ATCO NEWSLETTER

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ATCO HAM IN THE SPOTLIGHT

This time the spotlight shines on Mark Griggs, KB8YMN. Mark has been an ATVer ever since that very rainy day at the Columbus hamfest when Ken , W8RUT, demonstrated ATV to the group. That was almost 5 years ago!

Mark decided it was now finally time to start **transmitting** pictures so he purchased a PC Electronics transceiver at Dayton. He didn't get started on good footing however, for it seemed that the transceiver worked OK on transmit but didn't receive. I offered to look at it rather than take the time to send it back to PC Electronics and sure enough, I found it bad but couldn't locate the problem so we sent it back. Turns out they couldn't find anything wrong with it so back to Mark it came. It now works fine. Let's keep our fingers crossed Mark.

ACTIVITIES ... from my “workbench”

OK, we’ve accomplished a little more in the ATV direction than last time but, I admit, it’s hard to focus with the excellent weather we’ve been having. It didn’t seem important in February, but now that warm…well hot, weather is here, air conditioner maintenance just seemed to take center stage. The low cooling problem turned out to be simple though and one pound of Freon solved it. A loose fitting on the suction line going into the furnace was found to be the cause. Everything’s back to normal in that department….I hope! Now let’s concentrate on ATV.

Well, after several trips to the repeater, Dale has got the 2.4 GHz portion back up and running. When he first checked it, he found the output to be under one watt where it should be about 15 watts. After thinking that it could possibly be the expensive final transistor (again) he tucked it under his arm and took it home for “surgery”. Fortunately he found the transistors OK but the RF stages severely out of tune. After re-tuning the power came back up to normal. He left it that way to cook at his place for a few days and after finding that it stayed put, he carted it back to the repeater. It now works fine and at my QTH, the signal is back to original strength. Both 2.4 GHz antennas were checked and found to be in good working order. Next on the agenda is to find out why the 2.4 GHz receiver isn’t working properly. I suspect our wireless Ethernet transmitters in the area are de-sensing it. However, the last time I looked, the Ethernet stuff apparently didn’t like out ATV signal either and moved down the band to 2395 MHz or so. That is where we have the receiver now so maybe it’s time to move it back. Looks like a cat and mouse game to me. More later.

The antenna party we had in June was great as far as the weather and food were concerned but little got accomplished as far as antenna plots were concerned. I guess it’s my fault for not checking the equipment beforehand but the plotter didn’t work properly. We could measure gains OK but couldn’t get a pattern plot. I’ve got to work on the antenna rotor design and N8NT said he’d look at the software. The feedback to the rotor is problematic so we feel the only way to do it is with a stepper motor where we can index the antenna a known amount. I’ve got a high power stepper from work that was damaged so now it’s time to get to work. After looking at what will be required to drive this motor, Bob, N8NT, will have a “fun” time indexing it. It’ll be great. More on that later. (Oh, by the way, I ran out of room in this Newsletter so I’ll publish the pictures of the party in the next issue).

The next item is the roofcam that we mounted at the repeater. I’ve got the details later in this issue but thought I’d brief it here also. I know I’ve been talking about the roofcam project for over a year now (maybe it’s almost two years) but this time I can report that it’s working! Yes, it still has a few problems but is generally operational. I think some RF is getting into the controller and turning on some of the camera controls randomly. I plan a trip back soon to sit back and watch it for a while to verify this theory. If so, I’ll probably have to remove it for a time to put capacitor bypasses in some strategic locations. I’ll take some ferrite devices with me in case the RF is coming in via the control cable. In any case, I promise it will get better.

Last but not least, I’m making progress with the new commercial linear 427 amplifier I bought for the repeater. As you may recall, I picked up a commercial television amplifier that is intended to be used on TV channels 14 through 80. It takes 10 watts to drive it to the 100 watt output level. It seemed great but as the manufacturer says, it works OK on UHF TV channel 14 up but NOT below. Channel 14 is 275 MHz and we are on 427 MHz where the 10 dB gain drops of to only about 3 dB of gain. Since it works fine at 475 MHz, I proceeded to find out how to modify it to operate satisfactorily at 427. Fortunately I was able to talk with the engineer that originally designed it over 10 years ago and as it turned out, he’s a ham and willing to supply the needed design details. The internal matching to the RF stages was linearized for “no tune” operation on all UHF TV channels but the design didn’t allow for operation below this. Some experimental capacitor additions will be required. I did this and was able to peak it up to provide about 7 dB of gain which provides about 60 watts out for 10 watts in. I hope I can do better than that and feel that the chip caps I’m using are contributing to the problem. I’ll order some special RF porcelain types that can handle the RF better and try it again. So, until the new caps arrive, I can work on something else…what could it be?

Well, for one thing, I’ll work on the Newsletter so that’s what I’m doing now. After that, clean the shack and paint the house. I guess that’ll tie me up till November. (See you at the Fall Event)

That’s all for now, guys. Don’t forget the Columbus Hamfest at the Aladdin Shrine is coming up in early August. See the table in this issue for details. See you then.
…Art WA8RMC

INTRODUCING AMATEUR TELEVISION!…part two.

In the April issue I presented the first half of an article I did for the ARRL Operating manual last year. In this issue I describe how to build your ATV station. Although this article is intended for beginners, the content is of general interest to all. Maybe it will give some of the "old timers" some additional insight that they may have not thought of. Pass this info on to any prospective ATVer. Enjoy!…WA8RMC

II. BUILDING THE STATION

Well, if you've progressed to this point, let's start putting something together. If you have convinced the rest of the family to relinquish the main TV set, let's hope you have been able to see an ATV picture. In any case, now you need equipment for the ham shack . . . The receiver is a good start.

RECEIVING EQUIPMENT

There are many receiver possibilities and combinations available mainly dependent upon which band you want to receive. Let's start with 70 CM (420-450 MHz) because it's the easiest to receive and, universally, most popular.

70 CM - This band is home to much more than ATV operation but as a rule, the segment from 420 to 440 is used for ATV while 440-450 is dominant with narrowband FM simplex and repeater activity. Of this 420-440 segment, 439.25 MHz (cable channel 60) is the most popular ATV frequency for simplex and repeater inputs while 434.25 MHz (cable channel 59) is used for simplex and repeater inputs to a lesser extent. Most repeater outputs are 421.25 (cable channel 57), 426.25 (receivable on cable channel 58) and 427.25 (cable channel 58). Other frequencies are in use, but they're generally avoided to preserve most bandplans. Oh, by the way, ATV signals in the 70 CM band are usually horizontally polarized. This came about from two main factors: existing commercial TV antenna systems are horizontal and many early ATVers were weak signal DXers first. They exclusively used horizontal antennas. In addition, horizontally polarized 439.25 MHz signals are better neighbors to the vertically polarized FM voice repeaters in the 440-450 MHz segment because of cross polarization isolation. If you also plan 70 CM narrowband FM activity, consider a cross-polarized antenna, 2 separate antennas or a polarization rotor so vertical and horizontal signals can be accommodated.

One type of 70 CM ATV receiver is the TV itself, if it is of the "cable ready" variety. Almost all TVs manufactured in the last 10 years are cable ready so if you own one, you've got a good start! ATV activity on cable channels 57, 58, 59 and 60 is no coincidence and is the result of the cable ready sets. Most tuners in these sets are quite good and will suffice to start but usually not as good as a separate receiver made specifically for ATV reception. Also, a separate receiver may be more convenient because it won't tie up the family TV.

A preamp for any receiver is a good idea, but if you decide to purchase a separate receiver, it may already contain an acceptable preamp. Most preamps today are constructed with a GASFET transistor (rather than bipolar) which is a good idea for intermodulation rejection characteristics and almost a must for wideband operation. Simple GASFET preamps are not expensive and on this band, it's easy to achieve low noise operation. Expensive microwave devices won't buy anything extra. A good preamp can be had for $25 (kit - assembled by you in your box) or $100 (assembled by manufacturer in a box with connectors). When buying a preamp, make sure it has a tuned input (filter on the incoming line) for if not, interference and overloading will occur in metropolitan areas because of narrowband FM activity nearby. Consider the purchase of an "interdigital" type of filter if interference is experienced. This filter has the wide bandpass characteristics needed for ATV while maintaining steep bandpass skirts for maximum rejection of unwanted out of band signals. The cost is about $100 for a 4 pole unit.

Now, if you're thinking ahead, you may wonder, "If I buy a good preamp, I can mount it up at the antenna and use cheap coax to go to the receiver." Well, "**That depends**." It *might* be a good idea, but let's continue with the receiver discussion first. More on that later.

If you purchase a separate receiver or use your existing TV, think about an additional factor. Sooner or later you are going to want to transmit. Therefore, some means is necessary to disconnect the receiver while transmitting and vice versa, usually accomplished with a coaxial relay. If a self-contained receiver/transmitter package is purchased, this feature is usually built in so that issue is simplified and may be more desirable even though the cost is higher. See a typical receiver/transmitter combined package ideal for the beginner in figure 2 below. If you like to build things and are handy with tools, don't forget about the antenna relay because if the transmitter and receiver are purchased separately, this little item is often forgotten. That's about it for the 70 CM receiving tips.

Figure 2.
Illustrated above is a complete 20 watt 70 CM receiver transmitter combination ideal for the beginner if an all-in-one package is desired. Its 20 watt power output may eliminate the need for a final amp later. Photo courtesy of PC Electronics Inc.

33 CM - This band (902-928 MHz) offers no easy opportunity to utilize unmodified commercial equipment so building expertise is generally required. There is surplus 850 MHz cellular equipment available that could be modified for use on 902-928 but all of this equipment is for narrow band FM so it might not work satisfactorily. Radio Shack™ stores used to market what is called "Rabbit" radio units that operate low power on 910 MHz. Some people have used these units with limited success but only for short ranges. However, it's a very low cost way to experiment. There are a few mail order ATV dealers offering FM receiver/transmitter units also. Check it out.

23CM -This band (1240-1300 MHz) offers the **best** opportunity (the author has his favorites) for those who want to get away from the sometimes crowded 70 CM band. ATV operation here is primarily FM but there are some "old timers" still using AM. Check for activity in your area. If AM is chosen, a suitable downconverter that takes 1250 MHz and converts it to a suitable VHF TV channel is the best choice. Several are available. The overall activity on this band largely depends upon your location but in general, narrowband SSB and CW are found around 1290-1300 MHz with simplex and repeater FM ATV inputs around 1270-1280 MHz. FM ATV repeater outputs are generally located below this at around 1250-1270 MHz. Localities with UHF TV station channels 39 to 44 sometimes have second harmonic energy strong enough to cause interference in this band, so ATV activity is usually away from these signals.

The ideal receiver for FM ATV reception is a surplus "LNB" type satellite block downconverter receiver. These units sometimes have acceptable sensitivity, tune the entire band and output video directly for connection to a TV monitor or modulated channel 3 or 4 for connection to a standard TV set. The best part is the cost. They are rarely priced above $30 and if you're lucky, hamfest $5 bargains could happen! Here are some things to look for when searching for these units at your favorite hamfest or garage sale.

- **The bad news**. Some don't work which may be why they're there in the first place. Now, here's the good news. Most do, and the ones that are "bad" usually have defective satellite rotor/polarizer circuitry not needed anyway. If you can, power it before purchase. If it lights, it's probably ok for ATV use.

- Make sure the unit that you choose has a switch on either the front or rear panel for inverted video operation. In its intended use, the LNB amplifier on the satellite dish converts the 3.8-4.2 GHz incoming signal to a 950-1450 MHz output frequency inverting the signal. It is then fed into the LNB receiver. When it is used for 1250 MHz ATV, the signal from the antenna goes directly to the receiver and no signal inversion takes place so the receiver must be in the "inverted video" mode if used for ATV. Some receivers don't have this switch and if not, it's useless for ATV use unless an inverting amplifier is added to the video output.

- There are two types of LNB receivers: those that tune 950-1450 MHz (which is what you **do** want) and those that tune 450-950 MHz (which you **don't** want - unless you use it for the 33 CM band). It's nearly impossible to tell which is which if it isn't marked on the rear of the unit at the input connector. Fortunately, there were very few 450-950 MHz units in service, so it's very unlikely that you will get one by mistake. (the author found one of these disguised as an "ideal" unit)

- Select a unit with manual switch or pushbutton tuning if possible. Nothing fancy is needed so don't get one with a lot of bells and whistles such as auto scanning etc, as they will only be bothersome.

- Look at the unit closely. There are many "look-alikes" with only a 70 MHz input intended to operate with "LNA" satellite dish voltage tunable converters. These won't work. (Again, the author once made a mistake.)

- Most LNB receivers are equipped to provide 12-18 VDC to power the LNB converter on the dish. They usually provide this DC voltage on the center conductor of the incoming coax, so check for this voltage at the input connector and if found, it must either be removed, disabled or a DC isolator inserted to prevent a short when the antenna or preamp is connected.

