ATCO NEWSLETTER

VOLUME 19 NUMBER 4 **October 2002**

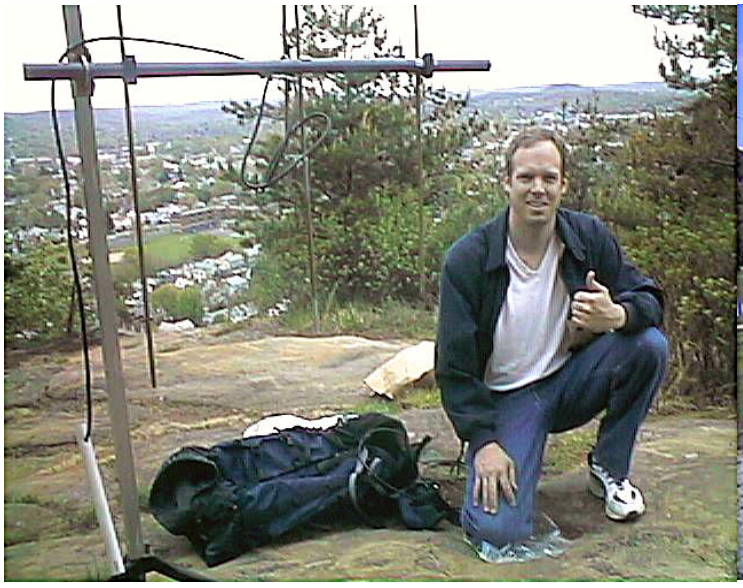
The ATCO newsletter is the official publication of a group of amateur television operators known as AMATEUR TELEVISION IN CENTRAL OHIO Group Inc." and is published quarterly (January, April, July, and October)

ATCO HAM IN THE SPOTLIGHT

This time we visit Rod Shaner KB8FLY. Rod was first exposed to ATV in 1994, after a visit to W8DMR's "studio B". He was amazed to learn that ATV existed, and shortly thereafter put some video on the air. A collection of PC Electronics 70cm boards were ordered with the video I.D'er supplied by WB8ELK. He didn't do very much at all with ATV at that time so it got mothballed for 7 years.

Last year, it came out of storage and was converted to mobile operation because frequent passes by Columbus in the car afforded more opportunity. A mini wheel followed, and voila, mobile ATV! Most antenna / accessory stuff is homebrew. Other activities with ATV include the 4 element loop yagi in the left photo below. It was constructed with PVC and afforded great fun. An 11 element "regular" yagi in the right photo below was also constructed out of leftover aluminum.

He says the greatest ATV experience so far was backpacking the 11 element, with a tripod, a motorcycle battery, HT, 2m. 3el. beam, coax, digital camera, etc. to the top of Mt. Pleasant in Lancaster's Rising Park also shown in photo. The hill affords a 200 foot "tower", with real line of sight possibilities into the Columbus and Lithopolis directions. Several contacts were made that summer day. Future experiments may include aeronautical ATV. He states, “My experience with ATV has been great due to the enthusiasm, encouragement, help and wisdom shared by many other hams. Without the above, I would not have known about ATV, nor would I be enjoying it”.



ACTIVITIES ... from my "workbench"

This time my mood is very casual for this article is being prepared at the Kiawah Island Resort near Charleston, South Carolina! I'll try to not get too carried away with ramblings but forgive me if I do, for as I sit here, I watch the sway of the tall palms in the sunny sky with a glimpse of the Atlantic ocean in the background. Well…you get the picture. Now, I must get back on track.

This past summer has not seen too much actual repeater construction or improvement activity but many plans have been discussed. The one major improvement, however, is the replacement of the 1250 MHz transmit antenna. We have had a lot of trouble here with intermittent problems, which I reported last time. The antenna was replaced last spring and to the best of my knowledge, there has been no further trouble. Everyone reports good reception on the 1250 MHz band with the exception of Jay, KB8YMQ. Jay reports he now sees the repeater about P2 to P3 most of the time where before it was P5. I have no explanation for this at this time. The only difference between the old antenna and the new one is the change from a 12dBd ½ wave Comet antenna to a 12dBd ¼ wave unit. The angle of radiation probably changes (I don't know which is which) but at 20 miles distant, I don't think it makes much difference. I plan to repair the old antenna and re-install it to see if any change is noted. The switch shouldn't take much time. Stay tuned for the results. While I'm still on the subject of 1250 MHz, I've noticed that a number of you have made the big switch to transmitting on this band. I think as time goes on, more will follow suit and perhaps, this will be our best band!

I've been busy between chores putting the finishing touches on a new 439 MHz link transmitter to replace the existing one. The reason I'm replacing it is twofold. First, it will boost the output power from about 1 watt to about 10 watts. That should help with reception in fringe areas. Second, the existing link transmitter is packaged with the present 427 MHz transmitter electronics and causes some interference from RF getting into the video circuits. When I replace the 427 transmitter with a new one the link transmitter would replace the link transmitter anyway. This just gives me the opportunity to upgrade it and switch packages in one step. Additionally, the new 436.35 MHz link transmitter will have a 439.35 MHz input also to accommodate the roof camera control without tying up the 147.45 frequency.

The big ticket item coming up is the proposed Columbus to Dayton repeater link. We have the official go-ahead to start work, as the West Liberty site is almost exactly halfway between. Preliminary site topographic work indicates that both paths have "line of sight" conditions. This means that a P5 signal can be maintained with a transmit power of about 3-4 watts at each end. We plan to use the 1250 MHz repeater output as is for the 50 watt signal should be plenty to make it to West Liberty. The return 1280 MHz signal from West Liberty needs to be only 3-4 watts. This must be verified as well as the 900 MHz link signals to and from the Dayton repeater. We plan to perform a test someday soon to verify the calculated data and hope it to occur before it gets too cold to climb towers this fall. That way we will have the winter to devote to construction. Hopefully with the link addition, about 10 new ATVers can be added to the ATCO contact list. That would be great! The next step could be a Dayton to Fort Wayne or Dayton to Cincinnati link. Also, I'm thinking about a remote 439 MHz receive site at West Liberty which would increase the range for both DARA and ATCO. The list goes on and on…

There has been some discussion about adding a 10 Ghz output to the repeater also. If we DO this, are there any Hams out there that would be willing to build receive equipment to monitor this output? Ken found a 10 Ghz 10 dBd gain omni commercial slot antenna at Dayton and couldn't resist the urge to buy it so…we now have antenna capabilities for this band. If there is interest, we'll add a transmitter and voila! A new repeater output will be born. Does anyone have any comments for available transmitters on this band? I know that Downeast Micro has 10 Ghz products but I'm told they are not suitable for wide bandwidth ATV video. Let's discuss this one at our annual Fall Event coming up later this month.

Last but not least is the subject of digital television. Not High Definition Television you have been hearing about lately but just digital television. As many now know, analog television as we presently know it will go away shortly. That is, within the next 5 years or so (if the government has their way) all commercial TV stations will gradually switch over to digital transmission. Some have done it already and are simultaneously transmitting analog AND digital signals. Eventually they will cease transmitting the analog portion and at that time, if you still have your same television, you'll be required to purchase a digital to analog conversion box for your TV to continue. We'd like to begin transmitting digital ham TV at our repeater as soon as possible and to that end, we are investigating ways to accomplish it. There are a limited number of hams doing just that but to my knowledge, there is no ATV repeater in the USA presently doing this. If possible, we'd like to be first. If any of you have any information on this, I'd like to hear about it. There ARE a few foreign groups doing it and I'm trying to find out more. A German group has been reported to have developed a PC board set for this purpose so I am trying to contact them. So far, no information. This will also be a good topic for the Fall Event. For discussion, since our new 1250 MHz antenna is a dual band unit, this gives us an unused vertically polarized omni antenna available for 427 MHz. We propose using it for vertically polarized digital TV on 421 while still keeping the horizontal 427 signal still on the air. Comments are welcome.

Well, that's all for now folks! Don't forget the Fall Event on the 27th of this Month at the ABB shelter house. The details are found later in this issue.
…WA8RMC

THE VIDEOSCANNER FROM G1MFG…A handy ATV item

The Videoscanner from G1MFG is a small semi scanning 5” B/W portable TV that operates from 2300 to 2500 MHz from an external 12vdc source. It has a built in “paddle” antenna similar to the one used in the Wavecom receivers to complete the compact self-contained all-in-one receiver.

This receiver can be handy to take with you on field trips, repeater site search/repair missions, interference hunting expeditions or, for the sports enthusiast, to the game to tune in blimp TV links or to the auto races to tune in the race driver video. Perhaps the black/white screen is all that is needed to “observe” one of the many hidden surveillance video signals in use today by a variety of sources. The included power cord has a plug that fits an automotive cigarette lighter socket. If a separate battery is desired, the current consumption of about 1 amp allows about 10 hours of use with a 10 Amp hour 12 volt battery.

