "square" wave, it must by definition, have frequency components above 4.5 MHz. In fact the highest practical "square wave" in video is about 1 MHz, depending on how round we are willing to have the corners. This is also the defined rise time for all pulses used in transmissible video. By the way, rise time is defined as the time it takes for the signal to go from 10% - 90% of the difference between two voltage points. For example, going from zero to 1 volt, the time is measured from where the signal passes the .1 volt point to the .9 volt point. This eliminates the confusion of where the "knee" starts or ends.

Now in video, there are also two frequencies generated for each video element. A video element is any transition in level. This could be from blanking to sync pulse, or from blanking to white, or from 50% white to 51% white. The amplitude of the transition, determines how much energy is in the generated sideband which is separate from the frequency of the sideband it generates. If we modulate a normal carrier wave with a sine wave on a spectrum analyzer, you would see three blips, the center being the carrier wave frequency. On each side would be a blip which represents the original modulating frequency. If we had a 1 KHz modulating signal and a carrier wave of 1 MHz, we would see the blips at 999,000 Hz, 1,000,000 Hz and 1,001,000 Hz. This is fine for audio, because there is but a single frequency/time component to the modulation. In video, there is second aspect. All video is a repetitive waveform because of the scanning of the image, the same transition will be "seen" each time the scanning gets to that particular location. For simplicity, let's use a picture with a single white vertical line on the screen. The remainder of the video is black. Each time the scan system bumps into the white line, it will generate the sideband that represents the frequency of the slope of the transition from black to white and back again. Since the white line is vertical, it will be "seen" on every scan line, 262 1/2 times per field, (minus the vertical sync period) or about 241 times, which, because we use interlace scanning, is 482 times per frame (two fields x thirty times per second), or 14,460 times per second. We add back the vertical interval time, which is just a temporary lapse of video, and we have a time between "bumps" of about 65 microseconds, or 15,734 Hz. So a second sideband is generated at 15,734 Hz as well as the frequency of the slope (say 4.5 MHz) of the transition. If the transition is large, the energy in the sideband will be large and if the transition is small, the energy of the sideband will be small.

If we rotate the line so it runs diagonally, we get the same results, since the scan rate determines the first sideband component, and the slope of the transition determines the second sideband component. All sidebands will exist at multiples of the scan rates, 30, 60 and 15,745 Hz! These sidebands exist instantaneously and simultaneously. So their amplifier has to produce a power bandwidth of 4.5 MHz

(9 MHz at the amplifier device, part of which will be thrown away in the sideband filter later). If there is a sound subcarrier, it will also exist at the same instant, and if the line is colored, not just white, there will be color sidebands generated too. Even the most simple video element generates a considerable amount of information in the modulation process. In audio, the modulation is symmetrical. For the most part, if you divide the signal into positive and negative portions, they cancel to zero. If you look at audio on an oscilloscope, you will note that the little green worm tends to stay wherever the centering control put it, and the audio waveform is a series of wiggles above and below this "zero" voltage reference. There are both positive and negative parts of the waveform, and the center of this is 0 volts. Not so in video. Video waveforms go from zero to one volt. Our little green worm will dance up and down in response to the average DC level (ac coupled scope). In baseband this is usually 0 volts for sync and 1 volt for white. In the TV transmitter this is inverted so that one volt = sync level, .714 volts blanking and .1 volt = white.

In order to maintain black and white and sync levels to precise values, both the transmitter and receiver have circuits, called a clamp or DC restorer, which forces the signal to be at a particular level for various reasons. First, we want the transmitter to always be at maximum power during sync pulses. Second, we want a constant black level so the picture contrast ratio stays the same and we want to limit the white level so that we never have a 0 carrier (over modulation) state. The values of these are precise voltages. At the 1 volt standard video signal, we divide the signal into 140 units. 40 are used for sync and 100 are used for video. Another 20 units of bias are used for the level between TV white and absolute minimum carrier. For the 140 unit signal, there are 40/140 volts of sync and 100/140 volts of video, or .286 volts of sync, and .714 volts of video. The sync portion is constant. There should be no variation in the level set for sync and blanking. (Blanking is the "zero" or black reference for video). In the transmitter, the power is held to 100% for the sync pulses, and 75% for the blanking level. The video can be at any level from 75% - 12.5% power. Because there are two functions, sync and video, and the sync is constant and the video is not constant, the average voltage level over any time period of less than one line will be any value between 100% and 12.5%, and for any period in excess of one line the average voltage will be between 75% and 25%. By keeping the blanking level constant, the two portions of the signal, that above and that below .714 volts will almost never cancel out to zero. There will always be a generated average bias voltage, which represents the average picture power in any one line, frame or field. This is the DC component generated by the video signal. The DC level is at its highest during vertical sync when the transmitter is generating 100% power for the greatest period of time, and it is lowest during an all white picture, where the transmitter is generating 100% power for 5 ❍s, 75% power for another 6-8 ❍s, and 12.5% power for about 45 ❍s. During vertical sync, the average power is about 92% and during video, about 23% average power. The only time the apparent DC level is zero is when the transmitter rests at a constant power level. There is a time constant involved, so the DC level is actually always changing except under static, test signal conditions. The negative only modulation voltage also means that there is a DC component to the video signal, since it always offset (biased) from zero volts, and there is never a corresponding "positive" modulation voltage. Note that in the transmitter we DC bias the signal by about .12 volts so that the white level can never achieve zero carrier. Otherwise the one volt signal would clip the carrier when there were 100 IRE white levels (or more) causing splatter, sync buzz, loss of aural carrier recovery and other nasty things. This leaves a little modulation room between peak white and zero carrier level. Thus, a minimum of 10-12% carrier power is always present.

In the old days, TV receivers lacked DC restorer circuits (typically just a diode) and it was common to see the retrace lines during bright scenes when the picture tube would be biased by the DC component of the video to a point above blanking (extinguishment) and when the picture was very dark, it was REALLY dark. Now to add to all this, is the vestigial sideband filtering. If receivers centered the carrier in the IF passband and we transmitted both sets of sidebands equally, (upper and lower) we would have no differential between the sideband power for low frequency and high frequency modulations. But video as any AM signal is redundant between the upper and lower sidebands. They start out identical but when we look at the energy of the sidebands, we find that the low frequency modulation components are quite strong, and the high frequency components are very weak. This means nearly all the sideband power is very near the carrier frequency and very little is in the area of the spectrum away from the carrier. In fact, nearly 95% of the video sideband power falls within the first 1 MHz. If we were to remove one entire set of sidebands, we would also remove a considerable amount of the DC signal, and the low frequency response would be quite poor, resulting in video smearing and blurring. But if we only remove a part of one sideband, we keep a faithful representation of the video and the DC voltage generated. The small error, typically less than 3% is not discernible. But it also means we have cut the power of the higher sidebands in half, since we threw half away in the vestigial sideband filtering process. So the receiver IF is tuned such that the high frequencies are fully within the passband, and the carrier and low frequencies are on a slope of the IF filter, so that the carrier is at the 50% level. (- 3 dB power) This equalizes the sideband power. When we tune our ATV receivers, this causes a curious effect.

If we tune the receiver for maximum picture, we shift the incoming carrier to the center of the IF passband, so that we fully recover the low frequency sidebands which would otherwise be 3 dB down. To accomplish this, we shift the video carrier within the IF passband by about 1.5 to 2.5 MHz (remember we are looking at a 6 MHz wide channel and IF). Where is the sound? It's gone! This is why on weak signals we can tune our ATV receiver and get PICTURE OR SOUND BUT NOT BOTH! The 4.5 MHz subcarrier is now above the

passband of the IF and has been cut off by the IF filter! This is one reason the sound "disappears" long before the video. Its like using the IF shift on an HF SSB receiver to shift an interfering signal out of the passband and eliminate it.
Commercial TV stations use audio carrier levels of -7dBc to -15 dBc (a 5% to 20% of video carrier power) So the aural carrier is much stronger than a typical ATV transmitter which uses a subcarrier level of not more than -15 dBc (dBc means dB relative to the video carrier). I.E., a commercial station could be using five million watts of video PEP and one million watts of audio while we use 100 watts of video and three watts of audio which after VSB filtering is 1.5 watts of audio! So now you know where the audio went! For better audio, use a separate transmitter or a second band i.e. two meters 144.34 for audio with video on 70 cm, 439.250 MHz. Likewise, our 100 watt video signal with its "handy-talkie" audio signal is not likely to bother anyone! But you say, when I look at a waveform on the oscilloscope, the color is more than 1 volt. Not so, my friends. The oscilloscope is a simple voltage measuring device. It cannot separate (without filtering) the various components of the TV signal by frequency. A waveform monitor is a specialized type of oscilloscope, which is equipped with filters to allow us to look at the luminance, chroma or both parts of the signal. In "flat" response, the same as an unfiltered oscilloscope, the display simply adds the chroma signals to the luminance signals. In truth, the chroma signals are completely independent of the luminance as they are subcarrier modulation. To be more accurate there are two subcarriers and they are each modulated as double sideband, suppressed carrier. A balanced modulator takes the signal and makes it DSSBSC so only the sidebands remain. The two components of the color signal, I and Q (for In phase and Quadrature phase, meaning 90 degrees difference) (also called R-Y and B-Y) have two components. The amplitude of the color signal represents the saturation, and the phase of the color signal represents the color hue. In genuine NTSC there is also a difference in bandwidth, one being 1.5 MHz the other being .5 MHz which is cheap equipment is reduced to .5 MHz. for both, tossing out the higher frequency color components (picture detail). The color subcarrier, 3.579545 MHz (called .358 for short) was chosen so that the color sidebands fit in between the luminance sidebands. With this, two things happen. First, we can separate the Y (luminance) and C (chroma) signals using a frequency comb filter, and second, since the sidebands are never on the same frequency, there is no direct additive effect. They both exist at the same time, but never at the same frequency.