- These receivers are intended for use with an LNB satellite dish low noise amplifier/converter, which outputs high signal amplitude. Therefore, the input sensitivity will probably be low. Search for an IF gain pot and turn it up if it has one. If not, an input preamp may be needed.

Preamps - Most of the previous discussion about 70 CM preamps applies here also. However, it is found that many have untuned front ends necessitating an input filter of some type for acceptable operation. Some people have reported that when an untuned preamp was first tried, the results were poorer than with no preamp at all. This usually results from front end signal overload caused by out of band signals. A simple cavity filter will usually fix the problem. Again, the preamps are not expensive and run about the same price as the 70 CM ones.

2400 MHz - This band has grown very rapidly in popularity ever since Radio Shack™ introduced the Wavecom/ Wavecom Jr.® short range video extender units. Other manufacturers have similar ones. They are purchased as a receiver/transmitter pair and operate on 1 of 4 pushbutton selected frequencies of 2411, 2434, 2453 and 2473 MHz. Since two of the channels are in the Ham band, they're ideal for 2.4 GHz experiments and short range ATV communication. These units are also modifiable in a number of ways to increase power in the transmitters and provide more available frequencies so quite a few ATV dealers stock these units as well as modification kits. If you like to experiment, here is a wonderful opportunity to have some fun at minimum cost. The only bad part is the limited range. It is difficult to increase the transmitter power beyond about 50 milliwatts or so because of available devices and high cost so this usually becomes a "buddy project" with normal ranges being a mile or so and then only if a good line of sight path is available.

However, because of the receiver/transmitter compactness, Wavecoms have become the favorite for remote control projects such as radio controlled airplanes, radio controlled cars and balloons. Here the low power is an advantage because a very good signal can be achieved with a very small and light package. The line of sight restriction is not normally a problem because it's a good idea to be able to see these devices while operating or *real bad things* could happen.

Above 2400 MHz - Very little ATV activity is found on the bands above 2400 MHz and is generally reserved for the more experienced and dedicated ATVer. Most activity is centered around 10 GHz because of the availability of "Gunplexer" radar units. You may have seen some of these at hamfests sold as "brake light testers" because they can generate signals that activate automotive radar detectors. In any case, these bands are generally reserved for experienced Hams willing to experiment.

TRANSMITTING EQUIPMENT

Well, now that the receiver issue is settled, let's investigate transmitter possibilities. Obviously, if you decide to buy a packaged ATV system including receiver and transmitter, this information is not too important. But wait! At least let's discuss some possibilities that could change your mind. As before, let's start with 70 CM.

70 CM. - A number of ATV manufacturers make transmitters both in kit and preassembled form. Your choice depends upon your level of expertise. For this band, about the *minimum* useable power level is approximately 100 milliwatts. This coupled to a reasonably large antenna with 50 feet or less of low loss feedline will yield a communication range of about 5 miles over flat terrain. However, many entry-level transmitters output about 2 to 5 watts average. This is a good starting point for a reasonable picture can be transmitted about 20 miles. In addition, if it is decided to add more power later, most high power amplifiers (50 to 100 watts) require about 2-5 watts of drive so it's a final amplifier today and an exciter for the high power final amplifier tomorrow. If you settle on a 10-15 watt unit now and later want to add a power amp, you'll probably have to attenuate the signal to lower it enough to be compatible with the maximum allowable power level into the amplifier.

Solid state final amplifiers that output up to 100 watts usually require about 2-5 watts of drive and operate from a 12 volt DC power supply. For power output levels beyond that, tubes are normally used. If this range interests you, bear in mind that you'll probably have to build it yourself or buy a home brew unit from someone else as there are no ready built commercial units for sale. Amplifiers with one or two 4CX250 tubes are common and can output up to 500 watts (for 2 tubes) but remember, beyond about 75 watts, the cost goes up exponentially with improved signal strength. Keep in mind that doubling the power level will only yield 1/2 P-unit better picture at the other end. Most people start with 5-10 watt transmitters and then get solid state power amps later to boost the signal to 50-60 watts but seldom go beyond that.

33 CM - There's not too much to say about this band for the beginner as far as transmitting equipment is concerned. A few manufacturers provide FM transmitters with outputs in the 1-5 watt range and additional amplifiers with outputs in the 15 watt range but not much beyond that. It's possible to convert surplus cellular transmitting equipment for use on this band but most are designed for narrowband service and converting them to accept a 5 MHz or so video signal may be quite a chore (if at all). As mentioned earlier, "Rabbit" transmitters are available but the output power of a couple milliwatts puts them in the "toy" category.

23 CM - Now here's a neat band with lots of opportunity for adventure. Unfortunately, again there are few, if any complete packaged solutions; only individual modules are available. A few manufacturers have put together units for security purposes that can output up to 100 milliwatts. They are great for Ham use because they're either within the amateur band as is or they can be switched there. This is an

excellent starting point because with the availability of higher gain antennas, a transmission distance up to 20 miles is possible. Inexpensive FM power amps that require 100 milliwatts or so of drive and output 10-15 watts are relatively easy to obtain.

Higher power on this band is not very common and again you must use tubes, with the 2C39 variety the most common. If you go this route, most likely you're going to have to "roll your own".

2400 MHz - At the present, this band presents a real transmitter challenge if power levels in the 1 watt range and higher are desired. For the beginner, stick with the Wavecom or equal units and be happy! The unmodified Wavecoms output about 0.5 milliwatt but a simple internal attenuator modification will bring the output up to approximately 3 milliwatts. Add an internal MMIC amplifier to easily boost it to about 50-60 milliwatts. At that level, it serves as a very good transmitter for short-range communications of up to 1 mile. The required modifications are easily found in a number of ATV publications as well as on the Internet and are not difficult, even for the beginner.

Above 2400 MHz - Although a number of articles are written about transmitters in this range, little exists for ATV applications except for 10 GHz. These bands are normally reserved for the serious, experienced individuals and definitely not beginner material. They always are "buddy projects" because of the short ranges involved.

ANTENNAS.

What a potentially huge subject! This is an area where a lot of us like to experiment and rightfully so, because there are more articles on this subject than any other in the Amateur Radio (including television) field. However, it is also the least understood. You can find antenna "designs" of almost every imaginable size and shape with emphasis on many variables for a variety of reasons. Size is probably the most important factor. For example, many of us live in apartments or in antenna-restricted locations so a small one is anticipated. Then again some lucky people live in rural areas and the spouse doesn't mind looking outside directly into a 100-foot plus tower with multiple antennas on it, so a much larger array may be your first choice. Whatever the size, try to stay with one designed for 50 ohm transmission lines, as they are most popular and will make the transmission line choice much easier. With that said, lets summarize with the things to look for when selecting an antenna specifically for ATV.

Concentrate on 70 CM antennas first because that's where most start. Most ATV signals in this band are horizontally polarized so if narrowband FM use is also anticipated (vertical polarization) provisions must be considered. Antennas with gains below 10 dBd (10 dB gain compared to a dipole) should not be considered unless "repeater only" operation in a metropolitan area is anticipated. These (Yagi) antennas are compact with boom lengths of about 6 feet or less. Antennas with gains of 10 to 15 dBd are considered intermediate and are most common (8-14 foot booms). Gains greater than 15 dBd are found only on very large antennas with boom lengths in the 15-20 foot category. One last point. Beware of those manufactures that claim gains that are hard to believe. This is an area that many "stretch the truth". For instance, it is common to state the gain without stating the reference or state it compared to an isotropic (i) radiator which is about 2 dB less than a dipole (d). Therefore 10 dBi is about the same as 8 dBd but it looks much better if dBi values are listed on the data sheet. Sometimes it is just stated as 10 dB so you can guess whether they mean "i" or "d". (It's supposed to be "d" if not identified, but beware!). See figure 3 for a typical Yagi ATV antenna.

Figure 3
This is a shot of W8SJV's antenna arrays. Sandwiched between his 20 meter beam (below) and his 2 meter Yagi (above) is an M^2 model 440-21ATV 21 element 15 dBd Yagi on a 14 foot boom for his ATV work. John has reported excellent results with this antenna.

Without a doubt, the Yagi or its derivatives is the antenna of choice for most ATV applications on 70 CM, even if size and space is no factor. It's easy to build if you like that sort of thing but is also the most available commercially. Just try to keep these things in mind:

a.) Yagis are high Q antennas. That is, they're sensitive to construction variables, surrounding objects and weather conditions for consistent optimum performance. In general, Yagis don't do well in the rain. The SWR goes up and performance goes down.
b.) Because of the Yagi's inherent narrow bandwidth properties, it probably won't be acceptable for optimum ATV use on both 421 MHz and 439 MHz. If a compromise must be made here, optimize it for 439 MHz (your transmit and simplex receive frequency) and take whatever you get at 421 MHz (Repeater transmit frequency).
c.) The bandwidth limitation at a given frequency *may* degrade ATV performance but usually is not a consideration. Be more concerned about the achievable communication distance than signal quality. If the signal at the receive end is 50% snow (about P3) it won't matter if the resolution is good or poor. In fact, a narrower bandwidth antenna generally has a higher gain for a given size.
d.) The physical size is relatively small for a given gain. However, if a really large Yagi is anticipated to get as much gain as possible, difficulty may be found keeping it on the tower because of wind and ice loading problems. We **all** learn this fact the hard way and you probably will be no exception, so remember, you've been told.
e.) Polarization arrangements are easily accommodated. If you decide to mount a polarization rotor in the boom, this will work OK unless you decide on a "monster" antenna. Or, if you decide on two antennas, it's easy to mount two on the same mast. (Be careful of spacing requirements).

The next most popular 70 CM ATV antenna is the collinear or broadside array. This antenna is not usually found commercially so home construction is in order. The ARRL Antenna Handbook, as well as other publications, contains good designs. There are rewards for "rolling your own" so this avenue should not be ignored. Here are some of the pros and cons:

a.) Broadside arrays are low Q antennas. As a result, construction errors, nearby objects and tolerances generally are not detrimental. In fact, it's a good idea to stagger the element lengths slightly in construction to help broaden the bandwidth with no gain sacrifice. Neat huh?
b.) Rain has little impact on its performance. I like this but come to think about it, most of my friends use Yagis and they're not around when it's raining so most times it doesn't matter.
c.) It is more difficult to erect because of vertical construction. It looks similar to bedsprings standing on end fastened to the mast. It takes a lot of vertical mast area, which many don't have but is very tolerant of nearby antennas.
d.) This antenna is very broadband and usually works well for the entire 70 CM band. In fact, it is an acceptable antenna for UHF commercial television up to about channel 20 so it can be used to check for band openings by watching the lower UHF TV station signal strength.
e.) It's my own opinion but, if all antennas with equally "claimed gain" are compared, this one will perform better because of increased capture area. That's all that should be said here on that but feel free to read more about antenna capture area in other well-known publications.

A number of other antennas stand out for particular individual situations or for the desire to just try something new but are normally not used for ATV purposes. For instance, omni-directional antennas such as slot types are commonly employed for ATV repeaters where the coverage is large but shouldn't be used by an individual because of low gain. Remember that you don't get something for nothing. For a given desirable feature, something else must be sacrificed. The loop Yagi and helical antennas are also used but primarily on the higher bands.

The 900 and 1200 MHz bands have more antenna choices because the ones that are too large on 70 CM, work just fine here. The Yagi still is the first choice but it usually shows up in a slightly different configuration. It has become attractive to fold each straight element around in a circle to form loops (which actually occupy a little less area for a given antenna) creating what we commonly call the Loop Yagi. It normally has a 1 to 2 dB gain advantage for the same number of elements so, here it seems we actually *do* get something for nothing. I've used them on both the 900 and 1200 bands with good success.

The helix antenna is worth noting at this point because of its circular polarization properties. Because it's circularly polarized, a 3dB cross polarization loss will occur when transmitting to or receiving from a vertical or horizontally polarized antenna. However, if a vertically polarized antenna was receiving a horizontally polarized signal (or vise versa), a cross polarization loss of approximately 25 dB will result. So, if a single antenna must be selected for both polarizations and it can't be rotated for polarity, the 3 dB loss for each could be the better choice.

The collinear or broadside array can also be used on this band and in many cases is easier to construct because of the small size. The supports for the elements can be fashioned from 1/4" dowel rods so if you like to construct model airplanes and cars, this is right down your alley. The bad news is that there are very few articles on this; the good news is they can be scaled down from existing lower frequency designs.

2400 MHz antennas are similar to 900 and 1200 MHz ones except they are smaller. Loop Yagis dominate this band and are now small enough to be placed inconspicuously almost anywhere. Parabolic dishes are also sometimes used here but the size on this band tends to be rather large. However, as the frequency goes up, the antenna gain must also go up to maintain the same signal level. With all other

factors equal, if the frequency is tripled, the antenna gain at *each* end must be increased by about 5 dB to maintain the same signal strength.