Although this receiver may not be ideally suited as a primary ATV receiver, it comes in handy as a portable compact receiver for signal verification purposes. Under those conditions, a color display is not usually needed. However, if a color display IS needed, simply use the rear video output jack to connect it to an external color monitor.

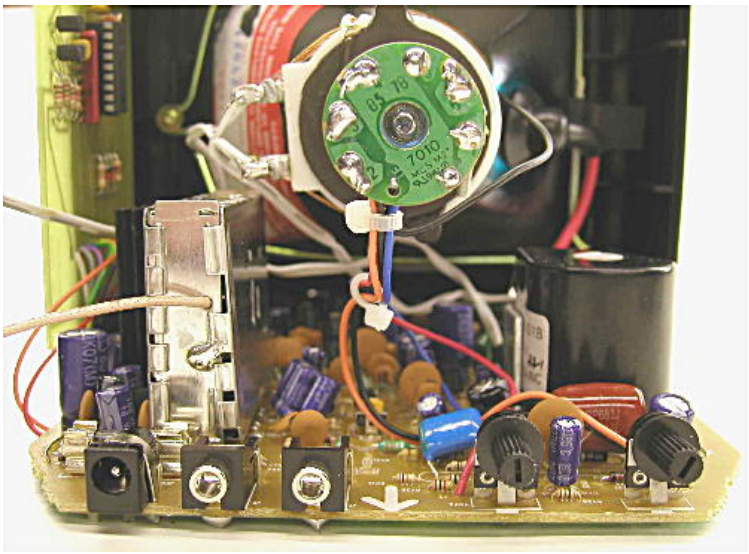
The scanning feature is not a true automatic scanner that scans the band and stops on a received signal but it continuously scans the band from 2.3 to 2.5 Ghz and then repeats which takes about 15 seconds to complete. When a valid signal is observed, the side slide switch must be manually moved from position 1 to position 2 freezing the frequency. When the switch is again moved to position 1, scanning resumes in the opposite direction. That way it is easy to “zero in” on a given signal. An additional aid is a slow scan feature that scans at a 1 MHz rate for approximately the first 5 seconds then accelerates to about 12 MHz/second until halted.

The receiver also incorporates an on-screen display of the frequency being scanned. While the scan is in process, the frequency is displayed. After it is stopped, it’s displayed for about an additional 10 seconds. After that, it disappears so the entire screen is dedicated to the received signal. The on-screen display is not displayed in the remote video signal so use the video output to an external monitor if identification is not desired.

The video output connector, located next to the audio connector and power jack in the picture to the right, contains a high quality color signal that is much better than the black/white self-contained picture. The black/white signal tends to be of lower resolution and contains some traces of trailing image ghosting resulting from poor frequency response in the CRT circuitry but after all, this display should be used to identify the signal and not judge its quality. Use the video output and external monitor for that task.

I checked the overall sensitivity and found it to be about 4-6 dB worse than the average Wavecom and about 14 dB worse than the G1MFG 13cm receive module. This may seem like a lot but remember that this is a portable unit and its main task is to identify relatively strong signals within the 13 cm Ham band and not for “DX” activity. The primary weak signal receive module should still be the G1MFG units described on G1MFG’s web site at www.tvham.com.

The unit is provided with a built in circularly polarized “paddle antenna” permanently wired to the internal receive module. Fortunately there is enough extra internal cable to allow it to be cut off and connected to a rear mounted antenna jack. I recommend cutting the cable near the center to allow connection to a rear connector and also wiring the internal antenna to an additional rear mounted antenna jack. That way a jumper form one jack to the other will enable the internal antenna and using the jack connected to the receive module allows the use of an external antenna. I recommend using SMA connectors because they are both small and well matched to the 2.4 GHz signal.



The picture to the left shows a rear view of the circuit boards with the cover removed. The power jack is on the lower left. Next to it are the audio and video jacks followed by the brightness and contrast controls.

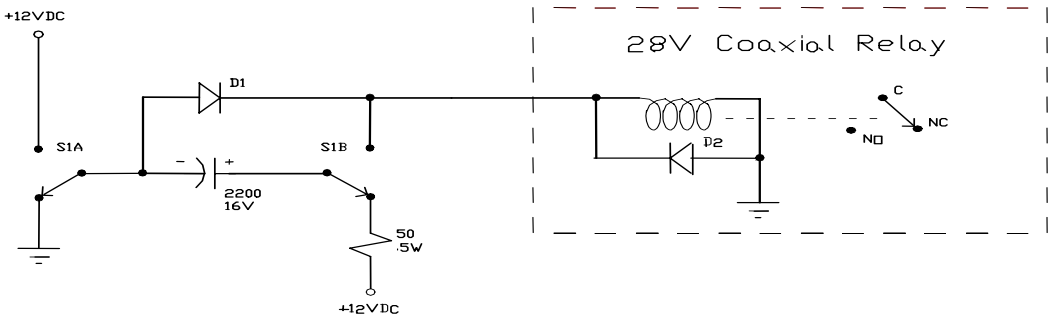
The 2.4 Ghz receiver module is located directly above the audio jack. Notice the small coax cable going to it which is long enough to cut in the middle and fasten to a RF input (SMA) connector to the rear case. The other half of the cable going to the internal paddle antenna can then also be routed to a rear case mounted jack for maximum flexibility.

Notice that there is a separate PCB mounted vertically at the upper left which contains the scanning and frequency control logic.

In summary, if the planned use for this receiver is for primary 2.4 GHz reception in the Ham shack, I think you'll be disappointed. If, however, its use is for portable diagnostic purposes or for surveillance service, satisfaction can be achieved. Also, because at power-up, it locks on to 2.3 Ghz, this makes it inconvenient to set the desired Ham band frequency each time. But, after all, the original design is intended to be used as a surveillance monitor where a number of signals within the 2.3 to 2.5 GHz band are present from various surveillance cameras in the area. For that application the Videoscanner captures the first signal and displays it for about 5-6 seconds until the next signal is within capture range. At that time the picture would "pop" to the next higher frequency signal and so on.
…WA8RMC

NEW LIFE FOR THOSE 28V ANTENNA RELAYS

This is not exactly ATV specific but everyone needs the use of a good antenna relay for his or her Ham station. Frequently 28vdc relays can be found at Hamfests at bargain prices but you usually pass them up because they operate at 28vdc and all you have is a 12v source. But wait! I found the circuit below on the Internet and would like to share it with the group. It will put new life to those old 28vdc relays. My UHF Dow Key 28vdc relay would operate reliably down to about 7 volts DC using this scheme. The schematic is shown below.



It works because the circuit is actually a voltage doubler of sorts for the short time it takes to switch relay positions. In the position shown, switch S1 charges the 2200 mf capacitor to 12vdc. Note the polarity. When the switch changes position, the capacitor is now placed in series with the +12v supply and relay coil (+ supply to – capacitor and + capacitor to + relay). This places 24vdc across the relay until the capacitor discharges. Then diode D1 supplies the remaining 12vdc to keep the relay energized. The circuit works because 12vdc is sufficient to hold the relay coil in the correct position after it receives the initial 24vdc surge required to switch it. Diode D1 can be any power diode rated above the relay current rating. In some cases a Shottky diode would be better because of the lower forward voltage drop. Diode D2 protects the circuit from an inductive "kick" when the switch returns to the initial position. The 50 ohm resistor only limits the capacitor charging current so it can be almost any value from tens up to hundreds of ohms.
…Paul W8RRF

THE 75TH ANNIVERSARY OF THE INVENTION OF TELEVISION

SEPTEMBER 7, 1927 TO SEPTEMBER 7, 2002

A TRIBUTE TO PHILO TAYLOR FARNSWORTH II, THE LAST LONE INVENTOR.

In the summer of 1921, at the age of 14, while plowing a field near Rugby, Idaho, Philo T. Farnsworth was struck with an inspiration, that is still with us today. The television screen you watch is a direct descendent from that moment in the potato field. Farnsworth marveled at the inventions of Edison and Bell. At age 6, Philo confided to his father that he had been born 'an inventor'. By 12, he was demonstrating a natural affinity for all things electrical.

Late one night, hidden away in his attic loft with a stack of old electrical magazines, the aspiring inventor encountered the fanciful notion of "picture, that could fly through the air" by radio waves. Imagine that he had stumbled upon a problem which he may be uniquely suited to solving.

As he continued reading, Farnsworth learned of the earliest attempts to transmit moving images using ungainly machines with spinning disks and mirrors to decompose an image into tiny bits of electrical current. He recognized immediately that these contraptions would never attain the speeds necessary to transmit a coherent moving image.

Upon continuing his studies, Philo learned about the tiny, subatomic particles called electrons. Magnets could manipulate them. These photoelectric substances could convert light into electricity and back again. He also learned about a device called a "cathode ray tube" which combined some of these characteristics and began to wonder how they could be integrated to form a system of television, without any mechanical parts.