So on your voltage scope, you may observe a highly saturated color signal as appearing to be 1.5 volts peak to peak (P-P) but in fact only one volt (or less) is luminance, and the remainder is color. Now since the color signals are suppressed carrier signals (sort of like SSB audio) we need to insert a small amount of carrier at the receiver to recover the signals a BFO (beat frequency oscillator) of sorts. We also need to be able to lock up the receiver oscillator so that we recover the correct phase and amplitude so the color is stable. This is where the burst signal comes in. At the back porch of sync (the area after the horizontal sync pulse and the beginning of the picture) we insert nine cycles of the original 3.58 carrier. This is enough so that when it is recovered at the TV set, the local 3.58 oscillator is phase locked to the original carrier and we can demodulate the signals with the receiver generated continuous 3.58 carrier signal. The amplitude of the burst signal is also used. The color detector circuits adjust their gain (color intensity) inversely to the color burst amplitude. The normal level of the burst signal is 40 IRE units (.286 volts) the same amplitude as the sync pulse! By comparing both, we can decide if the burst is lower or higher than the normal level. If the burst signal is low, the circuits add more gain (turn up the color) to compensate. If the burst is higher, the circuits reduce the gain (turn down the color) to compensate. This keeps the color intensity from changing even though the signal strength of the TV signal is changing. Without this action, a fixed reference, the color would change intensity with the strength of the received signal. Viewers near the transmitter would have overly saturated color, and distant viewers would have little if any color. OK, but why does my watt meter go down when I turn up the video gain control of my transmitter, aren't I losing power? And why doesn't it ever go up like my AM transmitter does when I speak in the mic? No. the power is not changed, only the detected average power has changed. Remember back to the start, I mentioned that normal AM voice modulation is symmetrical. There are positive and negative voltages generated with a zero volt starting point. So when you add the voice signal to a carrier wave, you have both positive and negative voltages being added to a steady CW waveform. The result is part of the time the signal is audio + carrier and part of the time the signal is audio - carrier. The sidebands are additive on the wattmeter, so you see 100 watts of carrier with up to plus fifty watts of audio. When you talk, the watt meter, a voltage sensing device as the oscilloscope, moves up to show the increase in additive signals.

In video, the signal has only positive voltages (sync is 0 volt) in baseband signals, which is inverted in the transmitter to negative only voltages. The zero volt sync signal is still zero volts, so the carrier plus sync still =100 watts ,we have 100 watts of carrier and zero watts of modulation. When the video signal goes to blanking (black) level, we have a -.286 volts added to the carrier, so we have 100 watts minus the power of the negative sidebands, so we have less than 100 watts, or about seventy-five watts average power. When we add the white portion of the video, we have the negative .9 volts, added to the carrier power, or 100 watts minus the white power sidebands, or about ten - fifteen watts. So your watt meter senses the positive carrier voltage and the negative video voltage and says you have (on average) about twenty - thirty watts. There are never any positive going voltages so the meter can never go up (carrier plus positive modulation). Your peak power is unchanged, it is still 100 watts, but the watt meter is an average responding device, so it is showing the average power or APL (average picture level). Keep in mind that we want to limit the white video levels so that we never have less than 10% power, which leaves room for the audio subcarrier wave at 4.5 MHz. At the receiver the video carrier is used to "beat" against the FM carrier at 4.5 MHz. The difference frequency is the recovered audio. Unlike the color signals, the sound signal

has a carrier, and so it "rides" on top of the video carrier in a voltage/ power sense. If you use separate transmitters, thus separate carrier waves we can run our video transmitter at full output and sync will equal 100% power. If we mix the sound with the video (called multiplexing) then we need to have some reserve power for the audio carrier, so sync should be 90% power of our amplifier, and the sound takes up the remaining 10%. In commercial TV we might get 60 KW from a single tube in "vision only" service, but have to operate at 40 KW for combined audio/video service. Most hams use the multiplexed method since it means much simpler designs. A few hams will operate a separate transmitter for sound and video, and either combine them at the transmitter output, or (rarely) use two antennas and let the signals "mix in the ether." Using a multiplex system also has some drawbacks. Intermodulation products can creep into the signal since it is not likely we are using a class A RF amplifier. We use a "brick" class C or poor class AB amplifier with two coax connectors, black heat sink fins and two power leads, red/black, exiting the box. When the carriers mix, (color, sound and video) we can get a triple beat. No, not a new rock rhythm, but an interference in the picture from a 928 KHz signal that is generated by the intermod of the amplifier. To minimize this, we use less than full audio power level, and use an audio carrier that is 15 dB below the video carrier, (-15 dBc) or even a little less. So when choosing a transmitter, make sure it has an adjustable FM sound injection level control, so we can find the happy point between intermodulation and not enough audio carrier to be heard.
Henry...KB9FO

QST MAGAZINE ATV TRANSMITTER ARTICLE UPDATE

I spent my Christmas vacation putting together the kits that appeared in QST from North Country Radio. After many hair pulling hours I have them on the air. For any of you that are thinking of buying/building these kits, let me say that the documentation is not very good. I never could get the transmitter going with the included tune up procedures. I had to use an RF volt meter and work each stage until I got a slight movement on my watt meter. Part of this problem was trying to use a 30 watt meter on a item that only puts out 2 watts. I have not been able to get rid of 100% of the smearing on the video, I have tried 3 different video sources, and get the same thing. The downconverter seems to work but not as good as a borrowed PC Electronics unit sitting next to it. All in all I wish I would have ordered my stuff from PC Electronics, but tried to take the cheap way out. I should have applied the $200 for the kits to a built unit. Just thought you would like to know.
Dale Wentz...KB9JJA... (dwentz@fvh.gtegsc.com)

ATV ALTITUDE RECORD...can anyone top this?

It looks like Mike Henkowski, KC6CCC, owns the ATV altitude record after a rocket launch last Saturday, Nov. 23 at Black Rock, Nevada. His 2417 MHz ATV signal gave a view of the earth all the way up to 53 miles, almost 280,000 feet before dropping back to hit the dry lake bed floor. The video package survived the impact and helped him home in on the signal seven miles from the launch site. The transmitter consisted of a FM ATV exciter, originally designed by Mike at his company, Microtek, for Part 15 license free use, driving a homebrew 1 watt amplifier.
Tom O'Hara...W6ORG

Art, there are Amateur rocketeers all over the US that are trying to officially get all the way into space... They build solid and liquid fueled rockets. They have to file a flight plan with the FAA etc. before they are allowed to launch and have to use such places as the middle of the desert etc. to make sure their "toys" don't land on someone's head or house... They had a special on the discovery channel a while back on this... Alex Van Halen (drummer for the band Van Halen) is one of the California rocket club members. Takes some serious bucks to play in their field though.
David Cooley ...N5XMT... cooldave@ipass.net http://www.ipass.net/~cooldave/

Art, I'm collecting together all of the images in .tiff format so we can produce an article for QST. The down-link video was great, the VCR had a problem recording clearly, lint on head possibly. I visited JPL two weeks ago in an effort to "clean up" the recording using their equipment. It worked very well, the tape was digitized and stored, allowing us to step frame by frame or field by field storing in .tiff. I've also been holding off release of information at the request of Reaction Research Soc. for copyright reasons.

I can tell you the ride a was wild 5 sec. burn, 35 G's, Mach 4.46, 53 miles high (based on optical and calculated measurements) & 200 mph fall to the lake below, DF'ed to it in 8 min looking at dirt clods. We have a future more aggressive launch in about 6 mo. 150 mile target alt.

Check out Microtek web page for a sample of the 2.4 Gig equipment we used. (power out was 1 watt into 6dBic patch antenna). http://www.microtekelectronics.com. We may post pictures on the page in the near future, check back.
Mike Henkowski...KC6CCC

ATV ANTENNA RECOMMENDATIONS

The following internet question/answer conversation was very intriguing and, I believe, very informative to ATV newcomers. It has a number of good considerations when dealing with antennas. Although I believe that most of us will not be flying ultralights or racing RC, the “where do I put my antenna and what kind shall I use” question haunts most of us at some time or another ....ed.

I am going to get into ATV, however I am not sure what band to get onto. I am hopefully going to build some of my own stuff, to add to the fun of it, but I am going to use it for three uses: 1) I want to attach a video camera to my ultralight. 2) I race RC cars and want to have a drivers view. 3) I fly RC planes and wish to play a little. So 2 of my 3 uses are very local, but when I fly around in my ultralight, I may be in a 30-40 mile radius. What band would work the best for me, or is it power, or will all of them work?
Jeremy Cowgar...KB8LFA... jcowgar@villers.com

While I don't have many kit recommendations, I can tell you of some of my experiences running ATV on various bands.
Starting with R/C cars, I have run both 70cm AM and 33cm FM. I wouldn't say that any particular band had any advantage over the short distances involved. The problems encountered were independent of the band used, the main one being MULTIPATH. While they manifest themselves differently, multipath on the different bands/modes amounted to the same thing: trashed video! The best suggestion to reduce this problem (I didn't say eliminate!) is to keep both antennas (especially the receive antenna) as high as practical. It should be a gain antenna, and pointed down and AT the vehicle. The key to preventing multipath problems is to reduce the amount of undesired signal paths. Obviously, a directional receive antenna will do this. For simplicity on the transmit side, there is less that one can do. One thing that “can” be done is to modify the pattern of the transmit antenna. On 70cm, a good old 3/4 wave vertical will have greatly reduced radiation at the horizon as compared to a 1/4 wave vertical. It has much of its energy directed upwards (which is why it is often used for a simple LEOSAT antenna) In that case, if your receive antenna were high above the vehicle (say, on a hill, atop a tower, or atop a nearby building or a house) looking down on the vehicle, then you would do better. This would reduce the strength of the reflections from nearby ground-clutter objects like building, cars, etc. keeping the receive antenna relatively distant so, over the course of the car's roving, the TX/RX antenna distance is more constant, percentage wise may help reduce the probability that a reflection will be anywhere near as strong as the “real” signal.