FEEDLINES

We've discussed transmitters, receivers and antennas so far. The "line" that connects these components is, naturally, the feedline or coaxial cable. All too often this item is not considered or if it is, not nearly enough emphasis is put on its importance. Since the coax passes energy from the antenna to receiver as well as from the transmitter, any losses here will be noticed on both transmitting and receiving. Therefore, buy the best coax you can afford, as it will improve both. Coax losses are determined by many factors but it's important to understand a few of the major contributors. This is not a theory session on coax design but rather a brief overview of the high points. The ARRL Antenna Handbook treats the theory and detailed applications very well but here's what you should know about selecting for the UHF bands.

Belden Wire and others make a type of coax (type 9913) that looks similar to RG8X on the outside which is approximately 0.4" in diameter but much stiffer than RG8X. Times Microwave makes similar coax identified as LMR400 Ultraflex™ cable which is slightly better than 9913. The real difference is on the inside where the dielectric takes on a spiral form to reduce losses. It's pretty good stuff and is the minimum recommended. As the frequency goes up the losses get worse so in general, reserve its use for the 70 CM band and then only for runs of 50 feet or less. Of coarse, if you have RG8X and can't find anything better, it will work but expect significant losses. Refer to figure 4 below for a comparison.

An improvement, but not by much, is surplus 75 ohm solid aluminum outer jacket coax. It is available in both 1/2" and 3/4" sizes, the latter being better, but it has drawbacks. First, the fittings are a little hard to find. Second, the impedance probably doesn't match a selected antenna so it will introduce a mismatch if not compensated. Fortunately, most 50 ohm antennas can be reasonably matched to 75 ohm line. Otherwise, there are matching sections of coax available to fix this but after you have spent the money and time, a better coax could have been purchased in the first place. If both coax and fittings are *free*, (ATVers love that word) because it was discarded by the local cable company, go ahead and use them. Even without the matching sections, it will probably be as good as 9913 or LMR cable. Otherwise, buy something better.

Next we move up to the Heliax® category. This cable, made by Andrews Corp, has a ribbed solid copper outer conductor and vinyl jacket and is readily available on the surplus market in both 1/2" and 7/8" sizes. It's used commercially for industrial communications including police, fire and cellular applications. Since new cell sites are springing up at a rapid rate, old installations as well as new cable end runs are available at bargain prices. New 1/2" Heliax can cost over $3.00/foot new from the supplier but it's generally available at Hamfests for $1.00/foot or less, most often with connectors attached. The connectors are not simple to work with but manageable so be careful and patient. They generally cost about $6.00 each when purchased separately as "cut off's". If you can afford the 7/8" size, the losses become greatly less, especially on 1.2GHz & up, so the investment's well worth it. Study the chart in fig 4 for a good comparison.

Oh yes, here's a short message about connectors. Try, if at all possible, to use type "N" connectors and not the PL259 type. PL259 connectors are OK for the "DC bands" as many call them but they have objectionable losses at 70 CM and above. Also, the "N" connectors have gasketing to make them waterproof. Do yourself a favor and get the best from the start. They don't cost that much more.

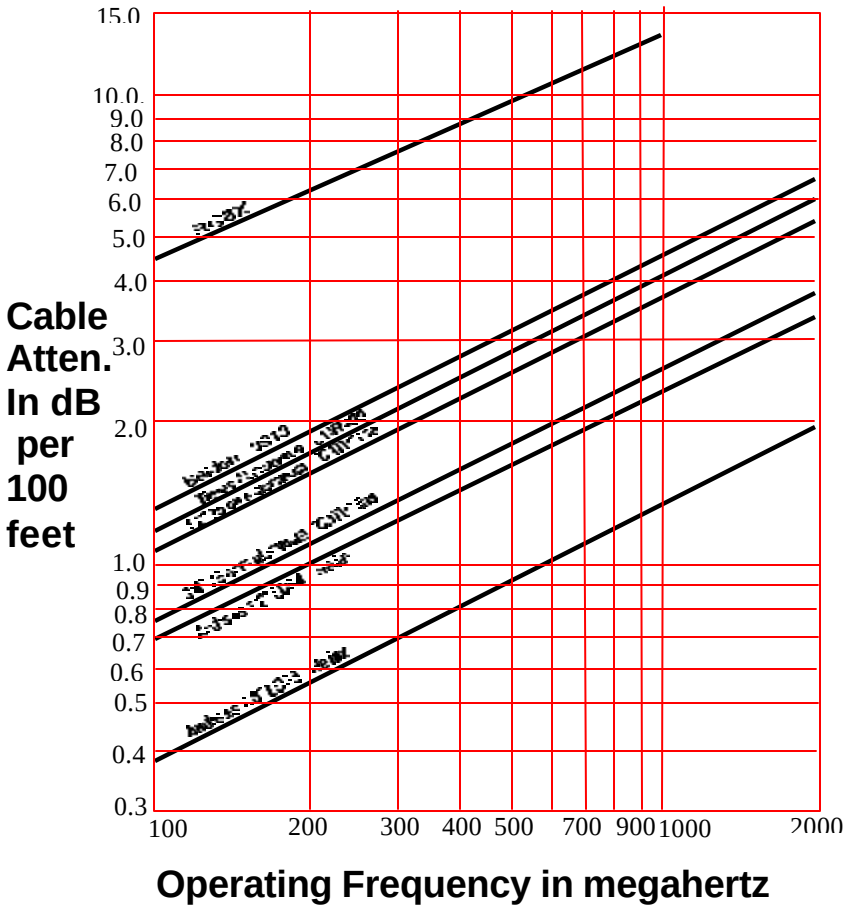

Figure 4

AO-40 TRANSPONDER TESTS A HIT! 10-GHz TEST IS SET

The inaugural AO-40 transponder tests in May have been a huge success. Reports from amateurs making their first contacts on AO-40 have come from all over.

"It was just great!" enthused AMSAT-NA President Robin Haighton, VE3FRH, who worked a dozen or so stations via AO-40 last weekend. AMSAT has announced plans to test the 10-GHz X-band downlink over the weekend. The solid state X-band amplifier will be turned on and adjusted on May 13 at 0500 UTC, at MA 165. If that works, the 60-W traveling-wave tube amplifier will be fired up. "Beacons will be used and probably the L1 uplink," said the AO-40 team's Peter Guelzow, DB2OS. Guelzow said plans also call for connecting the C-band receiver to the X-band downlink.

AO-40 ground controllers opened up the next-generation satellite's transponders May 5 for general amateur use on an experimental basis. Stations can uplink on either 435 MHz or 1.2 GHz. The transponder downlink is at 2.4 GHz. The operation is experimental; the schedule subject to change, and the transponders could be shut down at any time without warning.

Mike Seguin, N1JEZ, in Vermont, says he successfully logged a dozen contacts in the first hour of operation, including two contacts using the Mode-L uplink. "I also logged my first DX contact with IZ8EDE." Seguin said his final first-day tally was 24 contacts.

Ed Krome, K9EK, in Indiana, echoed N1JEZ's comments. "Wow, AO-40 was terrific on this first morning of transponder operation, he said. "After almost 10 years, what a thrill! Bruce Paige, KK5DO, in Texas also got lucky, racking up several DX contacts in Europe and later in Japan.

At this point, AO-40 may be available for use several hours a day, starting at orbital positions MA 136 and continuing through MA 240. During recent passes, the transponders have been available for six hours or so from a given point on Earth.

The tests have shown that uplink frequencies (without taking Doppler into account) are 435.495-435.780 MHz and 1269.211-1269.496 MHz, and the downlink passband is 2401.210-2401.495 MHz. The transponders are inverting, so a downward change in uplink frequency will result in an upward frequency shift in the downlink.

Users are being asked to avoid the "middle" telemetry beacon at 2401.323 MHz. For maximum QSO signal strength, stations should aim for a passband signal that's 10 dB below the beacon's. AO-40 has been operating without the benefit of the LEILA system, which can compensate for stations that are too strong in the uplink.

Haighton expressed appreciation for the "very hard work" of Project Leader Karl Meinzer, DJ4ZC, AMSAT-DL President Guelzow and the worldwide support group of command stations and technical advisors "for providing us with a great satellite."

Check the AMSAT-DL Web site for the latest information, http://www.amsat-dl.org/journal/adlj-p3d.htm .
…The ARRL Letter Vol. 20, No. 19 May 11, 2001

ARRL AGAIN PETITIONS FCC FOR PRIMARY ALLOCATION AT 2300-2305 MHz

The ARRL has again asked the FCC to create a primary domestic Amateur Radio allocation at 2300-2305 MHz. Amateurs now are secondary there. The ARRL first asked the FCC in 1996 to upgrade the allocation there to primary, but the Commission never acted on the request.

"The segment 2300-2305 MHz is of extreme importance to the Amateur Service, especially for weak-signal communications and propagation research, including beacon operation, due to the low noise levels in that band," the ARRL said. The renewed petition was prompted by increasing demands on that portion of the spectrum due to development of new telecommunications technologies.

The Amateur Service has primary allocations in this part of the spectrum at 2390-2400 MHz and 2402-2417 MHz. The ARRL last year sought to have the segment 2400-2402 MHz elevated from secondary to primary, but the FCC has not acted on the request to date. The AO-40 satellite has been successfully using that band for downlink telemetry and transponder operation.

In light of the FCC's stated policy to protect incumbent amateur operation at 2300-2305 MHz, upgrading the amateur allocation there "would constitute the highest and best use of the band at present," the ARRL asserted in its latest filing. "It would also be consistent with the protection requirements for government and NASA operations immediately below 2300 MHz and the [M]WCS operation above 2305 MHz." Amateur Radio weak-signal work is centered near 2304 MHz.

The ARRL also requested the FCC not to introduce any other users to the band. The FCC has not yet put the ARRL's petition on public notice.
… The ARRL Letter Vol. 20, No. 19 May 11, 2001

920 MHz INTERFERENCE…to other services. Something to think about!

Talking about 434 MHz interference to other users, I have been testing FM video and audio on 920 MHz at 10 watts here in Baltimore recently getting ready to construct a repeater at another location. Sometimes I have a test pattern with my call letters displayed and also Morse ID every 5 minutes on the audio. I can key it up remotely from various locations using a DTMF decoder and it will be on sometimes for over an hour each time while I drive to another spot using a 3 foot loop yagi to check it's P-level. Anyway, two of my neighbors, including my wife, have discovered that they cannot use the 900 MHz cordless phone while the transmitter is on even though my own phone is using spread spectrum. I had the transmitter and amplifier unit checked on a spectrum analyzer and it looks fine. I limit my time on now just to keep peace but see that there will be problems in the future with all of the wireless junk coming out especially on 2.4 GHz where a lot of hams are experimenting.
…K3ROJAL@aol.com, May 10, 2001

You are quite right. Most people who buy Part 15 devices are not aware that they must accept interference and not give any. Direct them to the FCC ID sticker on the phone or RF device they have. If it is a legal device, it is required to have the FCC ID sticker and note that says " This device complies with part 15 of the FCC Rules. Operations are subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received including interference that may cause undesirable operation". However, if the guy is bigger than you, or your own wife, you might consider not transmitting when they use the phone.
…Tom W6ORG

Tom,
I think you'll find the interference to your spread spectrum cordless home 'phone is caused primarily by simple power overload from your 920 MHz transmitter. It will more-or-less "flatten" the front end of that cordless 'phone, and no amount of spread spectrum will help it. Plus, as you point out, users of such telephones (and other gadgets) have to accept any interference problems they encounter. On the other hand, if you continue interfering with your wife's 'phone calls, how will you accept having to cook your own meals and sleeping on that lumpy couch every night?
…Karl K - W8TIF McKinney, Texas

MORE INTERFERENCE…The FCC gets involved here!

It seems that a company by the name of Code Alarm makes remote car security and auto starter Part 15 devices that is operating on 433.97 MHz and was having its range decreased from 200 ft to 20 ft every time the Space Shuttle transmitter on 434 MHz, operated by Chris, N8UDK, was on the air in Clawson, Michigan. Code Alarm made a formal complaint to the FCC. Pat Patterson of the FCC contacted N8UDK because Chris had a copy of his license on the rack as required and asked Chris to shut down his transmitter in response. Chris cooperated and told the FCC where the switch was at the site and they confirmed that his transmitter was the cause of Code Alarms problem.

I emailed Chris the applicable Part 15 Rules. Chris asked Pat Patterson if Code Alarm was Part 15 compliant and if so, stated that hams have priority in the 420-450 MHz band over Part 15 and that one of the conditions of getting a FCC ID for the device is to accept all interference from other services as well as not interfering. Pat Patterson said he would check out the rules, do some further tests and get back to him.