One steamy day, in the summer of 1921, Philo crisscrossed an open field atop a horse drawn plowing machine, thinking about television to relieve the boredom, when, for a moment, he stopped to survey his day's work. Noticing the neatly cut parallel rows in the dirt before him, he was struck with a flash of inspiration. As he plowed the field back and forth, in parallel rows, he could also scan an image, one line at a time, with a magnetically deflected beam of electrons inside a cathode ray tube.

At that moment, television, as we know it, with all its extensions and further manifestations, arrived on earth in the mind of-this 14 year old farm boy. A few months later, as the idea continued to take shape in the boy's mind, he drew a sketch of it for his high school science teacher, Justin Tolman. Four years after that, providence provided some funding for his idea.

In the meantime, love had entered his life and at age 20, he married his high school sweetheart, Elma 'Pem' Gardner, who would become involved in his experiments. Pem, only 19, accompanied her husband from their home in Utah, to San Francisco, where Philo began setting up his laboratory in a loft, at the foot of Telegraph Hill. The address was 202 Green Street.

One year later, on September 7, 1927, Farnsworth and his tiny 'lab gang' performed their first successful experiments. They transmitted a simple image of a straight line. As long as he could see if the line was horizontal or vertical, he knew that information was being transmitted from the bottom of one bottle to the bottom of another, proving the principal that struck him that day in the hayfield. In 1930, Farnsworth was granted patents for the ideas, which still form the very heart of the video system used throughout the world today.

Throughout the 1930's he struggled against his most formidable competitor, David Sarnoff, who headed the Radio Corporation of America. RCA, who also owned the National Broadcasting Company radio network, owned numerous patents for radio receivers. The many manufacturers of radio receivers had to pay RCA royalties in order to manufacture any apparatus capable of receiving radio broadcasts. Sarnoff, assured of his position in the industry, issued a statement that the Radio Corporation of America does not pay royalties, we collect them.

Sarnoff and one of his engineers, Vladimir Zworykin, were also working on a form of electronic television. Meanwhile, Farnsworth and his loyal staff, continued to forge ahead with his determination of establishing his system of an all electronic method of transmitting and receiving television pictures.

Needless to say, Farnsworth would pay a high price for his long hours of determination and devotion to his idea. His health would put him into bouts of sleeplessness and depression, which would throw him further behind in his work and also eat away at the remaining time left on his patents.

Meanwhile, the Philadelphia Storage Battery Company, manufacturers of Philco radios, offered Farnsworth a laboratory space. Upon completion of some business details, he accepted and crated up his equipment for the big move, accompanied by many of his 'lab gang'.

The heart of the Farnsworth system was a tube he designed and built, which he called an 'image dissector'. It was this invention which gave the system its brightness and clarity. Other experimenters were still using the mechanical spinning Niplow Disk, which provided a

jerky movement with a top resolution of around 200 lines, while Farnsworth had increased his picture clarity to 441 lines and eliminated all traces of flickering movement.

Meanwhile, things were not going well with Philco. Eventually, he decided to leave and set up his own laboratory elsewhere in the city. Farnsworth was always plagued with a lack of working capital. Sarnoff was well aware of his competitors financial situation and the fact that his offer to buy out Farnsworth, made several years earlier, had been turned down. It was then that Sarnoff and RCA decided to sue Farnsworth, claiming patent infringement. Meanwhile time was running out on some of Farnsworth's patents. With neither side providing concrete proof to back up their claims, it was difficult to come to a decision. It was then that Philo remembered his old high school science teacher, Justin Tolman, in whom he had explained his idea and diagramed it on the blackboard.

Fortunately, for Philo, his lawyer and the lawyer for RCA were able to find Tolman, who was able to produce the much needed evidence to substantiate the claim made by Farnsworth.

Eventually, for the first time in history, the Radio Corporation of America had to pay a royalty to Farnsworth, in order to proceed with an all electronic means of transmitting and receiving television pictures. Needless to say, this is only a capsule summary of what transpired behind the scenes which led to this day of celebrating the 75th anniversary of the all electronic television system and pay homage to Philo Taylor Farnsworth II, the last lone inventor.

Incidentally, the term ‘Emmy’ was taken from his invention, the image dissector which was called an ‘immy’ by the laboratory workers. Thus everyone who received this award is paying tribute to the inventor of this medium without even realizing it.

OBTAINING ADDITIONAL INFORMATION ON FARNSWORTH
For any of our readers wishing to follow up on this story of Farnsworth and his invention there are several books and websites available.

BOOKS: Distant Vision by Elma G. Farnsworth , The Farnsworth Chronicles by Paul Schatzkin, The Last Lone Inventor by Evan I. Schwartz, The Boy Genius and the Mogul by Daniel Stashower
WEBSITES: www.farnovision.com www.philotfarnsworth.com wT,7w.philo75.com

Some additional information: Philo Farnsworth died March 11, 1971 at age 64. His widow celebrated her 94th birthday on February 25, 2002. She is in good health and resides in Fort Wayne, Indiana. Incidentally, Elma "Pem" Farnsworth is the only living witness to the first successful demonstrations of electronic video in 1927!
…Thanks to QRM newsletter from TUSCO ARC in Dover, Ohio.

FCC OPTS FOR STATUS QUO AT 2300 TO 2305 MHZ

The FCC has dismissed an ARRL petition that sought primary status for amateurs at 2300-2305 MHz. At the same time, the Commission turned down petitions from AeroAstro and MicroTrax—commercial interests that had hoped to share the spectrum with Amateur Radio. The action, taken October 9, maintains the status quo on the band. "That the commercial petitions were dismissed is, of course, good news," said ARRL Chief Executive Officer David Sumner, K1ZZ. "We had argued for that outcome."

Sumner called the outcome of the League's petition, RM-10165, "mildly disappointing" because, as he explained, a status upgrade "would provide some measure of protection against future commercial proposals." Sumner pointed out that the FCC did not altogether rule out a future status upgrade, but he cautioned that the band "is still vulnerable."

In turning down the ARRL's petition, the FCC said that since it was also dismissing the MicroTrax and AeroAstro petitions for access to 2300-2305 MHz, "amateur operators' weak-signal communications in the 2300-2305 MHz band will be protected if the amateur allocation remains secondary." The FCC said the band "will remain in the Commission's reserve, and the status quo in the band will be maintained until the Commission reevaluates the spectrum status for the Amateur Service that may be appropriate."

The FCC turned down the MicroTrax and AeroAstro applications in part because appropriate spectrum already was available elsewhere and neither company had demonstrated a need for an additional allocation. MicroTrax had proposed to establish a Personal Location and Monitoring Service (PLMS) at 2300-2305 MHz under FCC Part 27 rules.

The AeroAstro petition went further, proposing to share the band on a co-primary basis with the Amateur Service subject to technical and service rules. AeroAstro wanted to establish its Satellite EnabledNotification System (SENS) messaging service under the FCC's Miscellaneous Wireless Communication Service rules. The FCC also expressed concerns that NASA's Deep Space Network would not be protected by the modified out-of-band limits AeroAstro had proposed.

Internationally, the 2300-2305 MHz band is allocated to Fixed and Mobile services on a primary basis and to the Amateur Service on a secondary basis in all three International Telecommunication Union regions. The Radiolocation Service has a secondary allocation in the band in Region 1, and a primary allocation in Regions 2 and 3.
…From ARRL Headquarters ARRL Bulletin 63 ARLB063 Newington CT October 15, 2002

REUBEN MEEKS – NEW ARRL OHIO SECTION MANAGER

Reuben Meeks, W8GUC, former president of the Dayton Amateur Radio Association (DARA) is the new Ohio Section State Government Liaison (SGL) for the American Radio Relay League (ARRL). He succeeds Law Professor Jeff Ferriell, K8ZDA, of Columbus, who retired after four years so he could complete a college level textbook on contract law.

Reuben, of Vandalia, will supervise Ohio's local government liaisons. These are amateur radio operators who monitor the activities of local elected officials and boards who pass on legislation which may affect amateur radio operators. Rules and regulations on tower construction are the biggest concern for these hams.

Reuben will also be the ARRL Ohio Sections official spokesman to the Ohio General Assembly, Governor and State Supreme Court. The appointment was made by Ohio Section Manager, Joe Phillips, K8QOE.

Reuben has been an amateur radio operator for 45 years (first licensed KN6GUC), is a Broadcast Engineer recently retired from government service but continues as an engineering consultant. He was graduated from Sacramento State College in both Business Engineering and Theology. He has 30 years experience in the US Air Force completing from 1983 to 1993 at Wright Patterson AFB. Reuben also found time to obtain a private pilot license.

For more information about the LGL program, contact Reuben at <w8guc@arrl.net>.
…From the Ohio Section, ARRL

TOM O'HARA AND BILL PARKER…Does W8DMR have mystical powers?

Bill, it is a strange coincident, but while cleaning out the garage – OK starting to clean it out, it will be a year or more to do this task - I was pulling down stacks of old QST's and one from April 1959 fell down and opened to page 61 where I saw a photo that had your call under it. It was in the "World Above 50 MHz" column and showed you on ATV at the time.
…Tom W6ORG

Tom, if you're at all like me, you would be sitting comfortably, still in the garage, with the other issues of QST, flipping one page at a time, making sure you hadn't missed anything, but rushing to complete the garage cleaning task. A guy has to be mighty careful or he could discard something really valuable, right?