Another means of reducing multipath is to go with Circular Polarization. This was a “fad” in the broadcast industry in the 60's and 70's. The idea is to transmit, say, left-hand circular polarization. You would then use a left-hand Circular Polarization (LHCP) antenna for receive. Because the sense of the rotation gets reversed on every other reflection, the odd-ordered reflections would be discarded by the receive antenna. This rejection would depend on how good the ellipticity of the antenna was in the direction of the incident wave. In theory this would be good. To know why it didn't work in practice, as yourself "How many circularly polarized TV antennas have I seen recently." BTW, using linear polarized antenna on one end of a circularly polarized circuit makes the system immune to cross-polarization - maybe important in an airplane, maybe not...) but you lose 3db of signal off the top.

However, if you use a Circular Polarization (CP) in your system on the TX and RX ends, you do have an advantage for those reasons. Some antennas for CP use include the "Egg Beater" (quadrafilar helix), the good 'ole helix (the "corkscrew" antenna) and the crossed-yagi. The Quadrafilar Helix (described most recently in the August, 1996 QST) is fairly easy to build and most appropriate for the "moving thing" (i.e. the car, or R/C plane) since is it produces a more-or-less hemispherical pattern. For receiving, a linear helical antenna (Helix) is easy to build and quite tolerant in dimensions, and as much gain as you care to give it.

For the R/C cars, the transmit antenna should be on top. For R/C applications, the antenna should likely be on the bottom - since, presumably you'd be below the antenna. As a question of band, keep in mind that the "apparent" path loss goes up by about 6db every time you double frequency! That is, given pairs of dipoles (one set on, say 70cm, and the other on 33cm) at the same distances, the system on 33cm will have more than 6db weaker signals than the system on 70cm. This "loss" is imaginary - the "ether" doesn't really attenuate the signals by 6db, it's just a questions of aperture (i.e. "metal in the air") and the fact that the 33cm antennas are about half the size of the 70cm ones (and will intercept only 1/2 the energy...)

However, there are advantages. For R/C cars & planes, for instance, where the distances are close, you can be running low power and still have plenty of signal strength. Also, antennas will be of more reasonable size. Tacking a 33cm quadrafilar helix to an R/C plane is not too difficult, and a 6 turn helix antenna is also small, having both reasonable gain and still a relatively wide beamwidth for following the craft. For pictures of/from such an arrangement, look at: http://uugate.aim.utah.edu/utah_atv/rcplane.htm. While I have not run 70cm ATV from an R/C plane, I know several that have and were disappointed with the results. The reasons are several: Often a simple dipole is used. A mistake in that a dipole has nulls at its ends. Also, especially if a linearly-polarized antenna is used, you can end up with problems with cross-polarization. Crossed-dipoles are better, but it is almost impossible to come up with a simple, linearly polarized antenna (that is small) that doesn't have some nasty nulls. A bigwheel antenna for 70cm is a bit large, but (as ATV balloon

users will attest) they have a pretty deep null under them! Also, a 70cm quadrafilar helix may be a bit large for the average R/C plane. The upside of 70cm is that the equipment to see it is more available. You have to keep in mind that only those very close to the plane are going to be likely to have enough signal to get much of a picture. Ask yourself "Do I want to be the only one to have a good picture, or can I live with a worse picture so everyone can also see that quality picture?"

If you use 33 or 23cm, do you use AM or FM? Each has their advantages. AM is simpler to receive. Simply downconvert it to the frequency range tunable by a conventional TV. This may be done with a modified "Rabbit" type of converter (33cm), or <$40 of parts from Mini-Circuits (either band...). FM, on the other hand, requires a special demodulator. Fortunately, old Satellite receivers are easy to find. The "old" (pre-1986 or so "pre-LNB") types with the 70MHz IF are good - especially if you build a narrower 70MHz IF filter and the newer "Block Types) that tune 950-1450 directly (for 33cm, many can be forced down into the 33cm band, while they do tune 23cm directly anyway!) The 70MHz IF types need a downconverter (I homebrewed my own for both 23 and 33cm - for a brief look at the 23cm one, look at: http://uugate.aim.utah.edu/utah_atv/ka7oei_a.htm.

Finally, in August of 1996, we had an assignment from the local ARES group. They wanted to have ATV transmitted from an airplane that we to fly from Provo (about 40 miles south of Salt Lake City) to Ogden (about 40 miles north of Salt Lake City) and have them visible at the EOC. An obvious problem was geography. There are mountains between both locations and the EOC. Also, the airplane had to keep fairly low (<1500 AGL) in order for the video cameras to be able to catch any detail. Secondhand, I was told that previous tests had been done on 70cm using about 10 watts TPO with a 5/8 wave antenna mounted somewhere... Even though the distances were short (<10 miles) the results were disappointing. This was likely due to poor receiving systems (i.e. expecting good results with UHF TV antenna and relatively long runs of RG-6, no preamps, etc.) but we decided to try a variation on an approach that I'd taken in years past:

Most years since 1992, I'd taken some ATV gear on the annual "Lone Peak Hamfest" - an informal group of hams that, over a weekend, attempt to top an 11251 ASL peak adjacent to the Salt Lake Valley. The equipment lineup (which works very well) is the home-brew FM transmitter on 1248 MHz, an amplifier that produces about 1 watt when driven by the FM transmitter, and either a dipole and/or a full-wave loop. Here is the setup: Lugging the camera, batteries, and (in 1995) a solar panel, I clip-lead the power connections, throw the coax (with the dipole on the end) over a rock so that it's a few inches above the ground, and I transmit. Paul, WA7PXD, uses his home-brew 23cm loop yagi (about 22 elements, with aluminum foil near the reflector to tune it down from 1296,) a GaAsFET preamp, one of those single-board ATV downconverters, and a 70 MHz satellite receiver. The result is essentially a P5, closed- circuit quality TV picture, with a slight bit of QRM from an FAA radar. The distance is about 15 miles.

On the airplane, since there was more room and weight capability, we set up with about 12 watts of RF power and two possible antennas: The "main" antenna was a bazooka dipole suspended between the RDF wire antenna (running from the front to the top of the tail assembly) and the top of the fuselage, and the other was a standard dipole, on a wooden-dowel standoff, attached to a wing strut. Unfortunately, the bazooka dipole had some serious problems (it got very warm, but didn't appear to want to radiate much power...) so we soon switched to the lower strut-mounted dipole. Paul ('PXD) and I were atop a mountain (at about 9000 feet) looking into both valleys with a 24 element, 24cm loop yagi with a decent GaAsFET preamp and the single-board receive converters going to 12MHz BW filtered 70MHz receivers, and retransmitting this on 70cm to the EOC in the valley. With the "lower" antenna, there were some "fringing" effects with the fuselage causing noticeable multipath, but at both extremes of the flight, we always had very strong signals - even when the airplane was >30 miles to the north of us.

The lesson? Well, had we more time to prepare, we would have installed a quadrafilar helix atop the airplane (keep in mind that we were at 9000 feet, and the airplane was at <6000 ft - so we were always above it) and used the appropriately sensed CP helix antenna(s) for it. After all, the SNG truck and helicopters use CP for that reason.)

If it were me doing ultralight ATV over that wide a radius, I would use several watts of power on 23cm using FM, using a downward-oriented quadrafilar helix, and helixes on the ground, with someone following you around. Why FM? If you look in, say, the 1997 ARRL Radio Amateur's Handbook at Fig. 12.69 in the "Modulation Sources" chapter, it shows graphically what happens. As all signal strengths down to limiting, there is relatively little increase in demodulated noise. Below limiting,
the picture quality goes downhill really fast. Meanwhile, the weaker an AM signal gets, the noisier it gets. In simple terms, with a given signal strength, the FM signal stays noise-free longer. With very weak signals, though, the AM signal may still be recognizable past the point where the FM signal is. In other words, if you can guarantee a minimum signal strength above limiting, FM will do better. With a half-decent FM receiver in the appropriate bandwidth (i.e. 12-14 MHz with a 4 MHz deviation signal) you could pretty much snow-free signals down to about 10-12 dB S/N ratio. That represents a very snowy AM picture.

Clinton C. Turner... KA7OEI... ka7oei@uugate.wa7slg.ampr.org

SILENT KEY

It is with great sadness that we announce the passing of Dave Sears W8AER on December 10TH 1996. He was 85. Although his ATV signal has faded to black, many ATCO members will still remember some of his hamradio accomplishments including:

- In earlier years he flew light aircraft for pleasure.
- Dave and his brother-in-law operated a radio and television repair service during the "vacuum tube" era.
- Dave loved dogs and always had one by his side.
- He drilled a well in his backyard so he could water his lawn anytime he chose.
- Dave had a well recognized video trade-mark, a picture of his QSL card.
- He constructed many, many things, such as his own tilt-over radio tower, model steam engines, a wind-turbine to generate low voltage OC, an electrostatic high-voltage generator and other electromechanical devices.
- Once he had made-up his mind to begin a project, he singlemindly concentrated on that particular project to completion.
- He especially enjoyed building electrostatic microphones. In his collection of more than a dozen microphones, were many of the condenser types as he often spoke of.
- Few knew that Dave like to paint with water-colors. He presented the minister of this church with a painting of the church.
- For his own enjoyment, he liked to play his electric organ.
- A painter a musician, an amateur radio operator since 1930, amateur television broadcasting was but one of his many talents.

"We'll miss you, Dave!"

Bill...W8DMR

HAMFEST CALENDAR

This section is reserved for upcoming hamfests for as far in advance as we know about them. They are limited to Ohio and vicinity easily accessible in one day. Anyone aware of an event incorrectly or not listed here notify me so it can be corrected. I maintain the fliers that compiles this list so for additional info Email me at towslee@ee.com. This list will be amended as further information becomes available.