A day later Pat Patterson confirmed to N8UDK that he was well within the FCC Rules and OK'd turning the Space Shuttle retransmission on 434.0 MHz back on. Further, Pat Patterson asked if Chris could talk to the engineer at Code Alarm, which he did. The engineer apparently was not aware of the ham band and that hams could run over 1 kW if they wanted to, much more than the 32 watts that Chris was running. Code Alarm had just recently changed to 433.97 from 315 MHz.

This was the second incident for Chris with new Part 15 device companies where he worked things out cooperatively on an engineering and FCC Rule basis with the company this year. Johnson Controls drove up with some new Chryslers and met with Chris to make some tests with their tire pressure sensors. They found no mutual interference and were appreciative for the time and cooperation.

Congratulations and a big pat on the back to Chris Oesterling, N8UDK, on a very professional and successful handling of what is an increasing problem in our ham bands. If you see Chris in booth 207 at Dayton, give him an Attaboy.
…Tom O'Hara, W6ORG ARRL Technical Advisor for ATV and Spectrum Management

DAYTON HAMVENTION HOSTS BUOYANT CROWD

Rain on the opening day of the 50th Dayton Hamvention did not deter the crowd from having a good time. Show-priced bargains offered by some dealers enhanced the enjoyment, and the weather improved immensely on Saturday and Sunday.

General Chairman Jim Graver, KB8PSO, said Hamvention officials believe that between 27,000 and 28,000 turned out for this year's show--nearly the same number as last year. Graver said he was happy to see a good crowd despite higher gasoline prices and Friday's rain.

Unlike past Hamventions, major manufacturers had comparatively little new to offer this year. Among the most noticeable items were: The new Kenwood TH-F6A compact triband hand-held FM VHF transceiver with wideband receive including HF; Ten-Tec's long-awaited 6 and 2-meter all-mode transceiver, the Model 526 "6N2"--the Tennessee company's first factory-built VHF radio; Yaesu's MD-200 desk mike "for elite-class Amateur Radio operators;" and Alpha Power's Alpha 6/2 maximum legal power VHF amplifier--the first amp produced under the company's new management and ownership.

ARRL Advertising Manager John Bee, N1GNV, said he got "almost universally positive comments" from Dayton Hamvention 2001 exhibitors. '"They came to buy,' was a common refrain," he said. Bee called the number of new vendors at this year's show "an encouraging sign" for Amateur Radio.

During the ARRL Forum Saturday, Executive Vice President David Sumner, K1ZZ, said, "It's been great year for Amateur Radio and the ARRL. Things are moving in the right direction on a number of fronts." ARRL President Jim Haynie, W5JBP, echoed Sumner's sentiments. Pointing to his career in sales, Haynie said Amateur Radio is "the best product that I have in my repertoire of things to sell." Haynie called upon those on hand to think about "the product" that is Amateur Radio and how they can share the fun with others.

"I'm asking you to talk to your neighbor, I'm asking you to talk to your brother, your sister, your city council, your mayor, your congressman, and tell 'em about your product, which is Amateur Radio," Haynie exhorted.

Haynie presented a plaque to Graver in recognition of the 50th Hamvention. Speaking on behalf of the Dayton Amateur Radio Association and the Hamvention Committee, Graver thanked the League for its efforts on behalf of Amateur Radio.

Saturday morning's AMSAT forum included a telephone visit with "space tourist" Dennis Tito, KG6FZX. Tito told the gathering that Amateur Radio provided a great boost to his recent visit to the International Space Station. "The opportunity to do a phone patch five days in a row was a very important part of my flight, and I looked forward to it every day," he said. A planned ham radio contact with the ISS crew from the Hamvention did not work out, however. In addition to handling the Tito interview, Roy Neal, K6DUE, of the Amateur Radio on the International Space Station program, also chatted with astronaut Janice Voss, KC5BTK.

The FCC's Riley Hollingsworth, K4ZDH, not only was one of the Saturday banquet speakers but the highlight of the Sunday morning FCC forum. Playing to a packed house, Hollingsworth and FCC colleague Bill Cross, W3TN, of the Wireless Telecommunications Bureau, reviewed regulatory and enforcement issues confronting ham radio (see below, "FCC to Amateurs: Detailed Regulation "Not in the Picture.")

Hollingsworth told the crowd that amateur enforcement complaints are way down. With tongue only somewhat in cheek, Hollingsworth said "California" topped his list of enforcement issues that keep him awake at night. "If it weren't for California, amateur enforcement would be a one-day-a-week job," he said, "and we wouldn't need most of the rules."

Hollingsworth also cited "stupidity" and unlicensed 10-meter operation as other factors that continue to provide grist for enforcement. He played taped excerpts of contentious on-air amateur discussions to demonstrate his point. "There was nothing illegal--nothing against our rules" on the tapes, he said. But, he continued, their content presents a poor image of the Amateur Service to anyone listening in--and that could include the media, decision makers and the general public.

Graver said there are no current plans for Hamvention to move from the venerable Hara Arena. Dayton Hamvention's contract to use Hara runs through 2003.

Dayton attendance down slightly: Dayton Hamvention General Chairman Jim Graver, KB8PSO, reports the official attendance at the 2001 Dayton Hamvention--the 50th event--was 26,151, down roughly 9% from last year's 28,804. Hamvention attendance peaked at 33,669 in 1993, before the change in date from April to May in 1996. Graver blamed rainy weather on the opening day of the event and high gasoline prices for the attendance drop. Graver also will chair next year's Dayton Hamvention.
…The ARRL Letter Vol. 20, No. 26 June 29, 2001

FCC PART15 RULES/REGULATIONS & 802.11B EMISSIONS IN ISM 2.4GHZ BAND

This stuff is sometimes hard to follow but I think Tim does the best that can be expected on the subject! Although not specifically ATV related, it's good to know and a good dose of "Rules and Regulations" now and then doesn't hurt. Try to stay with me on this!!! Read carefully as there will be a quiz at the Fall Event. Ed.

By Tim Pozar - pozar@lns.com for the Bay Area Wireless User Group

BACKGROUND

Introduction

With the unlicensed use of 802.11b radio Ethernet devices in the Industrial, Scientific and Medical band that has been set aside for such use, there is confusion of what is allowed or limited by the Federal Communication Commissions Rules and Regulations. This paper is meant to help guide folks through the cryptic nature of these rules.

What's the FCC involvement in this mess? The FCC is a regulation body whose purpose was defined in the 1934 Communications Act as: "*For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communications, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is created a commission to be known as the "Federal Communications Commission", which shall be constituted as hereinafter provided, and which shall execute and enforce the provisions of this chapter*."

The FCC, with the Act of 1934, was empowered to regulate wire and wireless communications. Wired communications regulation was needed to monitor and regulate monopolies. Wireless regulation is needed, as the spectrum is finite. The FCC is the "traffic cop" to ensure that communications is not interfered with.

Part 15 of the Rules and Regulations

Almost every bit of spectrum is regulated by the FCC with the exception of extremely high or low frequency spectrum and bands managed by the Intergovernmental Radio Advisory Committee (IRAC) for the military and other government organizations, by licensing operators of radio equipment. The part of the FCC's rules that cover the operation of equipment that does not need a license is Part 15 and has this role and is defined below:

"Part 15.1 -

This part sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license."

A "radiator" is a device that emits radio frequency energy. An unintentional or incidental radiators are devices that have the secondary effect that they create radio emissions. The primary purpose of the device would have nothing to do with emitting radiation to work. A computer would fall into that category as the primary purpose is to "calculate" but it would not need to emit radio waves to complete its job. We are interested in what is known as a intentional radiator. This category covers devices such as low power FM transmitters or wireless microphones like a "Mr. Microphone" or cord-less phones and 802.11b cards.

The Rules and where to find it...

The Rules and Regulations are the "bible" for the FCC. It is the text that defines all that the FCC regulates. Interpretation of the Rules are up to FCC employees or the courts. They are written in half "legalese" and half technical jargon. It is no wonder that most folks have a hard time wading through, let alone finding them.

Until recently the rules were only available by going down to your local Government Printing Office Bookstore, ordering them from Washington DC, or subscribing to third-party vendors of the rules like Pike and Fisher for a rather high fee. Fortunately, the Web came along and a number of folks have worked hard to get the Rules on the net. Harold Hallikainen's site has a nice interface to the rules.

Just the facts... aka Part 15.247

Part 15.247 covers intentional Radiators in the ISM bands that are the frequencies 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz. Besides covering the modulation schemes this part also covers the various power restrictions that the FCC has for devices like 802.11b. The critical section is 15.247(b)(1) through 15.247(b)(3)(i) quoted below:

- "(b)The maximum peak output power of the intentional radiator shall not exceed the following:
- For frequency hopping systems operating in the 2400-2483.5 MHz or 5725-5850 MHz band and for all direct sequence systems: 1 watt.

- (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

- (3) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi."

Lets dissect this section...
Part 15.247(b)(1) defines the maximum power that an intentional radiator can put out as 1 watt.

Part 15.247(b)(2) doesn't apply as it is covering devices in the 902-928 MHz band and 802.11b devices are in the 2400-2483.5 MHz band.

Part 15.247(b)(3) covers the need for limiting the amount of radiation the "intentional radiator" can emit with "directional gain" antennas. It says that in general (with an exception coming up) that if the gain of the antenna system is more than 6 dBi, the intentional radiator needs to be turned down to keep the emission at the 1 watt maximum plus 6 dBi (36 dBm or 4 watts EIRP). The FCC encourages the use of directional antennas. With that they give you 6 dBi more power for not polluting the rest of your space with radiation that is not needed to do what you need to do.

Part 15.247(b)(3)(i) covers the need for limiting the amount of radiation the "intentional radiator" can emit running "fixed, point-to-point" with "directional gain" antennas. This means that the transmitter is mounted not on a mobil device and is talking to one other transmitter.

Do we need to turn down the transmitter?

Omni-directional or Point to Multi-point paths...
15.247(b)(3) makes the assumption that you are running a point to multi-point network much like an Apple Airport or Cisco/Aironet AP box with a number of computers connecting to the network. They may be randomly surrounding the access point so you are not using a directional antenna.

But what does the FCC mean when they limit the "intentional radiator" to one watt? This is a critical sticking point in understanding what the FCC is talking about. There is some question of what an "intentional radiator" consists of and what and where exactly is 1 watt measured. Unfortunately if you just look at these poorly written rules you will not understand what the FCC means here. One has to look a bit deeper to the "Report and Order" and Notice of Proposed Rulemaking" that generated this section of the rules.

Things get a little clearer when we read this sentence in paragraph 4 of the Report and Order...
"The current regulations limit spread spectrum systems to a maximum peak transmitter output power of one watt. When operating at that power level, the maximum directional gain of the associated antenna may not exceed 6 dBi, resulting in a maximum equivalent isotropically radiated power (EIRP) of four watts, i.e., 6 dBW."

With the old rules they are referring to the "intentional radiator" as a whole with a directional antenna can't exceed 6 dBw or 36 dBm and the antenna gain can't be more than 6 dBI. The transmitter can be up to one watt.

In order to know if we are legal or if we need to turn down the transmitter we need to know the gain of your "intentional radiator". Let's say your access point actually puts out 1 watt of power and you want to put an omni-directional antenna on it that has a gain of 5 dBi such as the ORiNOCO Range Extender Antenna".

We know the gain of the antenna, the transmitter but we also need to know the loss of the transmission line going to the antenna as this attenuates the transmitter output power going into the antenna. Looking up the attenuation of a common coax cable such as RG-8 on an coax attenuation table we find that at 2.4 GHz we have 16 dB of loss with 100 feet of cable. With a 10 foot cable your loss is about 1.6 dB. So your new "intentional radiator" will be radiating transmitter power output plus antenna gain minus coax loss or (30dBm + 5 dBi - 1.6 db) or 33.4 dBm or 2.2 watts EIRP.

Since this is a non-directional antenna you are limited to 1 watt EIRP or 30 dBm. The transmitter will need to be turned down 3.4 dB to 26.6 dBm or about 0.45 watts (450 mW) to get you back to 30 dBm or 1 watt EIRP.

If you think about this you may ask, "why add an omni-directional gain antenna it if I already was at 30 dBm?" You would be correct that it would be a waste of time. But if you had something like an Apple Airport that will only put out 15 dBm or 30 mW then you can add an

omni-directional gain antenna and it will extend your "roaming" area. In fact you can add up to 15 dB of gain with an omni-directional antenna before you need to attenuate the output of the Wavelan card in the Airport.