It is without doubt, a supernatural event occurred, again proving all ATVers are part of an all encompassing entity, commonly referred to as the herd. Falling magazines do represent a hazard. Have you notified ARRL Headquarters of this unusual phenomena? The October issue of QST could use a good eerie, spooky, ghostly Halloween yarn.

Perhaps you should take the April 1959 issue, pound a wooden stake through it, and set it afire? No point in taking any chances. Thanks for sharing this very unusual happening with me. Now, if I can just locate my lucky charm...I certainly don't want any 40+ year old QSTs attacking me.
…Bill W8DMR

ATCO RECEIVES DONATED HAM EQUIPMENT

I am extremely pleased to announce that ATCO has received a significant quantity of Ham radio equipment donated to us by Mike Wilson Sr. of Tempe, Arizona. He inherited them from his father, Carl Wilson (SK), WA8CXO from the Springfield, Ohio area. The club wishes to thank Mike for his generous donation and assure him that all equipment will be put to good use.

I will display the equipment at our Fall Event coming up on the 27th so we can all see the individual pieces and decide how to best use them. A picture of the equipment is shown below which consists of two Kenwood HF transceivers, Heathkit HF linear, Drake antenna matching unit, Kenwood 2 meter mobile radio, two Yaesu 2m mobile radios a Cushman equipment monitor and other miscellaneous items.
…WA8RMC

ATV CHANNEL SPACING REFRESHER

Most areas have their ATV frequencies as part of a local band plan. But as the band is used more by all modes, there are technical considerations that need to be addressed if the local band plan is revised or an all new one configured.

Ideal AM ATV channel spacing would be same as broadcast - 12 MHz (10 MHz exception in the case of channel 4 and 5). This is what was done with the 1200 MHz band plan (5 channels starting at 1241.25 in 6 MHz band width channels) which was the first time a band plan was done from an engineering standpoint rather than a consensus of what was being used by a few at the time. On the 400 and 900 MHz band there is only room for 2 ATV channels in any given area.

On 900 MHz the spacing is 12 or 13MHz originally depending on where you are, but the Automatic Vehicle monitoring system people made us move from 910.25 simplex and 923.25 repeater output, to avoid their transmissions and this will vary from area to area and just have to take the interference since they are primary.

On the 400 MHz band, if the local ATV community elects to have an inband repeater, at least 12 MHz is necessary in order for the VSB filters to do their job of rejection to prevent desense and thus take the only 2 channels available. Because of the sound subcarrier being ± 4.5 MHz on each side of the video carrier, only 2 channels are available for ATV in any given area without overlap and interference. For this reason, 439.25 or 434.0 are chosen for the high end of the band, and 427.25, 426.25 or 421.25 MHz for the low end of the band. 421.25 is only used for repeater output because the lower sideband 4.5 MHz sound would be outside the 420 MHz band edge as well as any video carrier frequency below 425 MHz and requires a VSB filter in the antenna line to attenuate the out of band energy. The DCI 8 pole VSB filter has the best attenuation slope from those I have tested (International Crystal, Spectrum International and TX-RX Systems being the others). Ideally 434.0 or 439.25 can be inputs with 421.25 output. 439.25 and 426.25 can be respective input and output, or vice-versa, but 434.0 can only be an input with 421.25 output to get enough separation. Some areas have switched to 426.25 in and 439.25 output to minimize interference from FM voice repeaters below 444.0. Technically 427.25 cannot be used for a repeater because the sound subcarrier falls within the 431-433 weak signal restriction - however it is used in some areas due to military radar interference and no real problem to 432.0 weak signal operation.

The common ATV video carrier frequencies are taken from various local band plans and most predate the popularity of cable television. Only by coincidence are 421.25, 427.25 and 439.25 the same as cable channels 57, 58 and 60 respectively. 426.25 and 434.0 are well within the AFC locking range of cable tuners in TV sets to receive on cable channels 58 and 59. AFC in most TV's will lock ± 1 to 2 MHz from center channel frequency. 434.0 was selected instead of the standard cable TV channel 59 of 433.25 out of consideration to the weak signal members on our technical committee who wanted more separation even though the video sidebands are down 35 or more dB ± 1 MHz from the video carrier. It also puts the sound subcarrier (15 dB down) above the satellite segment of 435-438 (438.5 MHz). The color subcarrier is more than 22 dB down worse case (all red picture), typically 35 dB or more, even though in the satellite segment (437.58) and has not caused any interference here in the over 20 years it has been used. There are no satellites on this frequency presently. Legally, the repeater owner would only have to attenuate the color frequency 4 more dB with a notch filter to fall under the -26 dB FCC mean power definition of bandwidth, but it has never come up anywhere that I know of.

If the local ATV community elects to go crossband repeat, the least cost to the user and most efficient distance wise is to have the input on the 400 MHz band and the output on 900 or 1200 MHz (900 MHz goes half the distance that 400 MHz does given the same power and antenna gains plus it is easier to remove the higher coax loss of the higher bands with a preamp at the antenna rather than a transmit power amp). If one 400 MHz band TV channel is used for cross band repeater input, the other can be used for simplex and may not need the full 12 MHz separation depending on relative signal strengths. We use 434.0 repeater input and 426.25 simplex here in Southern California with only rare occasional interference. Our bandplans can be seen at www.scrrba.org.
…Tom O'Hara, W6ORG email: tomsmb@aol.com
Memeber SCRRBA Technical Committee
ARRL Technical Advisor - Spectrum Management and ATV

PIZZA PARTY GATHERING

On September 14 we conducted an informal Pizza party gathering at Donato's on Southwest Blvd near the Kingsdale shopping center. There were about 10 of us that gathered that night for some food and "tall" stories. I'd love to show you the fun we were having but as I was about to snap the picture with my new digital camera, it reminded me that I forgot to insert the memory card. With no spare available, we'll have to only remember the occasion with **our** memories. Sorry guys, we really DID have a good time.

The Fall Event is coming up later this month and the holidays follow shortly thereafter so I suggest that we re-convene around mid January. How about that? …However, on second thought, if Ted, N8KQN, gets hungry for pizza before then, we might be able to squeeze one in around the first of December. Any takers? Also, it looks like we have enough money in the treasury so the next pizza party will be financed by ATCO.
…WA8RMC

ATV BANDWIDTH DISCUSSIONS

Barry, VE6SBS asks the following question to the ATV Internet group:

"I am confused! Can someone give a good explanation as to how the bandwidth ends up being only 12 MHz and how Carson's rule does not apply? Or are a number of FM ATV repeaters deviating beyond the amateur band limits or encroaching on other adjacent amateur frequencies?"

Barry, I would be interested in seeing some of the responses. I was waiting for them to show up on the reflector but I see everyone must have replied directly to you. The reason I would like to see the responses is that I have not been able to find an answer to a similar question regarding the occupied bandwidth of an FM ATV signal. We are just starting to get involved in FM ATV locally. Before we ordered equipment (that arrived today) I searched the Internet to learn as much as possible about FM ATV. By noting what frequencies many groups have chosen to use, one can deduct that the bandwidth of an FM ATV transmission must be 12 MHz. But every explanation I have found usually starts out with:

Occupied Bandwidth: Per FCC Rules 97.3(a)(8) it is the width of a frequency band outside of which the mean power of the transmitted signal is at least 26 dB below the mean power of the transmitted signal within the band." and then goes on to say something like:

Carson's Rule for FM occupied bandwidth is a good rule of thumb to estimate what the 26 dB down point will be given deviation and highest modulating frequency. The formula is 2 times deviation plus 2 times the highest modulating frequency. Therefore with 4 MHz deviation and 4.5 MHz sound, the occupied bandwidth would be 17 MHz."

Most of the 1.2 GHz and 2.4 GHz equipment for sale comes with 6 and 6.5 MHz sound sub-carriers, so, using Carsons rule, the occupied bandwidth would be 20 MHz with 6 MHz sound or 21 MHz with 6.5 MHz sound. Carson's rule makes sense. But I see a lot of references to the bandwidth being 12 MHz and notice a number of groups transmitting video, including a 5.5 or 6 MHz sound subcarrier, using frequencies that indicate the bandwidth really is only 12 MHz.

Tom O'Hara responds as follows:

Carson's rule is a rough approximation and gives a worst case for occupied bandwidth - stay with in it and you should be clean FCC wise. A lot depends on the level of the sound subcarrier injection. Carson's Rule is accurate only for sine wave modulation at full deviation.

Those that believe their transmitted occupied bandwidth is only 12 MHz with 4 MHz deviation either don't have a sound subcarrier, are wrongly defining transmitted occupied bandwidth by the usual -3dB points or never looked at it on a spectrum analyzer and measured the -26 dB down points with full video modulation - My app note contains a spectrum analyzer jpeg photo.