LOCATION	SPONSOR	DATE	TALK IN FREQ.	COST	ARRL EVENT?	
Broadway, Ohio	Union County ARC	January 19, 1997	--	$2 door		yes
Dover, Ohio	TUSCO ARC	January 26	146.14/74	$2 door		yes
Mansfield, Ohio	Intercity ARC	February 9	146.34/94	$4 adv-$5 door		yes
Dayton, Ohio	DARA	May 16,17,18	146.34/94	$13 adv $15 door		yes

ATV REPEATER ACTIVITY IN TOLEDO, OHIO

Art, Just wanted to let you know, the WB8VJD ATV repeater is back on the air in Toledo. The input is 434.00 vertical, output is 923.25 vertical, with an output power of 20 watts. A 45 watt PA is being readied, and will soon (hopefully) be increasing our coverage of the Toledo area. It is located on the Lucas Co. EMS site at the corner of Detroit and Arlington streets in south Toledo, at 275' agl. The repeater went up Sept. 15th, along with the four receivers of the Friendly Radio Amateur Team linked repeater system, on 6m, 2m, 220, and 440. Three users have kept the phosphors burning so far, with interest growing at an almost alarming rate. The horizontal slot antenna was just not ready when the time came to climb so a hustler G6 was put up for receive. the transmit antenna is a Comet FP19. Mostly PC electronics gear make up the system, with an Elktronics ID board, and Downeast Microwave 20 watt amp. Feel free to use any of this info in the next ATCO newsletter, and by all means, express my heartfelt thanks to all the membership for their help in making this a reality. We still have a long way to go, but at least we're on our way.

Rick... WB8VJD

NEW MEMBER SECTION

Let's welcome the following new member to our group**!** If any of you know someone who might be interested, let one of us know so we can flood them with information.

BOOTLEGGERS ON THE ATV BANDS...is it a problem?

A number of people complain about unlicesenced signals on the ATV bands. Although, to my knowledge, it's not a problem in the Columbus Ohio area, we need to observe what other hams put up with elsewhere. As you can see as you read on, this topic really can really bring out the hostility in us (sometimes rightfully so). Have any of you been troubled like this lately? Let me know!...ed.

Henry...KB9FO of ATVQ magazine starts off the discussion by writing....
"QST promoted bootleg transmitter manufacturers in three issues. Good work, yet another example of how ARRL followship (vs leadership) is hurting ham radio."

Later, Henry KB9FO follows up with the following...
"It's true that there is a repeater in Indianapolis, IN, on 144.81 with the station CW ID as WPEY924. I'm told the FCC has received many complaints but that's the least of the problems. Hams themselves are contributing to the bootleg transmitter problem, by selling equipment to non licensed people. I have sent several ads clipped from various commercial Security magazines, Security catalogs, and professional video magazines. These ads have been offering a multitude of TV transmitters on the ham band frequencies, many with several watts on 439, 900 and other bands. The ads blatantly say these can be used for surveillance, law enforcement, security, long distance viewing for "movie directors" and other commercial purposes. The latest three ATV articles in QST feature this same equipment, by the same manufacturer, presumably so that the manufacturer can legitimately claim that the thousands of illegal transmitters they sold were "ham transmitters" and thus not subject to FCC type acceptance or FCC type approval but none the less are being sold and advertised elsewhere for illegal purposes. None of these advertise in ATVQ, and I would not let them hide behind an ad so they can sell their illegal bootleg transmitters to non hams. The ads seldom if ever say that they require a HAM license, or any license at all. Many are advertised as part 15 devices which they are NOT (except those which meet part 15 regulations for 900 MHz operation, which few do!). So we take a financial "hit" by not accepting these ads, yet QST, shuns their loyal ATV advertisers and prints dozens of pages for these illegal products, so the legitimate ATV manufacturers suffer as well. Go figure. Who's side is the ARRL/QST on? It seems they vote with their wallets for bootleg transmitter manufacturers, while stabbing their advertisers in the back. Go figure....just another symptom of how sick Newington has become."

Marshall Quiat (ARRL Rocky Mountain Division Director...quiat@csn.net) responds to Henry's comments...
"The substance seems to be QST has taken ads either from an organization that is -- or runs -- an illegal repeater. Complaints have been made to the FCC about this. Further Hams are selling equipment to non licensed people. Henry sent "ads" (I assume he means "advertisements" instead of the "cutting tool" cited by Webster's 10th.) clipped from security magazines and catalogs "offering a multitude of TV transmitters on the ham bands". Apparently the three latest ATV articles in QST feature the same equipment from the same manufacturer. There is some question about whether these are part 15 devices. Henry says few of these qualify for part 15. Unfortunately, he failed to provide any data in his e-mail. He does take the opportunity to bad-mouth and accuse the League. There is, however, no data upon which the League has done anything for which it could be bad-mouthed -- except possibly by taking the unidentified advertisements for the unidentified products for the unidentified uses: thus, Henry's magazine has lost revenue. Does anybody know what, if anything, is behind the ravings of this angry little man? Does anybody identify anything with substance that we should look into? Except for fury, has any illegal act taken place? Were we put on notice of fraud or illegality? Does anyone see any purpose in devoting any time or effort to this unidentified, apparently pathological fantasy?"

Tom O'Hara (W6ORG...tom@hamtv.com...http://www.hamtv.com) at PC Electronics now gets into the act...
"To all who have asked for some background on the bootlegging problem that resulted in Henry's flaming Emails out of frustration: For about 3 years now a number of us ham manufacturers, dealers and Henry have noted unethical manufacturers and dealers advertising and selling ATV gear on ham frequencies through security, law enforcement, R/C model and movie industry periodicals and trade shows with impunity. They operate on a don't ask and don't tell policy and let the buyer beware. Sure, the knowing or unknowing nonham user may or may not get caught and fined from the lack of truth in advertising. Meanwhile our bands get interference from these bootleggers. Again a number of us have been forwarding copies of these ads and catalogues from these unethical manufacturers and dealers to QST Associate Technical Editor, Joel Kleinman, N1BKE at his request and to the FCC in Washington DC. The recent 3 part articles in QST by one of those manufacturers, North Country Radio, makes us wonder if we are just beating our heads against the wall. I hope it was just a case of the right hand not knowing what the left is doing. In all fairness, Marshall Quiat, ARRL Rocky Mountain Division Director, was not familiar with the problem or details. After I outlined it to him, he said he would bring it up at the next Directors meeting in January. What ATVers can do is to inform their area ARRL Director (pg. 10 DEC QST) that you want a policy statement from the ARRL saying that they will not accept articles or ads from people who are actively engaged in advertising and selling ham transmitting equipment to non-ham or illegal users in the USA without full disclosure - no obfuscation's like "may require a license in your area" while listing as a use surveillance, movie production, etc. Below is a copy of my response to Marshall Quiat with more info and background.

Marshall: I really do appreciate that you intend to bring up the bootlegging problem at the Directors meeting. I think the problem is increasing and needs to be addressed at the League. While we all would like to explore ways to bring more people into ham radio, we cant at the same time encourage bootlegging in any form or else I am afraid it might go the way of CB. The Kenwood/truck stop thing probably would have gotten some of the truckers to get a license if that info was packed with each radio, but I think too many would not see any reason to go to the trouble to get one since the probability of getting caught or prosecuted is very low. The security industry all know the low cost of amateur radio equipment and low chance of getting caught or fined. Dealers at security shows for the last few years openly show the ham band transmitters from Super Circuits, North Country
Radio and others - Steve Uhrig, WA3SWS, who runs a security company and regularly attends these shows told me about the open defiance. Steve has been one of the guys sending copies of ads and catalogues from these companies to Joel Kleinman at QST and the FCC the last few years and is very frustrated at not being able to compete with those that sell the lower cost amateur gear instead of the type accepted part 90 transmitters. At the RF Expo in San Diego 2 years ago there was a company I saw with antenna mounted 900 MHz 10 watt amplifiers for part 15 license free add ons. They had no fear that the FCC would walk up and cite them for selling non-type accepted amplifiers - don't ask and don't tell. As a result, the 900 MHz band is all but unusable in the San Diego and San Francisco south bay area due to businesses using the high power add ons for digital transmissions. The 33cm ham band has already gone the way of CB in many areas. On the inputs to 70cm repeaters in the Los Angeles area we get business bootleggers. A security camera locked up a local ATV repeater for 2 weeks. While this may not seem to be a big deal with a few hams being inconvenienced, ATV is used extensively by LA County RACES for remote damage assessment - and we seem to have a few disasters per year. The local hams try to direction find and confront these people, but that is not what they got into ham radio to do. They feel they have no backup or support if one tells them to go to hell. I get up to 6 calls a day from people wanting to use our ATV gear for illegal uses - we turn them down of course. But a surprising number are licensed hams who feel the FCC and now the ARRL does not care so why fight it. Many police departments want video for surveillance and have said that the feds are not going to arrest the local cops, but just tell them to stop. Therefore, they feel safe to go ahead and do it until told not to. I understand and agree with the philosophy of it is not the hardware or manufacturer that commits the crime but the user, but where has ethics and integrity gone. I am sure a reputable gun dealer would tell a customer who comes in and says I want a gun to kill my spouse would refuse sale and also would not put an ad in a newspaper saying people who kill their spouses find this gun the best. These companies that primarily advertise in security, R/C and movie industry magazines and rarely ham mags, and do not inform potential customers of the legalities are not breaking the letter of the law but surely the intent, hurting ham radio, and getting the unknowing customer in trouble. FCC Rules do not prevent manufacturing transmitter kits on any frequency, just complete units which must be type accepted for the intended service if more than 6 are made. Now these kit companies are advertising complete units with seeming impunity. How can we defend our bands from other services if these bootleggers and their suppliers freely use them? Is it not hypocritical for the ARRL to tell other services we cannot share our bands with you or give you any segment and at the same time advertise directly or indirectly the very people who illegally use our bands? At what point do the reputable manufacturers throw in the towel and go along or risk going out of business? To get more info on this I suggest talking to these other people who are the good guys in the industries that are experiencing the unfair competition and have been sending stuff to Joel and the FCC: Steve Uhrig, WA3SWS, 410-879-4035 #3 to page, Security devices; Ed Mitchell, 800-473-0538, Microvideo Products, Radio Control Models; Mike Henkowski, KC6CCC, 714-498-3024, Microtek, Part 15 and 90 transmitters".