Use a directional antenna and get more power - or - this is where the Rules get even more hard to follow...
Part 15.247(b)(3) actually gives you a free 6 dBi if you use a directional antenna your "intentional radiator". How do the do this? Only if the gain of the antenna is over 6 dBi will the Feds want you to roll back the EIRP of your "intentional radiator". You don't have to do it right at 1 watt EIRP. When would you do this? Say if you have an access point in the corner of a building and it needs to aim back into the work area. You don't want an omni-directional antenna as about 75% of the power would be going out the windows. Why not use a directional to keep the signal in the building and penetrate through the walls better? If we have antenna gain of about 12 dBi and in this case the antenna is a directional antenna. With the transmitter putting out 30 dBm and the coax has 1.6 dB of loss we have an "intentional radiator" that is putting out (30 dBm + 12 dBi - 1.6 dB) or 40.4 dBm or just over 10 watts EIRP. Since the antenna gain is 12 dBi and we have to reduce the power of this "intentional radiator" 1 dB for every dB we go over 6 dBi of the antenna we would have to roll the power back to 34.4 dBm or 2.2 watts EIRP (40.4 dBm - (12 dBi - 6 dBi)). Well, it is slightly better than 30 dBm or 1 watt EIRP.

Fixed, point-to-point paths and get even more power...
There is another exception to this section of the FCC rules. Part 15.247(b)(3)(i) covers systems that are "fixed, point-to-point". That means this path only has two transmitters involved and they are bolted down by never moving their locations. Automobiles may not apply. An example would be if you have an access point and a user that is a couple blocks or even tens of miles away that you want to connect to.

This exception is more lenient as you only need to turn down the "intentional radiator" 1 dB for every 3 dB of signal over the 6 dBi of the antenna system. The FCC does this as it knows that these paths will not likely not be omni-directional on each end and will have less of a chance to interfere with others as well as the need to span some long distances.

Lets look at an example using the same antenna, transmission line and transmitter as above. Without turning anything down we had an "intentional radiator" that was producing 40 dBm or 10 watts EIRP. Since the antenna gain is 12 dBi and we have to reduce the power of this "intentional radiator" 1 dB for every 3 dB we go over 6 dBi of antenna gain we would have to roll the power back to 38.4 dBm or 7 watts EIRP (40.4 - (12 dBi - 6 dBi) / 3).

Real world examples: Omni-directional Point-to-Multi-point...Directional Point-to-Multi-point...Directional Fixed, Point-to-Point...
Recently I put up a short path between myself and a neighbor about 2 blocks away (.2 miles). I have an Apple Airport that uses the Lucent Wavelan Silver card that puts out 30 mW or about 15 dBm. The antennas have a gain of 24 dBi with a transmission line loss of about 6 dB. This gives me an "intentional radiator" power of 48 dBi. Since the antenna gain is 18 dBi over the 6 dBi that the FCC gives you and since it is a fixed, point-to-point link I would have to limit my power. Since the little Wavelan card only puts out 15 dBm I am legal.

Quicky Definitions

deciBels - dB
dB, or one tenth of a Bel, is a unit of measurement that looks at the ratio of one value to another. Gain or loss can be measured in dB. The dB scale is an exponential scale using the formula log(ratio)*10. This means that 3 dB is about twice the power, 10 dB is 10 times the power, 13 dB is about 20 times the power and 20 dB is 100 times the power.

dBm
dBm is decibels referenced to a value of 1 milliwatt of power. Power over or under 1mW would be plus or minus dBm respectively.
If you have a transmitter that produces 1 watt of power that would be 1000 times more than 1 mW so that converts to 30 dBm.

dBW
dBW is decibels referenced to a value of 1 watt of power. Power over or under 1 Watt would be plus or minus dBW respectively.

Effective Isotropic Radiated Power - EIRP
Effective Isotropic Radiated Power defines the gain of an antenna over an "isotropic antenna" that would radiate equally in all directions. If you have an antenna that radiates better in one direction than another, it would gain in this direction. The amount of gain would be the EIRP normally graduated in dB.
…Tim Pozar - pozar@lns.com http://www.lns.com/papers/FCCPart15_and_the_ISM_2.4G_Band.index

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NEW MEMBERS

Let’s welcome the new members to our group! If any of you know anyone who might be interested, let one of us know so we can flood him or her with information. New members are the lifeblood of our group. It's important that we actively recruit new faces aggressively.

Robert Schmauss (Bob) & K4KLT JoAnne Schmauss KD4ODQ (xyl) Land O' Lakes, FL

…Art WA8RMC

ATVQ MAGAZINE ARTICLE REQUESTS…do you agree?

Although the following remarks were directed toward ATVQ magazine, it also applies to the ATCO Newsletter. Tell me what you think. Is the material OK? Should I emphasize parts and put less emphasis on others? Let's see some input! ATVQ and myself have a reciprocal policy to publish each others' material so lets be in a position to have them copy US and not the other way around! Help me out and point out potential news and article sources. I'll do the "dirty work" if you'll let me know where to ***find*** *the good stuff! WA8RMC.*

Hi ATVQers, I have been giving some thought to what would be good to see in ATVQ.

- The newest developments in ATV on a variety of different bands and modes. These days it is "use it or lose it" as far as Amateur allocations are concerned worldwide. As well as getting on the air yourself and your repeater, you need to have things logged with your Local-Coordinator and get the word out to non-ATV Amateurs too. Just can't get enough publicity.

- Experimental things. Digital modes with potential for Amateurs. Not practical for everybody, but we should be keeping up to date with the direction things are going or we will get as out of date as 32 line mechanical TV.

- Things for the newcomer. Two pages an issue might seem a lot of old tedious stuff to experienced ATVers, but the new guy needs encouraging or else he soon moves on to other things. We could wind up with no-one to send pictures to. Sure there is a lot of material in back issues and the predecessor magazines to ATVQ. It just isn't accessible to the newcomer. (Anybody want to make a CD of all the back catalogue of A5, Spec-com & ATVQ?) A page of where to look for various things would be helpful too. Things a newcomer could go down to Radio Shack (or similar) and order some parts for would be a good starter level.

- Reviews of things you can buy ready to run. For those who have the cash, but not the time to build things, even though we would like to. It would be great to have notes on what the various Transmitters, Receivers, Pre-amps, Antennas, PC cards and Video gear can do can do.

- Reviews of kits for those with a little less spare cash but a bit more time available. Besides there are just something's you cannot buy ready to run. The big three rarely make anything for ATV.

- The best material available from ATV sources worldwide. Think why they no longer call G-Land "Great Britain". They stopped using the best available worldwide and went for the "If it wasn't invented here we don't want it" approach. I'm sure you' all salute the Flag, love Mom, Dad & Apple pie, but keep an open mind guys (and I'm not even an American) and don't let your country go down the drain. My Friend in Alabama, Dr John Fox WB2LLB says he has a hard time buying American anything, apart from Ten-Tec and a glass Radiometer bulb he gave me one time. We'll be saying "Great China" in no time. A straight "cut and paste" of articles isn't going to do a respectable job. It is a bear, but some explanation in Americana (if a full translation is not available) is a must. In recognition of the fact that some brands of parts are not distributed in the USA (can you get a BC547, 2SC3358, BFQ68 or TEA5114 easily?), equivalent devices might have to be mentioned or International electronic parts mail order addresses given. If DX authors are willing to license their artwork, a closer to home (for you guys) source of printed circuit boards could be arranged. The progress of ATV, especially repeaters, in ZL made great progress once we accessed the best technical information from South East Queensland TV Group, Australia and the Severnside TV Group in Bristol, England. Where there was only one ATV repeater in ZL, there are now five operational (in a country of only 4 million). More are a building too.

- Mods, Hint & Kinks. You'd all probably like to know what we have done to Tom's VOR to make it do a better job in our ATV AM & FM repeaters.

- News from far and wide as well as local. For a communications type hobby the word can be slow to travel sometimes. Email and this list helps me a lot.

- Home built projects. If you spent all that time designing it and getting that antenna or Transmitter, etc to work, let us all know. We might want to follow in your footsteps also. The most creative guys seem to be the poorest at writing (Aw, I've done with that & I'm into my next creation is what they tell me) of their achievements, so consider letting another ATVer ghost write the article for you, if you don't want to do it yourself.

- A balanced mix of the above. Too much of one flavor spoils the food, I think.

…Michael Sheffield ZL1ABS 176 Albany Highway, Albany, Auckland, New Zealand. Email mjsheffield@yahoo.com

IC MEDIA ANNOUNCES 'TRUE' SINGLE-CHIP DIGITAL COLOR CAMERA

By Semiconductor Business News Jun 25, 2001 (10:34 AM) URL: http://www.semibiznews.com/story/OEG20010625S0077

SAN JOSE -- Three-year-old IC Media Corp. today claimed development of the first "true single-chip digital color camera"--the ICM-532A--which provides common interchange format (CFI) resolution of 352-by-288 pixels for still or full-motion video up to 30-frames-per-second.

The camera chip contains digital output and built-in Universal Serial Bus (USB) interfaces for personal computers. The San Jose startup said the ICM-532A is ideal for PC still and video cameras, embedded cameras in notebooks and LCD monitors, USB-based finger print devices and other applications.

"With this product, we're able to provide low power consumption and the smallest form factor possible, so the total bill-of-materials for a high-quality camera is kept to a minimum," said Ben Wu, president and chief executive officer of IC Media.

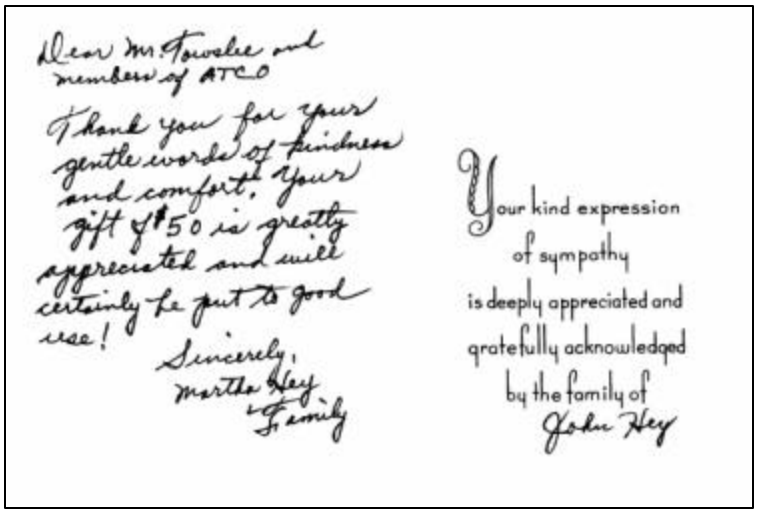
The ICM-532A also supports the QVGA format (320-by-240 pixels) and QCIF (176-by-144 pixels), providing a higher frame rate of 37.5 fps. IC Media said the ICM-532A integrates the company's 1/7-inch CIF-resolution sensor. With IC Media's miniature lens, the entire PC camera implementation can be as small as 3 cm-by-1 cm, with 0.8-cm height, said the San Jose company.

Samples of the ICM-532A camera chip are now available with production quantities scheduled to begin in July. In quantities of 100,000, the chip sells for $15 each. It is available in a ceramic or plastic 48-pin leadless chip carrier (LCC).
…THE EDTN NETWORK NEWSLETTER Thursday, June 28, 2001
To register for The EDTN Network, go to:
http://newsletter.EDTN.com/cgi-bin4/flo?y=eD2m0ByGcT0tH0NiH0Aw

SK…THE PASSING OF W8STB

It is with a great deal of sadness that we must report the passing of John Hey, W8STB from a sudden heart attack. John was very active in most aspects of Amateur Radio including ATV. As an ATCO member, he regularly checked into our Tuesday night net to report the status of the Dayton area ATV activity. He was also the main person responsible for obtaining a place to meet for the Dayton Hamvention Friday night gathering. His presence will be greatly missed and his past hard work will be hard to replace. We'll miss you, John!

The card at the right is from John's widow in response to our ATCO donation in his memory.
…WA8RMC



POWER LINE COMMUNICATIONS HAS HAMS HOPPING MAD

OK, here's another one not directly ATV related but…if they can push 2 Mb/s over the power line, how about video? Think about it! ED.
Power line communications (PLC) uses the power line to transmit data at 2 Mb/s or more. The technology, now implemented in Germany but soon to be implemented in other countries, has the amateur radio and short wave listening (SWL) communities on high alert. They claim that the technology has gotten ahead of regulatory developments and that could lead to the end of amateur radio and SWL as hobbies. They point out that at this point in time it's not even clear whether the R&TTE or EMC Directive covers PLC. Germany has a draft regulation in works in an attempt to control emissions from PLC, but it's not yet ready to be enforced. CENELEC and ETSI have also not agreed on which organization should control standards development in the field. There is also widespread skepticism that measurements made on PLC in the laboratory will predict with any accuracy how PLC will act in the field. Amateur radio operators have one consolation though. Firing up a 1 kW transmitter has been known to slow down a neighbor's PLC to a crawl. Here in the United States Ed Hare, W1RFI, is the ARRL point person on the subject. With the assistance of Cortland Richmond, we have compiled these links for more information:
Radio Nederland Editorial: http://www.rnw.nl/realradio/features_archive/html/020201.html
ARRL Documents: http://www.arrl.org/~ehare/plc/sec75.pdf
…From the CURTIS-STRAUS UPDATE NEWSLETTER FOR JUNE, 2001.