Now you can get away with a 12 MHz filter in the receiver IF, depending on the attenuation slope, with a little noticeable reduction in resolution and there may be enough sound subcarrier to get through, but this does not change the fact that your transmitted bandwidth is much greater and may pose a legal problem with band edges and other users.

Reduce your bandwidth by reducing the deviation, but as you do, you also reduce the FM advantage as the modulation index approaches 1.
…Tom O'Hara W6ORG

Thanks for all the excellent responses. I am no longer confused and my suspicions have been confirmed.(1) Carson's rule (which I never doubted) is correct (gives a rough approximation and gives a worst case for occupied bandwidth) and(2) those who insist that it is 12 MHz (no matter which sound subcarrier freq is used) are simply quoting what they have been told and have accepted as fact, rather than learning and understanding what the math and technical aspects dictate that the bandwidth really is.

Those claiming the bandwidth to be 12 MHz, even though they had no explanation as to how this bandwidth was determined, always had a reason as to why this figure had to be correct, such as "it must be OK as there have been no complaints"!

What I was looking for, and now have, are answers that I can confidently use to explain why the bandwidth sometimes is less than what Carson's rule indicates, why everything seems to work OK even though the bandwidth is greater than thought, etc, etc. Since I found no good, clear explanation of bandwidth requirements, etc on the internet, I am going to create a web page (try at least) with the information and excellent explanations that I received and attempt to clarify this, and perhaps a few other issues, so I have somewhere to send others with similar questions. When such a page is ready I will announce it on this reflector (and then prepare for any comments). Don't bother checking my ATV pages now as they are very outdated. I hope to update a lot of my pages over the coming winter as I learn more and try to get some ATV action started locally.
…Barry VE6SBS

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 our group's lifeblood. It's important that we actively recruit new faces aggressively. There are no new members this time so I encourage you to search for potential Hams that might be interested in ATV.
…WA8RMC

TV TUNER DELIVERS ADVANTAGES FOR SET-TOP BOXES

From time to time, I see new developments in the electronics world of interest to us. I hope I'm not boring you with seemingly useless trivia. If so, let me know. Otherwise, it's good to see what's happening in the world of electronics advancement. Ed.

"Industry's highest performing single-conversion tuner chip cuts tuner costs by up to 25%, and board space by up to 33%".

The manufacturer says . . .

Zarlink Semiconductor announced immediate availability of a flexible RF silicon tuner chip that delivers very high levels of performance and reliability to both analog and digital terrestrial television STBs, while significantly reducing cost and board space.

Zarlink's innovative SL2610 is the industry's first tuner chip that allows low-cost, compact, single-conversion tuner designs to achieve the same high levels of performance as larger, more expensive double-conversion tuners. The SL2610 was designed in consultation with a major U.S. television and STB manufacturer to deliver quality RF tuner performance in the most challenging reception conditions.

Designers of mass market terrestrial STBs are demanding flexible, low-cost tuner chips that can reliably convert analog and digital terrestrial TV (DTTV) signals into clear, crisp pictures. Until now, designers have used double-conversion tuners – which use two steps to convert incoming RF signals to lower-frequency, single-channel outputs – to achieve high-quality reception of DTTV channels. Zarlink's SL2610 allows STB designers to achieve high-performance, reliable analog and digital TV reception using a single frequency conversion step.

The SL2610 is also the industry's first single-conversion tuner device with on-chip image channel reject to eliminate unwanted "image channels." This image reject feature, coupled with the SL2610's sophisticated handling of high-amplitude input signals, eliminates the need for costly, complex, specially aligned front-end tracking filters in many applications. As a result, customers can integrate their tuner designs directly on STB motherboards, instead of placing them on dedicated RF boards.

"With the SL2610 we're delivering what designers truly need – a tuner chip that delivers excellent digital and analog TV reception while lowering the cost and shrinking the size of STBs," said Nick Cowley, RF systems specialist, Zarlink Semiconductor. "Tuners built with the single-conversion SL2610 cost about 25% less than double-conversion designs and use about 33% less board space."

Image reject is required to eliminate undesired image channels that are picked up by tuners while receiving desired channels. The unique image reject circuitry in Zarlink's SL2610 delivers more than 30 dB (decibels) of image suppression. When coupled with a simple, non-aligned tracking filter, the chip easily delivers the performance required for operation in Europe and other countries that have adopted ETSI's (European Telecommunications Standards Institute) DVB-T (Digital Video Broadcast-Terrestrial) standard for DTTV.

The SL2610 also delivers high-performance intermodulation intercept. This enables the device to efficiently tune to the desired channel in the presence of higher amplitude interferers or wide-bandwidth composite input signals.

The SL2610 is a triple-band, low-noise RF mixer oscillator (MO) that operates across the full 50-900 MHz analog and DTTV frequency range. Each MO band consists of a low-noise preamplifier/mixer and local oscillator, supported by an external, varactor-tuned tank. The MO outputs share a low-impedance SAWF (surface acoustic wave filter) driver stage.

The SL2610 also integrates an I2C bus-controlled PLL (phase-locked loop) synthesizer designed for low phase-noise performance and compatible with all common frequency offset requirements. At 10 kHz (kilohertz), the free running phase noise of the SL2610 is typically less than -90 dBc/Hz (decibels relative to carrier power per hertz).

The device can be programmed to generate all output IFs (intermediate frequencies) commonly used in analog and digital receiver systems.
The Zarlink website is www.zarlink.com.

ChipCenter's Paul O'Shea says . . .

Zarlink decided when they started designing this product that it was not going to be another me too product. It was a good business decision because there are several mixer oscillator PLL circuits on the market. The company decided to design a product that offers significant performance advantages so they collaborated with a leading STB and TV manufacturer, and specifically targeted the emerging digital terrestrial market in the US. They chose the US market because manufacturers were having problems with some installations. There were problems with high amplitude reflections of analog channels with the digital channels. Additionally, the transmitter power in the US market is not well regulated so it can be a very hostile environment for the tuner.

The SL2610 was made using a SiGe process, not CMOS. Zarlink put a lot of money in the different processes and from their observations and the papers published they were not convinced that CMOS was currently the right process for the very high performance RF analog functions. This was especially true for designs that need a very wide dynamic range. Currently, Zarlink doesn't think RF CMOS is at the stage where it's appropriate for the high-end tuner IC. For them, SiGe offers the best performance for the high-end tuner application.

As far as Zarlink knows this is the first single conversion tuner on the market with on-chip image channel reject. In fact there may not be any mixer oscillators that have image rejection built into them either off-chip or on-chip. Zarlink designed the SL2610 to integrate the image rejection, which gives better protection to the image channel, and also improve the signal handling. That means that in some of these environments where there is a very hostile analog interferer present, the chip can handle signals and cope with a very high offset interferer. The company designed the SL2610 to meet challenging requirements such as delivering an acceptable digital channel with an N+1 channel interferer or a +70dBc signal. For example, a high interferer arises when you are watching a digital channel from a relatively distant transmitter and an analog channel is transmitted from much closer proximity, causing interference. The transmitters in the area are supposed to be aligned so they don't cause a problem but if you get local reflection you can get a lot of power reflected into the receive path of your tuner. This is particularly bad in urban areas with many high-rise buildings.

The SL2610 single conversion tuner provides a lower cost conversion than the typical double conversion types. In the double conversion you have a broadband input to the mixer oscillator that is converted to a high IF, and the high IF uses some type of surface acoustic wave (SAW) filter to perform the channel selection, and then it is down converted to the IF. There are two mixer stages – the first being broadband and the second, narrow-band followed by a fixed SAW filter.

In the single conversion the RF input goes through a series of tracking filters to the mixer section. That tracking filter is a very narrow-band filter centered on the desired channel. The function of the narrow-band filter is to suppress the image channel present in a single conversion system, and reduce the total width of the composite signal presented to the mixer. That prevents intermodulation distortion in the mixer. Because there is a tracking filter in the single conversion tuner, the filter tracks with the local oscillator, so as you tune to a channel at 50 MHz, for example, the local oscillator may be at 90 MHz, and the filter is centered on 50 MHz. If you tune to a channel at 500 MHz, the local oscillator will shift to 540 MHz and the tracking filter will shift to 500 MHz. So they have to track with the local oscillator and the center frequency across the whole band. To achieve that you need alignment, which consists basically of a manual or robotic line with a tracking filter that consists of coils and diodes. The function of the tracking filter is to get rid of the image channel and get rid of the composite power that hits the mixer oscillator.

The free running phase noise of the SL2610 is typically less than –90 dBc/Hz (decibels relative to carrier power per Hz). That compares very favorably to the typical phase noise of –86 dBc/Hz for the lower performance local oscillator PLLs on the market. The SL2610 synthesizer was integrated with the mixer oscillator designed for low phase-noise operation making it is a low phase-noise PLL. The noise sources generated in the PLL loop are very low, and when coupled with the design it allows a relatively high comparison frequency for a given step size. That means you can use a wider loop bandwidth with the SL2610, compared to other products, and improve the phase noise within that loop bandwidth.