Now here's someone else (Name unknown...Coaxcable@aol.com) who also wants his say...
"Marshall Quiat, The arrogance and disregard for determining the facts and taking corrective action to avoid promoting the manufacturer of devices made to work on the ham bands but advertised almost exclusively to non hams is a classic example of why ARRL now represents only 25% of hams. You are more interested in covering up your actions than you are solving the real issues. As such you do a disservice to ham radio and should resign as director. The issue of ham equipment being blatantly sold to non hams for commercial purposes is big enough that even Kenwood made a public statement saying they had no intention of selling their ham radios via truck stops for illegal use by non licensed users (cb'ers). It has not been a secret that Ramsey, Rainbow Kits and others sell transmitters for use as surveillance or security devices, which transmit on non ham, not part 15 frequencies, i.e. TV channel 52. It is illegal to use the devices. Super Circuits devotes about a dozen pages of their SECURITY AND SURVELIENCE catalog to "ATV TRANSMITTERS" featuring units which operate on a multitude of ham and non ham frequencies, with power levels well in excess of any part 15 authorization. These are advertised and sold to non hams, with no mention that a license may be required, or that use of these transmitters is illegal in the US. Many of these devices are made by North Country Radio. QST has just run a three issue series by NCR, which serves only to allow NCR to point at the series and say, "See, we really make these for hams, and just because they are advertised and sold to non hams elsewhere is of no concern to us!" Meanwhile the ham manufacturers who compete for the same ham dollars and who spend big bucks for ads in the same QST issues, (virtually every issue) get no such free plug, and lack the income derived by selling ham equipment to non hams as NCR does. So NCR, a "bad guy" gets income from the sale of illegal transmitters and ham gear to non hams, gets a big three issue plug in QST for their crap, and the "good guys" who don't sell equipment to non hams, get no three issue plug for their equipment. Not to mention that the NCR articles are near carbon copies of the three article series in Radio Electronics Magazine a decade ago. Your response is symptomatic of the arrogance in Newington. Had QST bothered to even check with its own advertisers, or others knowledgeable in the area, they would have been able to avoid the situation

where QST is now seen as supporting the manufacturer of illegal equipment. You have damaged your own revenue providers (advertisers). Of course, few of you have any experience, or expertise in these matters, but you plunge ahead anyway. Sheer arrogance. Those who raise a protest are not your enemy. If they were, they would say nothing and let you spin burn and crash on your own, which you are doing quite well. Those who protest feel that the image and nature of ham radio is damaged everytime you arrogantly proceed as the "all knowing, all seeing, all wise" when in fact your base has eroded drastically, and all you can muster from nearly 150,000 members is a few thousand protest letters about little LEO's. It should have been 30,000 or 50,000 responses. In fact it shows what little leadership ARRL has when it "can't whip up the troops frenzy." You can't ASK anyone for advice because you are afraid of the answers. You are afraid that it might be seen as a sign of weakness, that you are not "all powerful, all knowing, all wise." Let me clue you in, every time you scrub your nose like this, or like the NFCC fiasco, or the Little LEO letter fiasco, you prove to everyone you are just as fallible as the rest of us. Tisk Tisk, the Emperor has no clothes. We are not going to lie to you. But we sure disagree with some of the things you are doing which we the general populace view as stupid and of no value to US. We pay for the subscriptions, not you. We pay the dues, not you. Fifty years ago ARRL was doing a good job. Somewhere along the line, the "leadership" became more interested in their own self image than in the image of ham radio. Somewhere along the line you lost sight of the reality that ham radio is not the same as it was, and we need to do things differently. But like the blind faithful who keep pulling the same "vote the party line" lever, your numbers keep dwindling. When the party faithful die off in the next decade or so, there will be no one left to pay for your arrogance. Just as the weight of 40,000 life subscriptions is dragging down the QST budget, because the funds were not invested to pay off the future liability, the weight of your attitudes is dragging down ham radio. My only hope is that since you are a couple decades older than me, that by the time you finally get too feeble or die, there may be a few folks left who give a shit to try and salvage your sunken ship. Am I mad? No just disgusted with your kind of politics and "leadership." You wouldn't know a good idea if it bit you. If this were a public corporation you would have been voted out by the stock holders because there has been no return on our investment. Hams have voted you out by 75/25. They are not joining ARRL, not subscribing to QST because there is no return on the investment. Wise up. You may be A voice, but you are not the ONLY voice, but you still act as though you are the ONLY voice. Foolish man. I can't bring myself to sign a 73 to you".

Finally, Wayne Maynard (WB6BFN...wmaynard@artsci.net) adds his comments to conclude this go-round...
"Mr Tom O'Hara (W6ORG) and all the rest of you commenting on the dilution and destruction of Amateur Radio by illicit (and illegal) radio operations on our bands are absolutely correct! For many years now we in the Los Angeles area have had to deal with commercial and consumer invasions into the amateur bands. Even in the Early 1970s when the transistorized and cheap VHF amateur radios became available enterprising salespeople at places like Henry Radio (among several others) would sell 440 and 220 radios to unsuspecting customers as "license free" radio systems. We have even had commercial, pay by the minute, mobile telephone systems on the amateur bands. All the proof in the world doesn't seem to get the FCC to take any remedial action! Seems as if they want amateur radio to get so corrupted that they have an excuse to reassign the bands to a service that would use it appropriately (that's an opinion - not a proven fact). The Tournament of Roses Radio Amateurs (TORRA) and Los Angeles County DCS have been using ATV for decades in support of emergency and special event operations. During that time we have had to deal with constant and varying intrusions into these systems. To wit:

1) The TORRA 900 MHz ATV repeater system has been disrupted by interference which was finally tracked down to a 900 MHz wireless street lighting control system. Highly directional antennas (waveguide beyond cutoff, etc.) are needed to get away from this problem. This system is now having to deal with Rabbits and computer networks on the band.
2) The DCS ATV system periodically has problems with commercial TV. (surveillance, etc.) tying up 426 MHz for days at a time.
3) In 1974 our 220 repeater was getting wiped out by a maritime commercial fishing operation just off the coast of Los Angeles. We got them off the air but found out that a local "reputable" radio store had sold an entire fleet of 220 radios to these people. They supplied the crystals & tuned up the radios on our repeater input freq.! I haven't purchased anything from that store since!

If there's an easy way to make money people will grab it. It matters not who gets damaged in the process. To make matters worse, there is no accountability for their actions... the FCC doesn't care and local authorities are not allowed to do anything about it. The amateur radio service is not alone in this area either. Local police, fire, and ambulance services are commonly disrupted by both intentional and not so intentional interference. They can't get the FCC to act either! We will never be able to totally suppress the profit making endeavors of enterprising people who are not above destroying someone or something else in the interest of profit. We can perhaps shame them into submission in some cases, but profit will always win overall. Perhaps what we can do in the long run is get the FCC to make a major change in the way they enforce their regulations. Perhaps allowing local authorities to enforce their regulations, deputizing other organizations, or whatever. Something needs to be done".

Wow...what an earful! I personally believe that bootlegging is a serious problem in some localities so let's keep on our toes around here to be able to recognize it as soon as possible after any infraction is initiated so it can be squelched before it gets out of hand. Sorry to take so much room for this, but I wanted you to be able to hear unedited comments from as many viewpoints as possible!
Art...WA8RMC.

"Ceep Wavin' "CW" forever....

No, this is not a really ole timer (old timer yes, but not really, really old!) making another plea to return to the 1920's style of Morris Code (apologies to Samuel F.B.). Although in the 1960's & and early '70's, you could find me at the bottom end of 40 meters more often than any place else, including the campus bars! No this is not about adjusting your spark gap, or properly setting your B.F.O. on your WWII BC348 (or if you had money, your SX 101) or tuning your regen control on your SPANMASTER, these words are 'bout "Ceep Wavin'" or CW for short! Now I know some of you will say "he spelt 'Keep' with a "C"!... I already told you...I spent more time at the bottom end of 40 than anyplace else...including school! By the way... I still "git a kick" out of sending the word "bottom" in Morse Code..... try it! In fact, when I was in school, I use to turn my homework in with the words spelled using the official abbreviations for Morse Code, including the "Q" signals! Instead of writing papers for my English class like ***" I can bearably hear someone in the distance of the night calling my name"*** I would write **QRZ DX?!** I never knew what '***sic***' meant! To this day, I still believe the word "From" is spelled '**de**'! Nuff said about that... this article is about CW...Ceep Wavin'....

On ATV, computer generated graphics are beginning to take over the majority of what's being transmitted via the Columbus ATV Repeater. Now I'm not against it... having 3 computers and matching VGA to NTSC converters myself ..but these fancy graphics are replacing good ole' live video shots!...you know.. the type of live video where the ATV ham sits in his shack with a bottle of beer, in a tee shirt with a poster of Miss Budwiser on the far wall and he's wavin' at you! Nope... not much any more... whiz bang animated graphics taking up millions of Giga bytes to show your call sign in a great number of creative ways! Some of my screen shows use about every 'Clip Art" that comes with Microsoft's Power Point! I used up (wore them out actually!) all of Harvard Graphics clip art some years ago! I was at the toy store 'Best Buy' today and bought a CD ROM with another 3,000 clip art images on it! Watch out! It's getting embarrassing. I go to the ATCO Spring & Fall Events and I still don't know what the ATVer's I exchange video with look like until we meet at the Event! When was the last time you saw W8DMR on camera? I saw KA8LWR at Findlay and I didn't recognize him! If you don't turn on the Live camera and put yourself on, how are you going to know when it's time to change your old tee shirt if no one sees you to tell you? Or maybe its just me that needs to be told...well that's not true because Bill, WB8URI has to be told!.. he wears those tees longer than I do!... maybe Bill *should* stick to computer graphics!

So next Tuesday night at the ATCO net, warm up that old camera, comb you hair, change your tee shirt, smile and most importantly CW------"CEEP WAVIN" at all that can see you...and thru the repeater, that's everybody! CW and Morris Code forever!
Ken Morris...WA8RUT

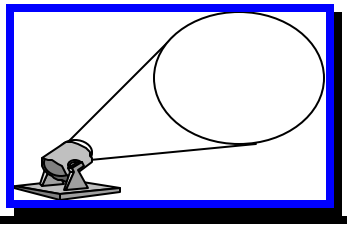
OHIO AREA ATV REPEATER LISTING

This list is compiled from actual repeater sightings in the Columbus, Ohio area. We need to keep up-to-date listings so newer operators know what to look for when the band's open. H&V in freq. list = antenna polarization. Our repeater is obviously the best so I'll list it first.