RED-WHITE-BOOM IS ANOTHER SUCCESS!

Once again, we helped to do our best to support a public service activity. Each year the Columbus police asks us to provide security crowd control video for their use. We set up cameras at strategic locations within the crowd preparing to watch the 4th of July fireworks show. Since 400,000 to 500,000 people were present, there is a high probability someone will get a bit unruly. It was our job to pan the cameras across the crowd with police direction and spot any trouble areas hopefully before they get out of hand. That way the police can make the most efficient use of their officers.

The individual camera video sources are RF linked to a receiver on the police building roof and then sent down to the Emergency Operation Center via two video cables. The video from a third camera was received directly in the EOC via a 2.4 GHz link directly from the ATCO repeater. The resultant three monitors gave the police a good snapshot of crowd concentration and overall activity.

This year they asked us if we could provide video of the Nationwide Arena parking lot area where numerous activities were scheduled for the major part of the day. Phil, N8LRG, and myself went down to that area a few days prior and could not find a building roof that we could place the cameras easily but was able to get a clear view of our repeater antenna atop the building. As it turned out, now that the roof camera is functional, we had a clear view of the desired parking lot so it was used to its capacity. The 300mm lens gave us a zoomed in view of as few as 3 cars in the lot or zoomed out, almost the whole block! The camera is great for this use!

There were five of us that ran the show this year. Pete, K4PRS and I were on the Columbia Gas parking garage roof. Ed, KB8TCF, and John, N8ZKZ, were on the police headquarters roof and Phil, N8LRG, was in the EOC watching the monitors. The pictures below were taken that night to show the extent of our equipment. Our cameras pointed directly down into this mass of people!…WA8RMC

If you doubt the crowd was huge, check out the picture below. Pete and I were stationed just above this.

Below is Pete checking out the crowd in the picture above. The 1280 MHz loop yagi sending the picture to the EOC is behind him.

The pictures on the right are taken from the police headquarters roof where Ed and John were set up. They had hi resolution digital CCD video cameras feeding into a switcher that changed the scene every minute or so. They are aided by two Sony 8"monitors so they too could see the video being fed downstairs to Phil and the police.

ROOF CAMERA OPERATIONAL DETAILS

Now that the downtown roof camera is operational, it seems only natural to know how to use it. There seem to be some minor bugs to be worked out yet but for the most part, it's ready to go! I'll point out the shortcomings so you'll know what to expect. Here goes.

A few things to remember when using the camera.
First and most important, there is NO PROTECTION from the sun. Do not rotate and leave it in a position where the sun will eventually shine directly into the lens. I need not describe the results here. Always leave the camera in a position that does not view any part of the sky!

At this time, there seems to be something that moves the controls occasionally when not commanded to do so. I think it's RF getting into the controller. Until I have a chance to identify and fix it, please disable the controls by entering the disable code of AAA after making any final control movements. The enable code of BBB must be entered the next time to enable camera function changes.

The pan and tilt operation is jerky. This is normal. In order to maintain maximum torque when varying the pan/tilt motor speeds, I had to proportionally control them where power is applied in bursts of varying on/off periods.

Sometimes, the command tone is not acknowledged. This could be my transmitter audio level or distortion or maybe the audio level into the controller needs adjusting. Bear with us till the problem is located and fixed.

The command tones are DTMF functions actuated by the touch tone buttons on your transmitter as follows:

"1" FOCUS - This will focus far away objects when pressed with the "forward" direction enabled and close up objects with the "reverse" function enabled. It will go from stop to stop in about 15 seconds. When the lens is at the full forward stop it will provide an "in focus" picture from about 100 feet to infinity.

"2" ZOOM – This will zoom in to a bring distant object closer when pressed with the "forward" direction enabled and zoom out to a wide angle position with the "reverse" function enabled. It will go from stop to stop in about 10 seconds.

"3" APERATURE – This will close the lens down to F22 (make the scene darker) with the forward direction and open it up to F2.8 in the reverse direction. The camera has an auto iris so with bright light, stopping down the lens has a non linear effect. Keep it stopped down as far as possible to still produce a good picture. The focus range or depth of field is the greatest with the lens stopped down toward the closed position.

"4" FILTER – There is a filter wheel inside the camera lens driven by a single motor without stops. The wheel has 2 filters, one straight through hole and one place where the lens is totally blocked. The first filter is equal to F22 (darkest) and so on. Since it is easy to get the straight through section miss-aligned, I prefer you not try to use it. If you pass the spot needed, it must travel around again which takes a few seconds.

"5" TILT – This function has a dual mode capability. If the function is activated for less than 2 seconds, the tilt motor will stop when the button is released. If it is depressed for more than 2 seconds, the motor will run continuously until the "5" button is momentarily pressed again. The tilt motor runs a cam that tilts a mirror to give a continuous tilting action. It will travel down till it gets about 45 degrees below horizontal then reverse to go up to about 30 degrees above horizontal and repeat. The speed can be altered with the "9" and "#" keys and tilt direction can be changed with the "7" and "*" keys. The tilting action is jerky sometimes because grease tends to stick to the tilt plate cam.

"6" PAN – This function has the same features as the tilt function. If set to pan continuously, it will rotate continuously 360 degrees without stopping. The motor is connected through slip rings so the wiring will not get wound up in the mechanism. When panning continuously, press the "6" button momentarily again to stop the action.

"7" FORWARD – This button works with the "*" REVERSE button to change the direction of focus, zoom, aperture tilt and pan. Notice that this button is directly above the "*" REVERSE button.

"8" no function for this button.

"9" INCREMENT – This button works with the "#" DECREMENT button to change the speed of the tilt or pan. Notice that this button is directly above the "#" DECREMENT button. There are 4 speeds. Press the button once to change speed one step.

"*" REVERSE – See explanation of "7" FORWARD button above.

"0" no function for this button.

"#" DECREMENT – See explanation of "9" INCREMENT button above.

CAMERA CONTROLLER KEYPAD FUNCTIONS

FOCUS 1	**ZOOM** 2	**APERATURE** 3	**DISABLE** A A A **A**
FILTER 4 steps 4	**TILT** 5	**PAN** 6	**ENABLE** B B B **B**
IN/RT/DN 7	8	**INC SPEED** **Pan/Tilt** 9	**C**
OUT/LT/UP *	0	**DEC SPEED** **Pan/Tilt** #	**D**

002 = ENABLE CAMERA
001 = RETURN TO NORMAL
Note: sometimes enter 003 for room cam then 002 for roof cam is better.

OK, that's it folks. Play with it to your heart's content. Oh, one more thing. Use the camera in the repeater automatic mode only. If you access it in repeater manual mode, the first time you hit a function button, the controller thinks you want another input and shuts it down. In auto mode hit "002" to enable the roof camera and "001" when finished to return the controller to the 2400 MHz input. Since there will be no 2400 MHz signal, the repeater will shut down.

Use the keypad diagram at left as a function reference. Cut it out and paste it beside your keypad if you prefer. Thanks to Dale, WB8CJW, for the handy work.

The pictures below depict Phil N8LRG and myself installing the camera. Pete, N4PRS, is the cameraman here. The picture on the right is of me going up the enclosed ladder with the camera strapped to my back en route to the "beacon light" location. The one on the right shows Phil and me mounting the camera on top of the mast pipe attached to the "crows nest" railing. Pete stayed on the roof below to monitor the situation and give verbal guidance.

ATV LISTSERVER … check here for the latest ATV news!

For those of you that don't know about the internet ATV listserver, here are the latest details about what's going on there!

The Tallahassee listserver is an internet site where ATV news from individuals from around the world may post questions and comments about ATV. Answers to questions may be either addressed to the entire group that monitors it or directly to the individual asking the question. It is open to all but please keep it to subject matter relating to ATV. It's great for those just starting in ATV or if you have something to sell or want to buy, ask here. It's fun and quite informative.

To subscribe to the listserver, send an Email message to *majordomo@www.kd4moj.org* and in the body of the Email type: **subscribe atv**
To unsubscribe, send a message as above but in the body of the Email, type: **unsubscribe atv**
To send an Email message to the group, address it to *atv@kd4moj.org* and type your comments in the body. Please fill in the subject also.
If you have problems, send a message to *kd4moj@kd4moj.org* and they will respond with help.

ATV EQUIPMENT SUPPLIERS… Find your ATV stuff here!

Below is a list of manufacturers of ATV equipment that I have found. There is no endorsement of any of the manufacturers listed below so buyers beware. If I or anyone else that I know of has had any trouble with a manufacturer, it won't be listed. As I get more info, I'll add manufacturers. Likewise, if I hear of any trouble, it'll be removed. Good luck and keep me advised. List verified 6/1/00.
…Art WA8RMC

Michael Kohlstadt, KD6UJS has a limited supply of used but working Pacific Monolithics 2.4 ghz downconverters and power supplies which will work fine for the repeater.
Phone: 408-926-0430.

Downeast Microwave
Antennas, Power Amplifiers, Deluxe Downconverters, microwave parts.
954 Rt. 519 Frenchtown, NJ 08825
Phone: 908-996-3584
Fax: 908-996-3702

Hamtronics Inc
Ham receivers, transmitters
Antennas, Preamps
http://www.hamtronics.com

M²
Antennas
7560 N. Del Mar Ave.
Fresno, Ca 93711
Phone: 209-432-8873
http://www.m2inc.com

CCI Communications Concepts, Inc.
508 Millstone Drive
Beavercreek, OH 45434-5840
(937)426-8600 Voice
(937)429-3811 Fax
Email: cci.dayton@pobox.com
http://www.communications-concepts.com ATV Equipment

ATV Quarterly (ATVQ)
ATV magazine publisher
5931 Alma Drive
Rockford, Il. 61108
Phone 815-398-2683
FAX 815-398-2688
Email: atvq@hampubs.com

PC Electronics
ATV Transmitters, Receivers
Manufacturer/Reseller
2522 Paxson Ln.
Arcadia, CA 91007-8537
Phone: 626-447-4565
Fax: 626-447-0489
tom@hamtv.com
www.hamtv.com

Black Box
1000 Park Drive
Lawrence, PA 15055-1018
(800)552-6816 Voice
(800)321-0746 Fax
Email: info@blackbox.com
http://www.blackbox.com
Electronic Connections

SHF Microwave Parts Company
10GHz Gunn oscillators and Antennas
7102 W. 500 S.
LA PORTE, INDIANA, 46350
Fax: 219-785-4552

Allied Electronics
7410 Pebble Drive
Fort Worth, TX 76118
(800)433-5700
http://www.allied.avnet.com
Electronic Parts House

GEKCO Inc
TV test signal circuit boards
PO Box 642
Issaquah, Wa 98027-0642
Phone: 425-392-0638
Email: sales@gekco.com
www.gekco.com

Cable X-Perts
416 Diens Drive
Wheeling, IL 60090
800-828-3340 Voice 847-520-3444 Fax
http://www.cablexperts.com
Wire and Cable

DCI Communications
Interdigital filters and cavities
Box 293, 29 Hummingbird Bay
White City, SK, Canada S0G5B0
Phone: 306-781-4451
http://www.dci.ca/

ATV Research Inc.
TV cameras & related parts
1301 Broadway PO Box 620
Dakota City, NE 68731-0620
Phone: 402-987-3771
Homepage: www.atvresearch.com
Email: atc@pionet.net

E. H. Yost & Company
2211-D Parview Road
Middleton, WI 53562
(608)831-3443 Voice
(608)831-1082 Fax
Email: ehyost@midplains.net
Battries

Phillips-Tech Electronics MMDS, ITFS downconverters and antenna systems
P.O. Box 8533
Scottsdale, AZ 85252
Phone: 602-947-7700
Fax: 602-947-7799

MCM Electronics
650 Congress Park Drive
Centerville, OH 45459
(800)543-4330 Voice
(800)765-6960 Fax
http://www.mcmelectronics.com

Jameco Electronic Components
1355 Shoreway Road
Belmont, CA 94002-4100
(800)831-4242 Voice
Email: infor@jameco.com
http://www.jameco.com
Electronic Parts

Fair Radio Sales
1016 E. Eureka P.O. Box 1105
Lima, OH 45802
(419)227-6573 Voice
(419)227-1313 Fax
Email: fairadio@wcoil.com
http://www.fairradio.com
Electronic Surplus Equipment

Directive Systems
RR#1 Box 282 Dixon Road
Lebanon, ME 04027
(207)658-7758 Voice
(207)658-4337 Fax
Antennas
http://www.directivesystems.com/

Mouser Electronics
958 North Main Street
Mansfield, TX 76063-4827
(800)346-6873 Voice
(817)483-0931 Fax
Email: sales@mouser.com
http://www.mouser.com
Electronics Parts House

Hosfelt Electronics Inc.
2700 Sunset Boulevard
Steubenville, OH 43952-1158
(800)524-6464 Voice
(800)524-5414 Fax

Pauldon Associates
210 Utica Street
Tonawanda, NY 14150
(716)692-5451 Voice
ATV Receivers and Transmitters

Universal Radio Inc
6830 Americana Parkway
Reynoldsburg, Ohio 43068
614-866-4267
http://www.universal-radio.com

Spectrum International
J-Beams, KVG, Micromodules,VSB
John Beanland
Phone:978-263-2145.
Email: Spectrum@ma.ultranet.com
filters

The Wireman, Inc.
261 Pittman Road
Landrum, SC 29356
(800)727-9473
(864)895-4195
Wire and Cable

Webster Communications, Inc.
115 Bellarmine
Rochester, MI 48309
(800)521-2333 Voice
(810)375-0121 Fax
Electronic Parts

INTERNET ATV HOME PAGES (list verified 01/15/01)

If you have access to the INTERNET, you may be interested to know of some of the HAM related information that is available. Most addresses listed below are case sensitive, so type exactly as shown. (For comments or additional listings contact me at towslee@ee.net).
Note: The listings below without URL's have disappeared! If any of you know otherwise, let me know.