Another important feature about the tuner is that it can be programmed to generate all the output IFs. The reference divider of the PLL enables Zarlink to cover all the different offsets required by countries. The SL2610 is programmable and the software drivers in the STBs contain the appropriate register maps to select the required step size. The software control built into the PLL allows you to dynamically change the loop parameters as you tune across the band, so you can maintain a fixed PLL loop bandwidth. You can use the PLL to improve the in-close phase noise allowing you to keep a PLL loop bandwidth constant as you tune across the frequency range. With most LO designs that is difficult to achieve because local oscillators are varactor tuned and the characteristic of the varactor diode means that the gain of the oscillator will change, which means that the loop bandwidth also changes.

The SL2610 is now in volume production. The chip is designed into SiGe and packaged in a 6 mm square MLP (miniature leadless plastic) flat pack. Evaluation boards are available. In high volumes, the SL2610 is priced at US$1.94.
…Chipcenter web page at http://www.chipcenter.com/analog/products_800-899/prod807.htm) **Reprinted by permission**.

SHUTTLE ATLANTIS LAUNCH CAMERA HAD HAM RADIO ORIGINS

Live video from a camera attached to NASA's shuttle Atlantis provided an unprecedented view of a space shuttle launch October 7. Designed and built by Ecliptic http://www.eclipticenterprises.com , the Rocket Cam Imaging System was attached to the skin of the shuttle's large external fuel tank. AMSAT's http://www.amsat.org Jan King, W3GEY, is Ecliptic's chief technical officer.

According to AMSAT's Tom Clark, W3IWI, King and another AMSAT stalwart--Gordon Hardman, W0RUN--developed the launch camera's prototype some years ago in Boulder, Colorado. According to an Ecliptics news release, the aft-facing Rocket Cam provided NASA's launch team and an eager world-wide audience with dramatic live, color video of the entire launch, starting 10 minutes before liftoff and continuing through separation of the shuttle's solid-rocket boosters and the jettisoning of its empty external fuel tank. The Rocket Cam transmission ceased some 15 minutes after liftoff when the tumbling external tank burned up during reentry into Earth's atmosphere above the Indian Ocean.

Ecliptics says its unique camera system is employed regularly by Boeing on its Delta II and Delta III rockets and by Lockheed Martin Astronautics on its Atlas 2, Atlas 3, Atlas 5 and Titan IV rockets.

King was the project manager for the AO-7 satellite, which recently came back to life following a silence of some 21 years. King and Hardman were the primary AMSAT-NA people behind the AO-10 satellite.

Hardman and his wife Molly, W0MOM, are now principals in Crosslink http://www.crosslinkinc.com , which makes the Alpha series of amplifiers. The Atlantis takeoff video is available from the Ecliptic Web site http://www.eclipticenterprises.com/gallery_rocketcam.shtml or from the NASA Human Spaceflight Web site http://spaceflight.nasa.gov/gallery/video/shuttle/sts-112/html/fd1.html .
…from The ARRL Letter Vol. 21, No. 40 October 11, 2002

THREE-FIVE TAKES ANOTHER STAB AT PROJECTION TV MODULES

SAN MATEO, Calif. - Three-Five Systems Inc. plans to show a 45-inch projection TV at Comdex in November that uses an optical module it helped design. Three-Five hopes the $800 module sparks a broader use of its liquid-crystal on silicon (LCoS) microdisplay technology.

Three-Five is developing LCoS microdisplays in partnership with Advanced Digital Optics Inc., a subsystem designer owned by Viewsonic Corp. The two hope to reduce by as much as two-thirds the cost of first-generation LCoS optical modules for use in projection TVs.

"We are investing in the required infrastructure to enable the microdisplay market," said Jack L. Saltich, president and chief executive officer of Three-Five (Tempe, Ariz.).

The partnership marks Three-Five's second effort in optical modules for projection TVs. The company provided components for an optical module that powered a 50-inch projection TV from Thomson. (Optical Link Inc. provided the color management system and and Corning Precision Lens the light source for that module.) Thomson withdrew that TV from the market when it concluded it could not reduce the costs of that module.

The Three-Five/Advanced Digital partnership aims to craft a lower-cost module. Saltich said he believes six-million projection TVs could be sold in 2005, which would give some traction to LCoS devices.

Competitors abound

But Three-Five has plenty of competitors in this area. Optical Coating Laboratory, Inc. (Santa Rosa, Calif.), a division of JDS Uniphase, is also developing optical modules for projection TVs. Texas Instruments Inc. pursues this market with its digital micromirror devices. Sony Corp. and Seiko Epson Corp. are betting on polysilicon LCD technology. And Toshiba Corp. has announced a $9,000 projection TV based on LCoS components from Hitachi Ltd.

Microdisplays are better known for use in wearable displays that could someday become options for smart phones, PDAs and laptop computers. Microdisplay goggles are still bulky, however, and cost more than $400.

"I think they need to get down below $200 to take off," Saltich said.

One advantage of microdisplays is that they consume only 1 watt, versus the 6 W to 7 W required for a laptop display, Saltich said.

At Cebit 2002 this past March, Siemens showed a prototype cellphone with an embedded LCoS microdisplay that could access slides off a remote network and project them onto a screen. "It's the concept of a sub-100-gram projector," said Saltich.

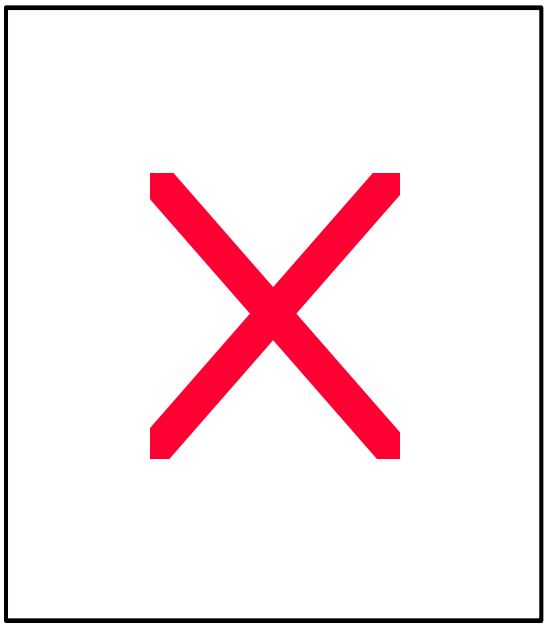
Three-Five now holds nearly 70 patents related to microdisplays, with some technology obtained through its $3 million acquisition in January of Zight Corp., formerly Colorado Microdisplay. The company is also part of a consortium that aims to enable production of microdisplay-based systems in Taiwan. The consortium is organized by Three-Five's silicon provider, United Microelectronics Corp.

While the company works to get microdisplays off the ground, its current bread-and-butter business is the design of custom flat-panel display modules for a variety of cellular, consumer and industrial/medical systems.
…Rick Merritt EE Times October 8, 2002 http://img.cmpnet.com/eet/v2/print_button.gif **Reprinted by permission.**

WEST MICHIGAN HAMS CAN NOW BE SEEN AS WELL AS HEARD

"CQ ATV, CQ ATV, CQ Fast Scan Amateur Television". Perhaps you have heard these words on 144.34 FM simplex some evening and wondered what was happening. Now 6 MHz wide AM television signals (minimum, assuming vestigial sideband filters are employed) are definitely not allowed by the FCC on the 4 MHz wide 2 meter band. Neither was the caller looking to exchange a few pictures/minute via one of the slow scan television modes so popular on the low bands. Rather he/she was looking for someone to QSY over to the 70 cm (or higher) band where one can legally transmit full 30 frame/sec NTSC video including color and sound. Typically individuals wishing an ATV "eyeball" QSO meet first on 144.34 MHz as that's the national ATV simplex liaison frequency. The use of 2 meter FM and vertical polarization makes it easy for others to join in or just listen with minimal equipment, even an HT can suffice.

What has been the problem with ATV in the West MI area until recently is that to achieve the required signal to noise ratio on video for a snow free "P5" picture at the other end, usually requires the use of gain directional antennas. Under simplex communication only 2 people can then exchange video at a time and trying to work any distance, say from Grand Rapids to Chicago, usually requires 50-100 watts, a high tower and an expensive UHF antenna array. As a way around this problem the K8DMR ATV repeater was put on the air in 1998 from the Grand Rapids Red Cross. It employs omni-directional, horizontally polarized, 6 dBd gain antennas for receive and transmit on 439.25 MHz and 421.25 MHz respectively (cable channels 60 and 57). Now everyone can simply point their antennas towards the same location to see the video. With sensitive receivers at the repeater and a powerful transmit amplifier the individual repeater user's home equipment can be quite modest.