LOCATION	CALL	INPUT	OUTPUT	BEAM	CALL FREQ	NOTES
Columbus, Ohio	WA8RUT	439.25 H	427.25 H	~	147.45	A signal on any listed input causes
		910.25 V	1250 H			an output on both listed frequencies
		1280 H	~			
Xenia, Ohio	KB8GRJ	434.25 H	421.25 H	240	144.36	*10= tone up for 1 minute
Dayton, Ohio	W8BI	439.25 H	426.25 H	250	147.45	*10=ID, *71= bul board
		1245	1287			
		1249.5	1291.5			
Lima, Ohio	WB8ULC	439.25 H	421.25 H	315		
Ashland, Ky.	WA4GSS	439.25 H	421.25 H	180		
Elizabethtown, Ky.	W4BEJ	439.25 H	421.25 H	210	146.98-	
Bowling Green, Ky.	W4HTB	439.25 H	426.25 H	200		
			1280			
Wheeling, W.Va	KB8QHO	439.25 H	426.25 H	080		

Acme, Pa	W3PVH	439.25 H	421.25 H	
Pittsburgh, Pa	W3KWH	439.25 H	426.25 H	090

SPOT LIGHT ON ONE OF THE ATCO REPEATER FEATURES



THE ATCO BULLETIN BOARD / TEST BEACON

TOUCH TONE "BUL" (285)

DOWN CODE " # "

The ATCO Club Bulletin Board and Beacon was installed in the Spring of 1995 and has been on the air continuously since that time. The purpose of the Bulletin Board is to provide ATCO repeater users with information about ATCO club function, repeater information, special events and other useful and non(!)-useful information. In addition, the ATCO Bulletin Board serves as a beacon on the 33 and 13 cm bands. Additional features of the Bulletin Board are planned to be added in the near future.

The Bulletin Board System Description At the heart of the ATCO Bulletin Board is an old 386 PC running Harvard Graphics 3.0 software in Presentation Show mode. Harvard Graphics is a business software package primarily aimed at creating presentation slides. It's similar to today's Microsoft "Power Point" presentation software but was chosen because it uses much less disk drive space and RAM and doesn't require Windows to run as compared to Power Point (it's running on a really old 386 PC!). In addition, I have been using Harvard Graphics for about 11 years and didn't have to be re-trained! I am primarily a Power Point user today, but I still use Harvard for some things. I would recommend Harvard Graphics for your home system for ATV if you don't have the Microsoft's Office Suite running on your system. I've seen older versions of Harvard Graphics in Flea Markets for $50 and less.

On the output of the 386's video card is a **AITech VGA to NTSC converter**. This convert produces composite video ready to drive a standard NTSC monitor or ATV transmitters. These converters are available at most computer stores and discount/mail order houses for $80 to $125 or more, depending on the type. If you have a computer and a ATV station, these converts are a must have addition to your station! The output of the VGA to NTSC converter goes to a Radio Shack Video/Audio distribution amplifier ($29) and the video goes to 2 transmitters and a NTSC local monitor.

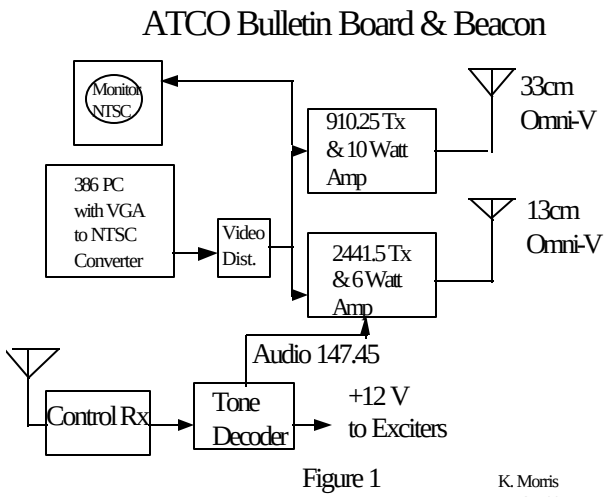


Figure 1

There are currently two Video transmitters that come on when the bulletin board is toned up (TT "BUL" or 285). The first transmitter is **P.C. Electronics exciter driving a Pauldon** 10 watt amplifier on 910.25 MHz (33cm) AM ATV fed via Belden 9913 to a **Comet 10dbd omni-vertical antenna**. The 910.25 signal is received at the main ATCO repeater site down town Columbus is re-transmitted on 427.25 MHz and on 1250 MHz FMATV for 8 minutes or until the Board Bulletin is brought down with a Tone "#", which ever is first. The **Tone Decoder/Controller** is a single output unit supplied as a kit from **Hamtronics**.

The second transmitter is a **HF Technology exciter driving a SSB Electronics 10 watt amplifier** on **2441.5 MHz** (13cm). Since the exciter runs only about 0.6 watts, it drives the 10 watt amp to about 6 watts. The antenna on 13cm is a **12 dbd omni-vertical made by Comet** fed with 35 feet of **LMR 600** low loss line. The video content on 13 cm is the output of the bulletin board and the audio output (on a 6.0 MHz sub-carrier) is 147.45 audio.

Using the System Features The bulletin board system has two features at the moment. First, as the club's Bulletin Board, up-linked to the main ATCO Repeater transmitters and, second, as a Beacon on 910.25 MHz and 2441.5 MHz. Using the ATCO Bulletin Board is simple: Touch Tone "BUL" (TT 285) on 147.45 MHz and watch either the 427.25 our 1250 FMATV on the main repeater. The bulletin board will run for 8 minutes or until it is toned down with a "#" sign.

To watch either of the two transmitters directly will take a little more work! First you need to know where the Beacon transmitters are so you can point your antenna at the right spot! The Bulletin Board/Beacon transmitters are located 4 miles north-northwest of the downtown ATCO main repeater, very close to the WCMH Channel 4 old antenna tower. Both the 33cm and 13cm transmitters are using vertically polarized, omni-directional antennas so it is possible to view the video from any direction from the transmitters. Once you have your 910.25 or 2441.5 converter on and your antenna pointed at the Beacon site, simply bring up the ATCO Bulletin Board (TT 285) and both transmitters will come on the air. (You can confirm that they are on the air by looking at the ATCO repeater outputs on 70 & 23cm and you should see the Bulletin Board.) The 33cm (910.25 MHz) is not hard to see and is quite strong around Columbus. The 13cm (2441.5 MHz) transmitter is a different story! Your antenna really needs to be line of sight with the transmit site to get a usable picture (Hint: Try looking for the picture on AM first. by running the output of your converter directly to your TV on channel 3 instead of the 70 MHz IF.) My station at home is only 5 miles away from the transmitter and I only see it P4. I am not line of sight with the transmitter being just "over the hill" from it! Yes, contrary to popular belief, Columbus is not "flat as a pancake"! If your antenna can see in to the Olentangy River Valley, you should be able to see the 13cm signal. At some point, we will re-locate the 13cm transmitter to a higher location.

The Future of the Bulletin Board/Beacon Site Additions to the current site that are nearly complete include a **Roof Top Camera** pointed at the downtown area that may be turned on via touch tone and a **new Touch Tone/video controller**. Also planned is a low power (1 watt) 70cm video transmitter for use as a signal source to tune up pre-amps, converters and antennas. The frequency of the 70cm of the low power source has not been determined, but 434.0 and 421.25 MHz have been suggested.. It would also be possible to add a another 439.25, 434 or 1270/80 MHz (AM or FM) receivers to this site and up-link to the main repeater transmitter site if there is a need. A local weather station for current temperatures, wind speed/direction, rain fall, etc. with the current readings up-linked to the ATCO repeater could also be added. I welcome your input.

In future issues of the ATCO newsletter, we will profile other features of the ATCO Repeater System. If you have any questions about any of the features or function of the ATCO Repeater systems, please call me on 147.45, on the phone numbers listed for me in this issue of the newsletter or E-mail me at **wa8rut@aol.com**.
Ken...WA8RUT.

CHICAGO ATV IS ALIVE AND WELL

Of all people, I don't have any ATV antennas up yet at home! So I checked in on the 144.34 intercom frequency this AM to see how things are with my TV repeater. There were 3 users on, so I joined the QSO. I was asked what equipment was used at the Sears building for the repeater because the system was working well and according to the users, on air in transmit/repeat mode about 8 hours a day. I was happy to say that it was a PC Electronics exciter, a Mirage D100 and an Astron M35 power supply. The system has three filters, Spectrum International on the output of the Exciter, ICM on the output of the amplifier, and TX-RX combline duplexer. So I get about 24 watts out of the coax to the power divider, which feeds 2, 6 element yagis (KLM) horizontally polarized, one on the north side facing NW (aimed at O'Hare airport) at the end of a 75 foot 9913 coax run, and the second is aimed SW (at Midway airport) at the end of a 220 foot run of 9913 coax.

One station reported he is at 95th st and the I-290 expressway that's about 30 miles away, uses 2 watts for P3 into the system, and receives on a TV set. Altitude is everything. For DX he uses a tower mounted (52 feet) antenna and 100 watts from a 4CX250. He reports that he can judge band conditions from the return signal and signal reports. There are 14 regular users and another 25 occasional users on the system. Even the regular Thursday night net is now on the repeater (it used to be simplex by the "big gun" station in town).

I will soon be adding 1252 MHz FM RX and an antenna for the easterly direction so the folks in Michigan who can see the system can get into it too. The receiver arrived from Europe OK, and as soon as I get some time, I will get it to the site and connected (an all day job) considering the crawl over and under the plumbing and other mechanical stuff in the building.

It's been on the air at its new location for 2 years and not one minute of down time so far, except when I work on it, which hasn't been for over a year now. The HFT repeater on 13 /23 /33 cm bands is trying to find a cable route from their system on another floor so that they can input on 2.4 GHz or 1252 MHz, and output on 421.25. That will add another couple of antennas/receiver to the system. At that point, we can run separate antennas for 439.25 (lower sideband) RX and 421.25 TX, and up the TX power a little to 50-60 watts TPO. That will give the stations in Milwaukee, Rockford, Peoria and South Bend a better signal to watch.