Domestic homepages

http://psycho.psy.ohio-state.edu/atco	Ohio, Columbus, homepage (ATCO)
http://www.radio-amateurs.com	Ohio, Dayton ATV group (DARA)
http://users.erinet.com/38141/atv.htm	Ohio, Xenia KB8GRJ
http://www.angelfire.com/al/gcats/	Alabama - Gulf Coast Amateur Television Society
http://www.hayden.edu/Guests/AATV	Arizona, Phoenix Amateurs (AATV) Carl Hayden High School
http://www.qsl.net/aatv/	Arizona, Pheonix Amateurs(AATV)
http://www.citynight.com/atv	California, San Francisco ATV
http://www.qsl.net/atn	California, Amateur Television Network in Central / Southern
http://home.tampabay.rr.com/k4lk/	Florida,Tampa Bay Amateur Television Society (TBATS)
?	Florida, Emerald Coast Amateur Television Society (ECATS)
http://www.qsl.net/scats/	Florida, Melborn Space Coast Amateur TV Society (SCATS)
http://www.bsrg.org/aatn/aatn1.html	Georgia, Atlanta ATV
http://members.tripod.com/silatvg	Illinois, Southern, Amateur Television group
http://www.ussc.com/~uarc/utah_atv/id_atv1.html	Idaho ATV
http://www.qsl.net/k4kjq/atv/BATS.htm	Kentucky, Lexington Bluegrass ATV Society (BATS)
http://www.kcatv.org/	Kansas, Kansas City Amateur TV Group (KCATVG**)**
http://www.bratsatv.org	Maryland, Baltimore Radio Amateur Television Soc. (BRATS)
http://www.icircuits.com/dats	Michigan, Detroit Amateur Television System (DATS)
http://come.to/amateurtv.mn	Minnesota Fast Scan Amateur Television (MNFAT)
http://www.intecnet.net/vidking/	Missouri, St Louis Amateur Television
http://www.qsl.net/kd2bd/atv.html.	New Jersey, Brookdale ARC in Lincroft
http://no3y.com/	New Mexico, Farmingham
http://www.ipass.net/~teara/menu3.html	North Carolina, Triangle Radio Club (TEARA)
http://www.lloydio.com/oatva.html	Oregon, Portland ATV (OATVA)
http://www.jones-clan.com/amateur_radio/klamath_amateur_television.htm	Oregon, Southern Oregon ATV
http://www.nettekservices.com/ATV/	Pennsylvania, Pittsburg Amateur Television
http://members.bellatlantic.net/~theojkat	Pennsylvania, Phila. Area ATV
http://www.geocities.com/Hollywood/5842	Tennessee, East ATV
http://www.hats.stevens.com.	Texas, Houston ATV (HATS)
http://www.wacoatv.org	Texas, WACO Amateur TV Society (WATS)
http://www.hamtv.org/	Texas, North Texas ATV
http://www.ussc.com/~uarc/utah_atv/utah_atv.html	Utah ATV
http://www.qsl.net/w7twu	Washington, Western Washington Television Soc. (WWATS)
http://www.shopstop.net/bats/	Wisconsin, Badgerland Amateur Television Society (BATS)

Foreign homepages

http://www.batc.org.uk/index.htm	British ATV club (BATC)
http://www.sfn.saskatoon.sk.ca/recreation/hamburg/hamatv.html	Saskatoon, Canada ATV
http://www.gpfn.sk.ca/hobbies/rara/atv3.html	Regina, Canada ATV
http://www.inside.co.uk/scart.htm	UK, Great Britain ATV (SCART)
http://www.cmo.ch/swissatv	Swiss ATV
http://www.rhein-land.com/atv	German ATV in "Niederrhein" area
http://www.arcadeshop.demon.co.uk/atv/	UK, G8XEU ATV homepage
http://lea.hamradio.si/~s51kq/	Slovenia ATV
http://www.burnabyradio.com/ve7rtv/	British Columbia, Canada VE7RTV repeater
http://www.qsl.net/zl1qf/atvug/ATVusers.html	Auckland, New Zealand ATV
http://www.cq-tv.com	British ATV Club and CQ-TV Magazine

INTERNET MISCELLANOUS HAM RELATED HOME PAGES

(list verified 01/15/01)

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

http://www.hampubs.com/	ATVQ Magazine home page. ATV equipment & article references.
http://www.hamtv.com	PC Electronics Inc. Lots of proven ATV equipment for sale.
http://downeastmicrowave.com	Down East Microwave Inc. Lots of uhf/microwave parts & modules.
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://www.arrl.org/fcc/fcclook.php3	ARRL/FCC revised CALLSIGN database. Search call sign or name.
http://hamradio-online.com	Ham Radio Online "newsletter" Lot of Ham related info.
http://www.qsl.net/atna/	ATNA homepage
http://www.ham-links.org	Ham Radio collection database
http://fly.hiwaay.net/~bbrown/index.htm	Tennessee Valley Balloon launch info (Bill Brown WB8ELK)
http://www.ipass.net/~teara/atv4.html	Arizona ATV 2.4Ghz Wavecom page (Wavecom mod. info)
	Space Shuttle Launch Info Service & Ham TV System (LISATS)
http://www.svs.net/wyman/	Wyman Research Inc. W9NTP Don Miller ATV equipment
http://www.m2inc.com/	M2 Antenna Systems Inc.
http://www.dci.ca/amateur_radio.htm	DCI Digital Communications Inc. Bandpass filters
http://scott-inc.com/wb9neq.htm	Kentucky, Airborn ATV from WB9NEQ in Bowling Green
http://www.icircuits.com/	Intuitive Circuits Inc
http://www.qsl.net/kd4dla/ATV.html	KD4DLA ATV web page index
http://www.severe-weather.org	Columbus, Ohio severe weather net at Columbus airport
http://www.mods.dk	Ham radio modification lists.
http://gullfoss.fcc.gov:8080/cgi-bin/ws.exe/beta/genmen/frequency.hts	look up any frequency on the FCC data base.
http://www.fcc.gov/wtb/	Starting point from which all radio license holders can be found
http://www.geocities.com/richcam1/Museum008.htm	Lab Guy Antique TV camera listing

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 some fliers that compile this list so for additional info Email me at towslee@ee.net. This list will be amended, as further information becomes available.

21 Jul 2001 + Northern Ohio ARS http://apk.net/noars/noarsfe.htm Contact: John Schaaf, K8JWS 6264 West River Road South Elyria, OH 44035 Phone: 216-696-5709 Email: k8jws@arrl.net Wellington, OH
22 Jul 2001 + Van Wert ARC http://www.redrival.com/w8fy Contact: Bob Barnes, WD8LPY 411 North Walnut Street Van Wert, OH 5891 Phone: 419-238-1877 Email: barnesrl@bright.net Van Wert, OH
28 Jul 2001 + OH-KY-IN ARS http://www.qsl.net/k8sch Contact: Mr. Lynn Ernst, WD8JAW 10650 Aspen Place Union, KY 41091-7665 Phone: 859-657-6161 Email: wd8jaw@arrl.net Cincinnati, OH
29 Jul 2001 + Portage ARC http://parc.portage.oh.us Contact: Joanne Solak, KJ3O 9971 Diagonal Road Mantua, OH 44255 Phone: 330-274-8240 Email: ljsolak@apk.net Randolph, OH
4 Aug 2001 + Voice of Aladdin ARC Contact: James Morton, KB8KPJ 6070 Northgap Drive Columbus, OH 43229-1945 Phone: 614-846-7790 Email: kb8kpj@cs.com Columbus, OH
18 Aug 2001 x Portsmouth Radio Club Contact: Jack King, KB8NBI Phone: 740-372-5811 Friendship, OH
19 Aug 2001 + Warren ARA http://www.onecom.net/wara Contact: Renee McCaman, KB8SVF 317 Raymond Avenue NW Warren, OH 44483 Phone: 330-847-8478 Email: mccaman@cboss.com Warren, OH
9 Sep 2001 + Findlay ARC http://www.bright.net/~kanga/w8ft/hamfest.html Contact: Bill Kelsey, N8ET 3521 Spring Lake Drive Findlay, OH 45840 Phone: 419-423-4604 Email: kanga@bright.net Findlay, OH
16 Sep 2001 + Greater Cincinnati ARA http://cincinnatiamateurradio.com Contact: James Weaver, K8JE 5065 Bethany Road Mason, OH 45040-9660 Phone: 513-459-0142 Email: k8je@arrl.net Cincinnati, OH
23 Sep 2001 + Hamfest Association of Cleveland http://www.hac.org Contact: Ed Santavicca, AA8TV 1259 Edwards Avenue Lakewood, OH 44107 Phone: 800-253-3378 Email: info@hac.org Cleveland, OH
7 Oct 2001 + Medina Two Meter Group http://www.qsl.net/m2m Contact: Mike Rubaszewski, N8TZY 4264 Alpine Hill Court Brunswick, OH 44212 Phone: 330-273-1519 Email: n8tzy@m3net.net Medina, OH
14 Oct 2001 + Ashland Area ARC Contact: John McMurray, KC8AAR 1126 Union Street Ashland, OH 44805 Phone: 419-281-3117 Email: johnamcmurray@myexcel.com Ashland, OH
28 Oct 2001 + Massillon ARC http://www.qsl.net/w8np Contact: Terry Russ, N8ATZ 3420 Briardale Circle NW Massillon, OH 44646 Phone: 330-837-3091 Email: marc.hamclub@juno.com Canton, OH

ATCO REPEATER TECHNICAL DATA SUMMARY

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, 1250 MHz FM modulation and 2433 MHz FM modulation.
Interdigital filters in output line of 427.25, 1250 & 2433 transmitters
Output Power - 427.25 MHz:40 watts average 80 watts sync tip
1250 MHz: 50 watts continuous
2433 MHz: 15 watts continuous
Link transmitter - 446.350 MHz 1 watt NBFM 5 kHz audio

Identification: 427, 1250 & 2433 xmtrs. Video identify every 10 minutes showing ATCO & W8RUT on four different screens.

Transmit antennas: 427.25 MHz - Dual slot horizontally polarized 7 dBd gain major lobe west
1250 MHz - Diamond vertically polarized 12 dBd gain omni
2433 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni

Receivers: 147.45 MHz for F1 audio input control of touch tones
439.25 MHz for A5 video input with FM subcarrier audio (**lower sideband**)
915 MHz for F5 video link data from remote sites
1280 MHz for F5 video input
2398 MHz for F5 video input

Receive antennas: 147.45 MHz - Vert. polar. Hi Gain 12 dBd dual band (also used for 446.350 MHz output)
439.25 MHz - Horiz. polar. dual slot 8 dBd gain major lobe west
915 MHz - DB Products vertically polarized 10 dBd gain omni
1280 MHz - Diamond vertically polarized 12 dBd gain omni
2398 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni

Input control:

Touch Tone	Result (if third digit is * function turns ON, if it is # function turns OFF)
00#	turn transmitters **off** (exit manual mode and return to auto scan mode)
00*	turn transmitters **on** (enter manual mode -keeps transmitters on till 00# sequence is pressed)

Manual mode functions:

00* then 1	Ch. 1	Select 439.25 receiver - manual mode (hit 00* then 1 to view 439.25 signal only)
00* then 2	Ch. 2	Select 915 receiver - manual mode
00* then 3	Ch. 3	Select 1280 receiver - manual mode
00* then 4	Ch. 4	Select 2411 receiver - manual mode
00* then 5	Ch. 5	Select video ID - manual mode (the 4 identification screens)
01* or 01#	Channel 1 439.25 MHz scan enable (hit 01* to scan this receive channel & 01# to disable it)	
02* or 01#	Channel 2 915 MHz scan enable	
03* or 01#	Channel 3 1280 MHz scan enable	
04* or 01#	Channel 4 2411 MHz & camera video scan enable	
A1* or A1#	Manual mode select of 439.25 receiver audio	
A2* or A2#	Manual mode select of 915 receiver audio	
A3* or A3#	Manual mode select of 1280 receiver audio	
A4* or A4#	Manual mode select of 2411 receiver audio	
C0* or C0#	Beacon mode – transmit ID for twenty seconds every ten minutes	
C1* or C1#	427.25 transmitter power output select (C1* = 40W output power or C1# = 1.5W output)	
C2* or C2#	2433 transmitter for on/off. (C2* enables transmitter and C2# disables it)	

Auto scan mode functions:

001	2411 receiver (normal mode - returns to auto scan)
002	Roof camera (select 001 when finished viewing camera so repeater will shut down)
003	Equipt. room camera (select 001 when finished viewing camera so repeater will shut down**)**

NOTE: We will change the controller sometime soon with a corresponding change to the above control codes. Stay tuned to the Tuesday night Net on 147.45 MHz for further details.