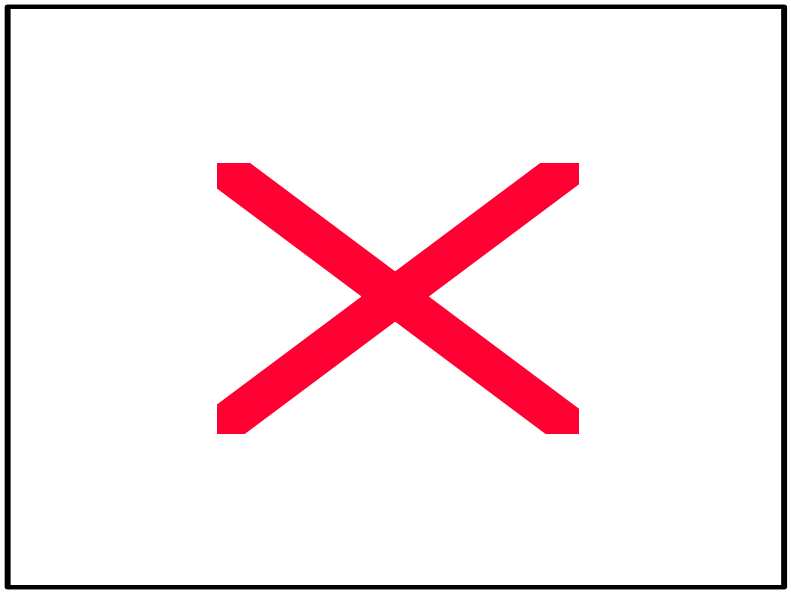
The 144.34 audio is also repeated on the companion sound subcarrier at 425.75 MHz along with a CW ID using a repeater controller based on a PIC microprocessor. Horizontal sync (15.7 kHz) keys the repeater. On 70 cm two receivers are used, both with VSB filters and GaAs-FET preamps. One receiver is set for the upper vestigial sideband (roughly 438-444 MHz) while the other is tuned for the lower vestigial sideband (roughly 435-441 MHz) associated with the input signal. Most users transmit full double sideband AM so both vestigial sidebands are available although the upper VSB signal is usually peaked in many ATV transmitters and therefore preferred. In addition to the multi-cavity VSB filters for each receiver a set of 4 notch filters on the lower VSB receiver serves to eliminate any trace of the K8SN repeater at 442.175 MHz or GRARA's own 444.4 FM repeater from desensing this receiver. In the case of the upper VSB receiver a single large cavity at the input notches out the 444.4 W8DC signal even though the transmit antenna is only a few feet away from the ATV receive antenna. A separate FM receiver monitors 442.175 at all times and because there is no way to notch out this frequency and still receive upper VSB a special control circuit switches receive operation to the lower VSB receiver when 442.175 is active.

There is also a sensitive 1290 MHz receiver and high-gain Comet vertical on the tower for those with transmit capability on the 23 cm band. Operation on this band is via FM video (constant power) rather than AM video used on the 70 cm. Also polarization is vertical on 23 cm vs horizontal on 70 cm due to the absence of FM repeaters in this area on the former and the additional bandwidth available there. The repeater controller has multiple video inputs so that either a 70 cm or a 23 cm signal will key the transmitter (on a first come first served basis).
Currently a commercial cable TV exciter tuned to channel 57 provides excellent but low level upper VSB video (50 mw peak "sync tip" power). This is boosted by a first linear amplifier to about 15 watts and then input to a second linear amplifier where the output is about 150 watts on sync tips. After 8 poles of additional VSB filtering the transmit signal is fed to a 22 element "rib cage" antenna mounted on the Red Cross tower and pointing downward just below the club's tri-band Comet "top-stick" antenna. With 6 dB antenna gain the effective radiated power is 600 watts peak. Receive is via a second rib cage antenna mounted right side up at the same location.

Typically there is an informal round-table every Thursday evening around 9 P.M., again using 144.34 for check in. However there is activity most every evening as people show off their stations, provide close-ups of current projects or schematics, run home movie video tapes of travels or the grandkids, provide close ups of the pets, or just enjoy a good eye ball QSO with friends. Because of the range of the repeater, stations from as far away as Central IL, Milwaukee and Jackson check in frequently, given just a slight band enhancement. Best true DX seen on the repeater so far have been Dayton Ohio, Davenport Iowa and Rochester MN.

To join in the fun tune to 144.34 most every evening on 2 meters. Then take a cable ready TV set to channel 57 and connect it to an external antenna rather than the cable service. If you live within 5-10 miles of the repeater a simple indoor UHF bow-tie or "even "rabbit ears" may work to give an acceptable picture. Otherwise a small beam can be used. Just be sure it is a 70 cm broadband beam and not a "Radio-Shack" outdoor TV type antenna. The gain of the latter antennas, even the big arrays, falls off like a rock below 480 MHz and is little better than a dipole antenna for frequencies above VHF channel 13 and below UHF channel 14. On the transmit side the price of ATV equipment is getting quite cheap. For example about $100 buys one a 100 mw exciter and $140 more a 10-20 watt

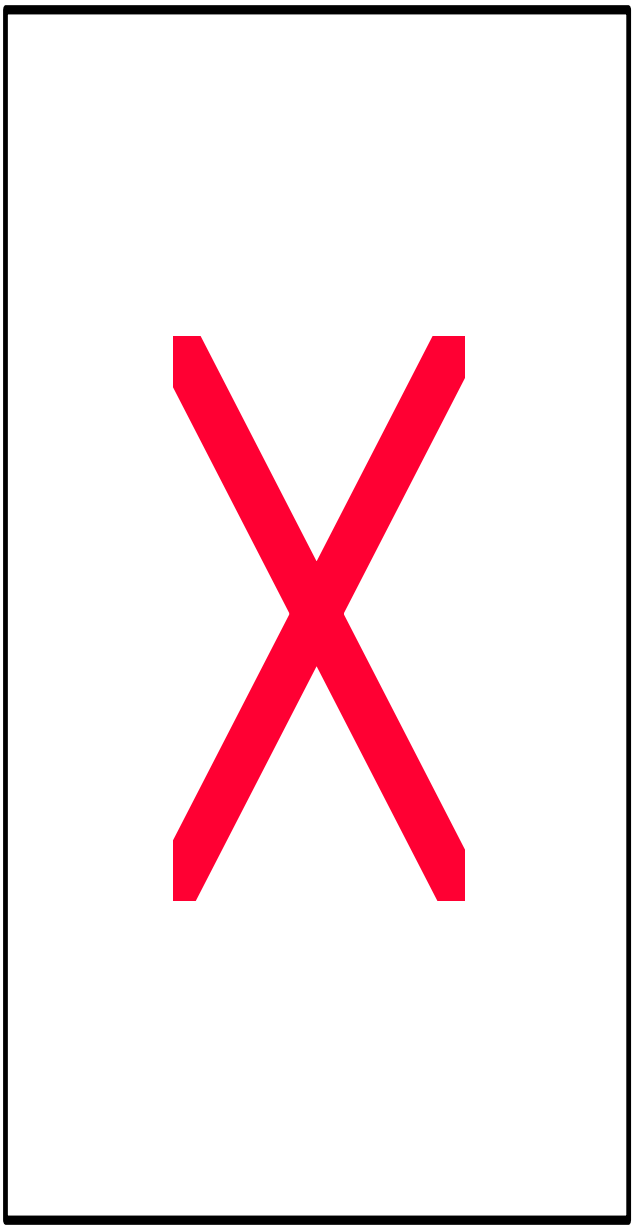
amplifier. Many of you already have video cameras for live video and computers with video output make great ID generators. For 70 cm gear check out www.hamtv.com PC electronics WEB site and for 23 cm gear try the similarly named UK www.TVHAM.com site. Currently we have about a dozen amateurs within a 30 mile radius of the Red Cross with ATV transmit equipment. All have contributed time, their own equipment, and money to bring the K8DMR repeater on line at no cost to GRARA. There is no ATV club as such since almost everyone is already a member of GRARA. Our ATV special interest group is just about at the critical mass where portable/mobile ATV can play a role in many other club public service activities such as the River Bank Run, walk-a-thons, emergency drills and Sky Warn. Look for an ATV demo at the September swap and a streaming video connection on the WEB soon so one can watch the repeater even without any equipment. Finally, the next time you hear someone calling CQ ATV on 144.34 FM give them a call. We would love to introduce you to this fascinating corner of amateur radio. For more info call Ron K8DMR at 791-9134.
…Ron Fredricks, K8DMR

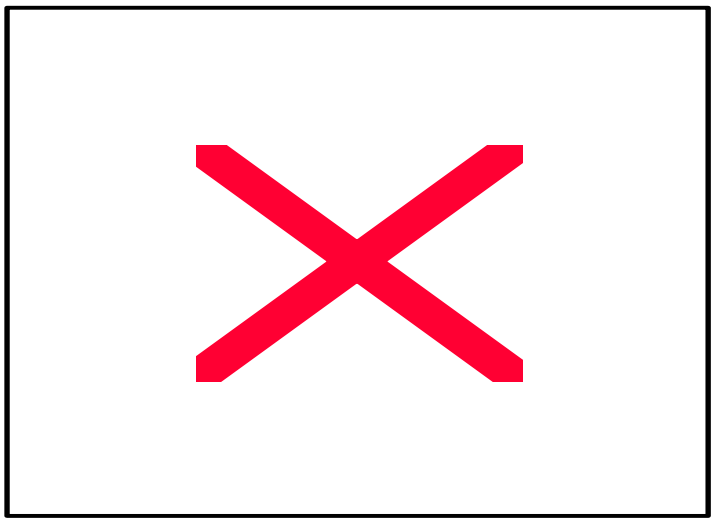


Above are the two 70 cm rib cages back to back with Comet 23 cm vertical hanging down on right. Spare rib cage at midlevel on left side also mounted hanging down. Dual band vertical used for 144.34 ATV receive and 440 FM rig also mounted at midlevel above spare rib cage.