Happy New Year from the PATC ATV Repeater (Peacock Amateur TV Club

INTERNET INFO

If you have access to the INTERNET, you may be interested to know of some of the HAM related information that is available. We've tried to start a list of interesting places to look in case you get in the "surfing" mood. If any of you find different places to look, I'd appreciate having the info passed on to me so I can include it in this list. The ATCO home page is updated periodically so be sure to check often for late breaking NEWS. The addresses listed below are case sensitive, so type exactly as shown below.
(If anyone has comments or would like additional listings contact me via Email at towslee@ee.net.

ATV home pages:

http://psycho.psy.ohio-state.edu/atco	ATCO ATV home page. **
http://www.geocities.com/Hollywood/5842	East Tennessee ATV home page
http:/www.portal.com/~jpawluk/KB6MMF.html	California ATV home page
http://www.ladas.com/ATN	**A**mateur **T**elevision **N**etwork in Central / Southern California
http://www.lloydio.com/oatva.hmtl	Portland, Oregon ATV (OATVA)
http://www.mindspring.com/~rwf/aatn1.htm	Atlanta, Georgia ATV home page
http://www.stevens.com/HATS/home.html	Houston Texas ATV home page
http://uugate.aim.utah.edu/utah_atv/root.html	Utah ATV home page
http://www.hayden.edu/Guests/AATV	Phoenix Arizona Amateurs
http://citynight.com/atv	San Francisco California ATV
http://www.njin.net/~magliaco/atv.html	Brookdale ARC in Lincroft New Jersey
http://www.ddi.digital.net/HamRadio/lisats.html	Florida ATV (LISATS space shuttle info)
http://fly.hiwaay.net/~bbrown/tvatv.htm	Tennessee Valley ATV (Bill Brown WB8ELK balloon launch info)
http://www.smart.net/~brats	Baltimore Radio Amateur Television Society (BRATS)
http://www.regio.rhein-ruhr.de/hamradio/atv	German ATV
http://www.ecn.net.au/~sbloxham	Australian ATV (exhaustive list of other ATV & ham radio sites)
http://www.inside.co.uk/scart.htm	Great Britain ATV (SCART)
http://ourworld.compuserve.com/homepages/batc	British ATV club (BATC)
http://www.sfn.saskatoon.sk.ca/recreation/hamburg/hamtv.html	Saskatoon, Canada ATV
http://www.gpfn.sk.ca/hobbies/rara/atv3.html	Regina, Canada ATV

**Check out the new look on the homepage located here. To the limit of my html capabilities, additional data and graphics have been added. We're not to the big leagues yet but it looks much better than before! Also, I have just contracted for my own URL which includes space for a home page that I am converting at this time. Stay tuned. My new Email address is towslee@ee.net but I'm still available on my work address at towslee@mtwt.mt.com.

NOTE: If you are a regular Internet browser, maybe you'd like to be kept up to date on all of the ATV related news bulletins that are generated Nationally. If so, subscribe to the "ATV Internet mailing list" and your Email will receive the bulletins automatically. If you'd like to SEND a message to all other subscribers this can be done also. Its free to all.

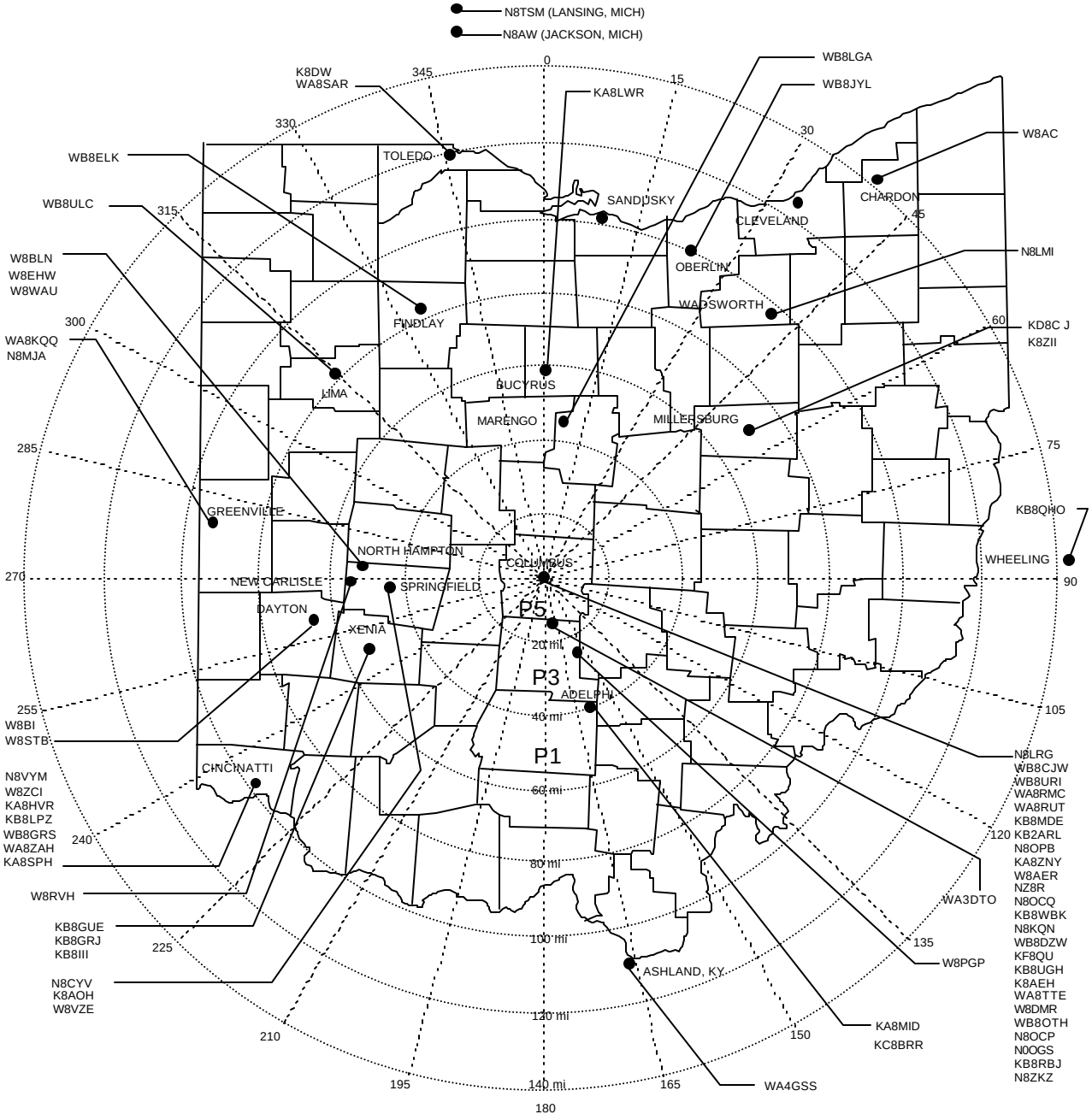
To *subscribe*, send Email message to "listserv@tallahassee.net" and include in the message the line SUBSCRIBE ATV.
To *send a message* address it to "ATV@tallahassee.net".
To be *removed* from list, send Email message to "listserv@tallahassee.net and include in the message "UNSUBSCRIBE ATV".

The following addresses are helpful in searching for many different Ham Radio topics on the INTERNET.

http://www.hamtv.com	PC Electronics Inc. Lots of proven ATV equipment for sale.
http://www.yahoo.com/Entertainment/television/Amateur_television	Listing of the available ATV home pages.
http:/www.acs.ncsu.edu/HamRadio	General ham radio info- satellite track, call sign database etc.
http://www.wolfe.net/~daydream/html/ftpsites.html	Ham radio equipment mod. / problem listing directory.
http://www.arrl.org/hamfests.html	Current yearly hamfest directory.
http://amsat.org	AMSAT satellite directory/home page.
http://www.arrl.org	ARRL home page
http://asp1.sbs.ohio-state.edu	Local & global weather map information (good detailed info)
http://www.ualr.edu/doc/hamualr/callsign.html	Search by call sign or name.
http://psycho.psy.ohio-state.edu/w8lt	Ohio State University W8LT radio station.

ATV LOCATOR MAP

Below is an Ohio map complete with counties, main cities, beam heading (from Columbus) and all of the hams known to have had video on the air recently. Please report anyone that has had video on and seen recently. If video is not reported for a given individual in about a year, I will remove them from the map. Let's see if we can make Ohio near the top for ATV activity. It also contains mile circles & approximate P levels expected. Generally the signal drops by 1 P unit each time the distance is doubled if all other factors remain unchanged. The P numbers are typical reported values under average (non band open) conditions.



ATCO REPEATER TECHNICAL DATA SUMMARY

This space of each publication includes the technical information of our repeater. Each time a new feature is brought on line it's added here. Use this as a quick reference for up/down access codes as well as some of the more important parameters of our system.

Main repeater:

Location: Downtown Columbus, Ohio

Coordinates: 82 degrees 59 minutes 53 seconds (longitude)
39 degrees 57 minutes 45 seconds (latitude)

Elevation: 630 feet above average street level
1460 feet above sea level

Transmitters: 427.25 MHz AM modulation and 1250 MHz FM modulation.
interdigital filter in output line of 427.25 & 1250 transmitter
Power - 40 watts average 80 watts sync tip (427.25)
50 watts continuous (1250)
Link transmitter - 1 watt NFM 2.5 KHz audio (446.350 MHz)

Identification Both 427 &1250 transmitters identify simultaneously every 10 minutes with video showing ATCO and WA8RUT with four different screens. Audio identification is 4 sequences of Morse Code.