ATCO MEMBERS AS OF 15 July 2001

Call	Name	Address	City	St	Zip	Phone	URL
AA8XA	Stan Diggs	2825 Southridge Dr	Columbus	Oh	43224-3011		sdiggs4590@aol.com
K8AEH	Wilbur Wollerman	672 Rosehill Road	Reynoldsburg	Oh	43068	614-866-1399	wilbur.w@juno.com
KC3AM	David Stepnowski	735 Birchtree Lane	Claymont	De	19703-1604		kc3am@aol.com
KC8ASD	Bud Nichols	3200 Walker Rd	Hilliard	Oh	43026	614-876-6135	
W8FZ	Fred Stutske	8737 Ashford Lane	Pickerington	Oh	43147		kc8bni@amsat.org
WB8CJW	Dale Elshoff	8904 Winoak Pl	Powell	Oh	43065	210-0551	delshoff@columbus.rr.com
WA8DNI	John Busic	2700 Bixby Road	Groveport	Oh	43125	491-8198	jbusic@copper.net
K8DW	Dave Wagner	2045 Maginnis Rd	Oregon	Oh	42616	419-691-1625	
WA3DTO	Rick White	5314 Grosbeak Glen	Orient	Oh	43146	877-0652	wa3dto@aol.com
WB8DZW	Roger McEldowney	5420 Madison St	Hilliard	Oh	43026	876-6033	wb8dzw@aol.com
W8EHW	Foster Warren	PO Box #32	No. Hampton	Oh	45349		
KS4GL	John Barnes	216 Hillsboro Ave	Lexington	Ky	40511	606-253-1178	jrbarnes@iglou.com
KB8GUE	Ron Piatt	PO Box 200	Leesburg	Oh	45135		yonkb8gue@webtv.net
KA8HAK	Jim Reese	1106 Tonawanda Ave	Akron	Oh	44305		
WA8HFK,KC8HIP	Frank, Pat Amore	3630 Dayspring Dr	Hilliard	Oh	43026	777-4621	
W3HMS	John Jaminet	912 Roberts St	Mechanicsburg	Pa	17055-3451		w3hms@aol.com
W8JND	Richard Knowles	573 Plaza Drive	Circleville	Oh	43113	477-8132	
K8KDR,KC8NKB	Matt & Nancy Gilbert	5167 Drumcliff Ct.	Columbus	Oh	43221-5207	771-7259	mjgilbert@wcom.net
K4KLT, KD4ODQ	Bob & JoAnnSchmauss	P.O. Box 1547	Land O' Lakes	Fl	34639-1547	813-996-2744	schmauss@att.net
N8KQN	Ted Post	1267 Richter Rd	Columbus	Oh	43223	276-1820	n8kqn@juno.com
WA8KQQ	Dale Waymire	225 Riffle Ave	Greenville	Oh	45331	513-548-2492	walkingcross@mail.bright.net
N3KYR	Harry DeVerter Jr	303 Shultz Road	Lancaster	Pa	17603-9563		deverterhf@dejazzo.con
KC8LOW	Bob Harmon	831 McDonell Dr	Gahanna	Oh	43230	478-2193	kc8low@netscape.net
N8LRG	Phillip Humphries	3226 Deerpath Drive	Grove City	Oh	43123	614-871-0751	phumphries@iwaynet.net
WB2LTS	Manny Diaz	8 Pearl Ave	Holtsville	Ny	11742-1711		wb2lts@worldnet.att.net
KC8LZC	Tom Walter	15704 St Rt 161 West	Plain City	Oh	43064	614-733-0722	kc8lzc@go.com
W8MA(ex wa8tte)	Phil Morrison	154 Llewellyn Ave	Westerville	Oh	43081		
KA8MID	Bill Dean	2630 Green Ridge Rd	Peebles	Oh	45660		ka8mid@qsl.net
N8NT	Bob Tournoux	3569 Oarlock Ct	Hilliard	Oh	43026	876-2127	rtournou@columbus.rr.com
WD8OBT,KB8ESR	Tom Camm & sons	1634 Dundee Court	Columbus	Oh	43227	860-9807	
N8OCQ	Robert Hodge	PO Box 23473	Columbus	Oh	43223	875-7067	
N8OPB	Chris Huhn	146 South Hague Ave	Columbus	Oh	43204	279-7577	
W6ORG,WB6YSS	Tom & Maryann O'Hara	2522 Paxson Lane	Arcadia	Ca	91007-8537	626-447-4565	tom@hamtv.com
W2OTA,WA2DTZ	Michael Chirillo	942 Bruce Drive	Wantagh	Ny	11793	516-785-8045	
KE8PN	James Easley	1507 Michigan Ave	Columbus	Oh	43201	421-1492	Jeasley11@hotmail.com
W8PGP,WD8BGG	Richard, Roger Burggraf	5701 Winchester So. Rd	Stoutsville	Oh	43154	474-3884	Rgburggraf@juno.com
WA8RMC	Art Towslee	180 Fairdale Ave	Westerville	Oh	43081	891-9273	Towslee@ee.net
W8RRF	Paul Zangmeister	10365 Salem Church Rd	Canal Winchester	Oh	43110		w8rrf@copper.net
W8RRJ	John Hull	580 E. Walnut St.	Westerville	Oh	43081	882-6527	
W8RUT,N8KCB	Ken & Chris Morris	3181 Gerbert Rd	Columbus	Oh	43224	261-8583	wa8rut@aol.com
W8RVH	Richard Goode	9391 Ballentine Rd	New Carlisle	Oh	45334	937-964-1185	w8rvh@glasscity.net
W8RQI	Ray Zeh	2263 Heysler Rd	Toledo	Oh	43617		Zehrw@glasscity.net
KB8RVI	David Jenkins	1941 Red Forest Lane	Galloway	Oh	43119	614-878-0575	kb8rvi@hotmail.com
W8RXX	John Perone	3477 Africa Road	Galena	Oh	43021	740-548-7707	
WA8SAR	Gary Obee	3691 Chamberlain	Lambertville	Mi	48144		
N8SFC	Larry Campbell		Galloway	Oh	43119		
W8SJV	John Beal & family	2899 Castlebrook Ave	Columbus	Oh	43026	876-9412	Johnbeal@columbus.rr.com
W3SST	John Shaffer	2596 Church Road	York	Pa	17404		w3sst@juno.com
K8STV	Jim Carpenter	823 Quailwood Dr	Mason	Oh	45040		
N8TCB	Bill Smith	657 Redford Ave	Columbus	Oh	43207	491-0709	n8tcb@columbus.rr.com
KB8TRP,KB8TCF	Tom, Ed Flanagan	1751 N. Eastfield Dr	Columbus	Oh	43223	272-5784	ed@fastpc1.com
W8TZ	Ross Hatfield	47 Wildflower Lane	Chillicothe	Oh	45601	740-774-2777	w8tz@qsl.net
KB8UGH	Steve Caruso	6463Blacks Rd SW	Pataskala	Oh	43062-7756	740-927-1196	Mixter.1@osu.edu
WB8URI	William Heiden	5898 Township Rd #103	Mount Gilead	Oh	43338	419-947-1121	
KB8UU	Bill Rose	9250 Roberts Road	West Jefferson	Oh	43162	879-7482	
WA8UZP	James R. Reed	818 Northwest Blvd	Columbus	Oh	43212	297-1328	wa8uzp@qsl.net
K7VE	John Hays	P.O. Box 95473	South Jordan	Ut	84095-0473		Jhays@hays.org
WB8VJD	Rick Morris	203 Merton Street	Holland	Oh	43528		wb8vjd@glasscity.net
KB8VUQ	Jack Wolff	2682 Hiawatha Ave	Columbus	Oh	43212	263-3092	
W2WIA,KA2EVC	Ed & John Kuligowski	63 Connecticut Ave	Massapequa	Ny	11758	516-541-3172	w2wia@netscape.net
N8WLT	James Neymeyer	2879 East Moreland Dr	Columbus	Oh	43209	237-2331	
KB8WBK	David Hunter	45 Sheppard Dr	Pataskala	Oh	43062	740-927-3883	Hiramhunter@aol.com
KB8YMN	Mark Griggs	2160 Autumn Place	Columbus	Oh	43223	272-8266	Mmgriggs@aol.com
KB8YMQ	Jay Caldwell	4740 Timmons Dr	Plain City	Oh	43064		
N8YZ	Dave Tkach	2063 Torchwood Loop S	Columbus	Oh	43229	882-0771	
KB8ZLB	Dave Kibler	243 Dwyer Rd	Greenfield	Oh	45123	937-981-4007	k154@bright.net
KA8ZNY,N8OOY	Tom & Cheryl Taft	386 Cherry Street	Groveport	Oh	43125	836-3519	ka8zny@copper.net
N8ZTJ	Jeff Skinner	25956 Locust Grove Rd	New Holland	Oh	43145		

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 this newsletter quarterly in January, April, July, and October. It 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
V. President: Ken Morris W8RUT
Treasurer: Bob Tournoux KF8QU
Secretary: Rick White WA3DTO
Corporate trustees: Same as officers

Repeater trustees: Art Towslee WA8RMC
Ken Morris W8RUT
Dale Elshoff WB8CJW
Statutory agent: Rick White WA3DTO
Newsletter editor: Art Towslee WA8RMC

ATCO MEMBERSHIP APPLICATION

RENEWAL ○ NEW MEMBER ○ DATE _____ CALL _____

OK TO PUBLISH PHONE # IN NEWSLETTER YES ○ NO ○ HOME PHONE _____

NAME _____INTERNET Email
ADDRESS_____
ADDRESS _____
CITY _____ STATE _____ ZIP _____-_____
FCC LICENSED OPERATORS IN THE IMMEDIATE FAMILY
_____
_____
COMMENTS_____
_____
_____
_____

ANNUAL DUES PAYMENT OF $10.00 ENCLOSED CHECK ○ MONEY ORDER ○

Make check payable to ATCO or Bob Tournoux & mail to: Bob Tournoux N8NT 3569 Oarlock CT Hilliard, Ohio 43026. Or, if you prefer, you may pay dues via the Internet with your credit card. Go to www.tournoux.com/~atco and fill out the form. Payment is made through "PayPal" but you DO NOT need to join PayPal to send your dues. Simply DO NOT fill out the password details and there will be no PayPal involvement.

TUESDAY NITE NET ON 147.45 MHz SIMPLEX

Every Tuesday night @ 9:00PM WA8RMC hosts a net for the purpose of ATV topic discussion. There is no need to belong to the club to participate, only a genuine interest in ATV. All are invited. For those who check in, the general rules are as follows: Out-of-town and video check-ins have priority. A list of available check-ins is taken first then a roundtable discussion is hosted by WA8RMC. After all participants have been heard, WA8RMC will give status and news if any. Then a second round follows with periodic checks for late check-ins. We rarely chat for more than an hour so please join us if you can.

ATCO TREASURER'S REPORT - de N8NT

OPENING BALANCE (04/15/01)..... $1105.81
RECEIPTS (dues)..... $ 170.00
OTHER INCOME (bank interest)..... $ 9.00
Spring Event food..... $ (115.43)
April Newsletter postage..... $ (44.00)
Antenna Party food..... $ (38.35)
Donation for W8STB..... $ (50.00)
CLOSING BALANCE (07/15/01)..... $1034.03

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

FIRST CLASS MAIL

REMEMBER...CLUB DUES ARE NEEDED.
CHECK MAILING LABEL FOR THE EXPIRATION DATE AND SEND N8NT A CHECK IF EXPIRED.