Transmit antenna: 427.25 MHz - Dual slot horizontally polarized 7 dBd gain major lobe west
1250 MHz - Dual slot Hi Spec horizontally polarized 8 dBd gain major lobe west

Receivers: 147.45 MHz for F1 audio input control of touch tones
439.25 MHz for A5 video input with FM subcarrier audio
910.25 MHz for A5 video link data from remote sites
1280 MHz for F5 video input

Receive antennas: 147.45 MHz - Vert. polar. Hi Gain "Comet" 12 dBd (also for 446 MHz output)
439.25 MHz - Horiz. polar. dual slot 8 dBd gain major lobe west
910.25 MHz - Vert. polar. dB Products 10 dBd gain
1280 MHz - Horiz. polar. single slot 3 dBd gain major lobe west.

			UP	DOWN
Input control:	Major Touch tones:	beacon (10 min)	*439	*22
		regional weather radar	697	#
		**Local radar(5 min)	264	#
		User repeat 1 minute	*45	*22
		Touch tone pad tester	#0	#5
		Manual mode (ID)	*7790	*22
		(910 input)	*7791	*22
		(439 input)	*7792	*22
		(1280 input)	*7793	*22
		(future)	*7794	*22
		NASA Select	*70	*20
		5 second ID	#9	*22
		Bulletin board	285	#
		Reset to scan mode	D37 or #437	

Remote sites:	Local radar (inactive at this time)	(910.25 MHz link output 8 watts)
	NASA select at KA8ZNY QTH	(910.25 MHz link output 10 watts)
	Aux link at WA8RUT QTH	(910.25 MHz link output 1 watt)
	Aux link at WB8CJW QTH	(910.25 MHz link output 1 watt)
	Aux link at WA8RMC QTH	(910.25 MHz link output 5 watts)

ATCO MEMBERSHIP INFORMATION

Membership in ATCO (Amateur Television in Central Ohio) is open to any licensed radio amateur who has an interest in amateur television. The annual dues are $10.00 per person payable on January 1 of each year. Additional members within an immediate family and at the same address are included at no extra cost.

ATCO publishes the ATCO newsletter quarterly in January, April, July, and October. The newsletter is sent to each member without additional cost.

The membership period is from January 1ST to December 31ST. New Members will receive all ATCO newsletters published during the current year prior to the date they join ATCO. For example, a new member joining in June will receive the January and April issues in addition to the July and October issues. Your support of ATCO is welcomed and encouraged.

ATCO CLUB OFFICERS

President:	Art Towslee WA8RMC	Repeater trustees:	Art Towslee WA8RMC
V.President:	Ken Morris WA8RUT		Ken Morris WA8RUT
Treasurer:	Bob Tournoux KF8QU		Dale Elshoff WB8CJW
Secretary:	Rick White WA3DTO	Statutory agent:	Rick White WA3DTO
Corporate trustees:	Same as officers	Newsletter editor:	Art Towslee WA8RMC

ATCO MEMBERSHIP APPLICATION

RENEWAL O NEW MEMBER O DATE _____
OK TO PUBLISH PHONE # IN NEWSLETTER YES O NO O HOME PHONE _____
NAME _____ CALL _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____-_____

FCC LICENSED OPERATORS IN THE IMMEDIATE FAMILY
_____
_____

COMMENTS_____
_____
_____
_____

ANNUAL DUES PAYMENT OF $10.00 ENCLOSED CHECK O MONEY ORDER O
Make check payable to ATCO or Bob Tournoux & mail to:

Bob Tournoux KF8QU
3569 Oarlock CT
Hilliard, Ohio 43026

ATCO TREASURER'S REPORT - de KF8QU

CASH BALANCE (10/15/96)			$1069.90
RECEIPTS	(dues)	$ 140.00	
OTHER INCOME	(bank interest)	$ 7.50	
	(repeater donation)	$ 5.00	
EXPENDITURES	(postage July & October)		$ (44.80)
	(film for July & October)	$ (16.07)	
	(Fall Event food)	$ (61.94)	
	(Fall Event prizes)	$ (85.00)	
	(flowers for W8AER)	$(57.87)	
BALANCE	(1/11/97)		$856.72

ATCO MEMBERS AS OF 11 JANUARY 1997

K8AEH	Wilbur Wollerman	1672 Rosehill Road	Reynoldsburg	Ohio	43068	866-1399
W8AER	Dave Sears	1678 Kaiser Dr	Reynoldsburg	Ohio	43068	861-0904
KC8AGZ	Dave Lukens	11780 Willowview Ct	Pickerington	Ohio	43147	
K8AOH	Charley Tucker	4546 Laredo Street	Springfield	Ohio	45503	513-390-0693
WB4BBF	Randall Hash	212 Long Street	Bluefield	Va.	24605	
W8BJN	Gene Kirby	13613 US 36	Marysville	Ohio	43040	513-644-0468
KC8BKD	John Miller	4419 Park Ave West	Mansfield	Ohio	44903	
WB8CJW	Dale Elshoff	8904 Winoak Pl	Powell	Ohio	43065	766-5823
N8CYV	Blaire Standley	721 West North St	Springfield	Ohio	45504	
K8DW,W8FB	Dave & Paul Wagner	2045 Maginnis Rd	Oregon	Ohio	42616	419-691-1625
WA3DTO	Rick White	5314 Grosbeak Glen	Orient	Ohio	43146	877-0652
WB8DZW	Roger McEldowney	5420 Madison St	Hilliard	Ohio	43026	876-6033
W8EHW	Foster Warren	124 East Clark St	No. Hampton	Ohio	45349	
WA8EOY	John Schlaechter	3199 Lewis Rd	Columbus	Ohio	43207	491-4470
KA8HAK	Jim Reese	1106 Tonawanda Ave	Akron	Ohio	44305	
N8KQN	Ted Post	1267 Richter Rd	Columbus	Ohio	43223	276-1820
WA8KQQ	Dale Waymire	225 Riffle Ave	Greenville	Ohio	45331	513-548-2492
K8MBY,N8SIR,KB8UVK	Phil,Jim,Phil jr Buckholdt	153 East Bergey St	Wadsworth	Ohio	44281	
N8LRG	Phillip Humphries	3226 Deerpath Drive	Grove City	Ohio	43123-4100	871-0751
KA8MID	Bill Dean	PO Box 458	Adelphi	Ohio	43101	614-655-2454
KB8MDE/N8ZTL	Shaun Miller/Greg MacCartney	5061 County Rd 123	Mt Gilead	Ohio	43338	419-768-2588
K8MZH	Leland Hubbell	7706 Green Mill Road	Johnstown	Ohio	43031	967-8412
WD8OBT,KB8ESR,KA8ZPE	Tom Camm & sons	1634 Dundee Court	Columbus	Ohio	43227	860-9807
N8OCP	John O'Bryant	3139 ElPaso Drive	Columbus	Ohio	43227	274-5410
N8OCQ	Robert Hodge	3689 Hollowcrest	Columbus	Ohio	43223	875-7067
N8OPB	Chris Huhn	146 South Hague Ave	Columbus	Ohio	43204	
W6ORG	Tom O'Hara	2522 Paxson Lane	Arcadia	Cal	91007-8537	818-447-4565
WB8OTH	Perry Yantis	1850 Lisle Ave	Obetz	Ohio	43207	491-1498
WA2PCH	Craig Stoll	87 Cleveland Ave	Lackawanna	N.Y.	14218	716-823-4185
KE8PN	James Easley	1507 Michigan Ave	Columbus	Ohio	43201	
W8PGP,WD8BGG	Richard, Roger Burggraf	5701 Winchester So. Rd	Stoutsville	Ohio	43154	614-474-3884
KF8QU	Bob Tournoux	3569 Oarlock Ct	Hilliard	Ohio	43026	876-2127
W8RIK	Joe Hussey	1678 Sandhurst Rd	Columbus	Ohio	43229	895-7601
WA8RMC	Art Towslee	180 Fairdale Ave	Westerville	Ohio	43081	891-9273
WA8RUT,N8KCB	Ken & Chris Morris	3181 Gerbert Rd	Columbus	Ohio	43224	261-8583
W8RVH	Richard Goode	9391 Ballentine Rd	New Carlisle	Ohio	45334	513-964-1185
WD8RXX	John Perone	3477 Africa Road	Galina	Ohio	43021	
WA8SAR	Gary Obee	3691 Chamberlain	Lambertville	Mich	48144	
N8SFC	Larry Campbell	316 Eastcreek Dr	Galloway	Ohio	43119-8914	
KG8SN	Paul Ernst	67 Richards Road	Columbus	Ohio	43214	267-5758
W8STB	John Hey	894 Cherry Blossom Dr	West Carrolton	Ohio	45449	
N8TBU	Ed Latham	8399 Fairbrook Ave	Galloway	Ohio	43119	
KB8TRP	Tom Flanagan	1751 N. Eastfield Dr	Columbus	Ohio	43223	272-5784
WA8TTE	Phil Morrison	154 Llewellyn Ave	Westerville	Ohio	43081	
KB8UGH	Steve Caruso	39 South Garfield Ave	Columbus	Ohio	43205	461-5397
WB8URI	William Heiden	4435 Kaufman Rd	Plain City	Ohio	43064	614-873-4402
KB8UU	Bill Rose	2685 Kropp Road	Grove City	Ohio	43123	878-8964
WB8VJD	Rick Morris	203 Merton Street	Holland	Ohio	43528	
W8WAU	Jake Fuller	PO Box 117	No. Hampton	Ohio	45349	
KB8WBK	David Hunter	45 Sheppard Dr	Pataskala	Ohio	43062	927-3883
KB8YMN	Mark Griggs	2160 Autumn Place	Columbus	Ohio	43223	272-8266
KB8YMQ	Jay Caldwell	4740 Timmons Dr	Plain City	Ohio	43064	
KA8ZNY,N8OOY	Tom & Cheryl Taft	386 Cherry Street	Groveport	Ohio	43125	836-3519

ATCO Newsletter
c/o Art Towslee-WA8RMC
180 Fairdale Ave
Westerville, Ohio 43081

FIRST CLASS MAIL

DON'T FORGET OUR NET AT 9:00 PM ON TUESDAY NIGHT ON 147.45 MHz
IT'S JANUARY GUYS AND TIME TO DONATE ANOTHER $10 TO YOUR FAVORITE ATV CLUB!