On the right is Ron, K8DMR, and Dave, KF8QL (on top), installing ½" hard line on ATV transmit (downward rib cage). The receive rib cage (upper rib cage) already had hard line but the transmit antenna had been getting by with 9913 since it was originally put up. A run of ½" hard line was also connected to the club's tri-band Comet in the center replacing the 9913 used there. The 23 cm vertical is right behind Dave at the top.

Thanks to Abe, W8HVG, from the IRA and Chuck KA8IBY from the 147.72 Central MI Amateur Radio Association for the hard line and some of the connectors. Dennis, KC8LZK (working the ground crew) fabricated the rest of the hard line connectors.

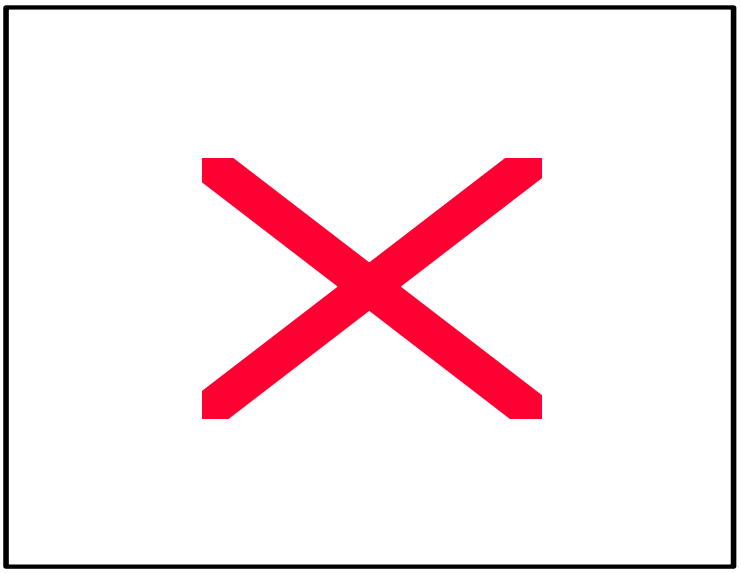


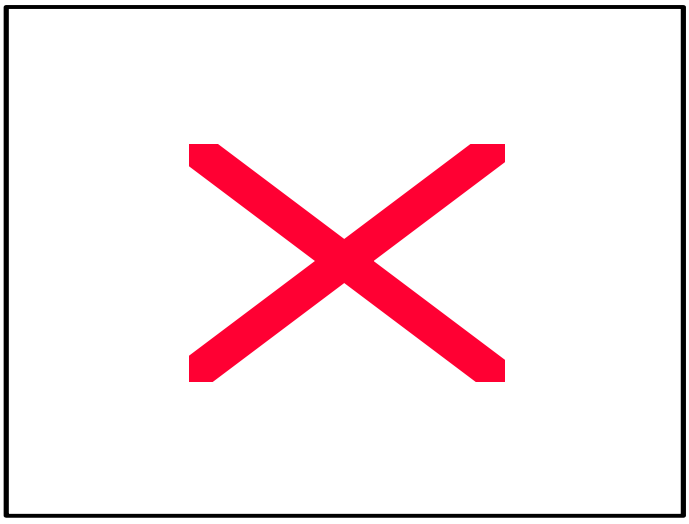


Close-up showing General Instruments exciter and PC Electronics driver amplifier in die-cast box. High power Teltec amp sitting on filter at right. Fans key on with repeater.

Large Aluminum box on which Teletec amp rests is one of 4 VSB filters we use (in addition to SAW filter inside exciter). Old video operated relay circuitry contained in box under driver amp but now replaced by commercial ATV controller donated by KF8QL.

Dennis, KC8LZK installing commercial General Instruments exciter (red video modulation meter visible) in ATV cabinet. Thanks to Tom, N8DGD, for procuring this cable industry castoff for us. The Teletec 150 watt sync tip final amp with blue front plate is also visible on top shelf.



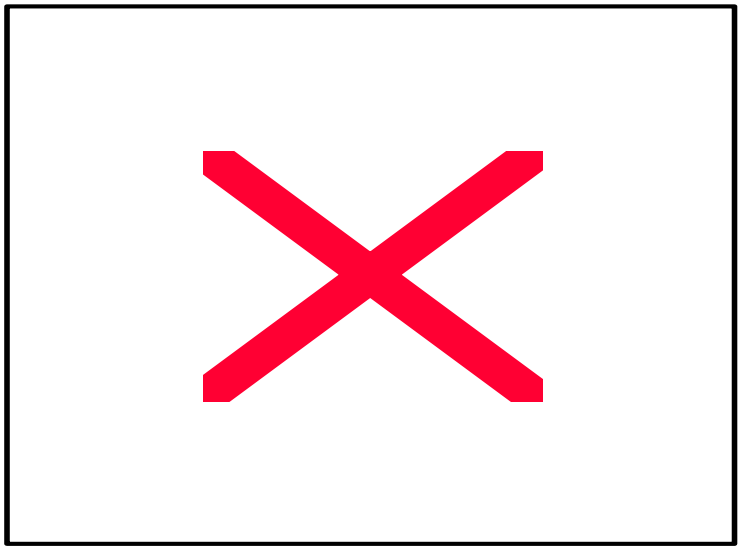


Video ID generator with cover off. Driver amp power supply and auxiliary 23 cm transmitter and amp to allow reconfiguring repeater from in-band to cross-band operation with 439.25 input and 1252 FM output also shown at far right.

The 23 cm transmit has currently been replaced by an additional repeater input port at 1290 MHz using K8DMR's Bensat receiver. This allows users to watch their own signals with a minimum of self interference as well as possible remote ATV receive sites in the near future with 23 cm links back to Red Cross. (We currently have permission from TV-8 for an ATV receive site at their Oakwood manor Storm Team 8 weather radar site.)

Note that cheap 23 cm gear is available on the WEB but propagation is really line-of-sight on this lowest microwave band. Consult Ron or Dennis before buying ATV gear for 23 cm to run propagation feasibility tests from your QTH first.

Upper VSB (normal) and lower VSB (alt) 70 cm receivers, new uP based controller, VSB filters, 70 cm receive voter and an off-air monitor TV, all located on accompanying rack or on top of transmitter cabinet. The 23 cm receiver is absent from this picture.



A single 4 pole DCI bandpass filter (435-445 MHZ), notch filter tuned to 444.4 MHz (the W8DC UHF output frequency radiated right on the tower) and a GaAs-FET preamp is common to both LSB and USB receivers. The preamp output is then split and input to separately tuned 7 pole VSB filters, one for each receiver. The video outputs key the video-operated relay in the controller (next to the off-air TV monitor) with priority given to the upper VSB receiver as for many users this gives the highest resolution video and best color. However this receiver is automatically disabled when 442.175 is active using a dedicated FM receiver tuned to that frequency and relay control circuit. Special notch filters (bottom shelf on top of one of the 7 pole VSB filters) stagger tuned across the low end of the 440 FM repeater band work to reject interference from any and all FM repeaters to the lower VSB receiver.

INTERNET ATV HOME PAGES (list verified 01/18/02)

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.activedayton.com/community/groups/rmeeksjr/index.html	Ohio, Dayton ATV group (DARA)
http://users.erinet.com/38141/atv.htm	Ohio, Xenia KB8GRJ
http://www.qsl.net/ka8mid	Ohio, Chilicothe area, KA8MID homepage
	Alabama - Gulf Coast Amateur Television Society
http://www.hayden.edu/Guests/AATV	Arizona, Phoenix Amateurs (AATV) Carl Hayden High School
http://www.w7atv.com	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://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
	Kentucky, Lexington Bluegrass ATV Society (BATS)
	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)
	Missouri, St Louis Amateur Television
http://www.qsl.net/kd2bd/atv.html	New Jersey, Brookdale ARC in Lincroft
http://www.no3y.com/radio.html	New Mexico, Farmingham
http://www.ipass.net/~teara/menu3.html	North Carolina, Triangle Radio Club (TEARA)
http://www.oregonatv.org	Oregon, Portland OATVA Oregon Amateur TV Association
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)
	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
	Washington, Western Washington Television Soc. (WWATS)
http://www.shopstop.net/bats/	Wisconsin, Badgerland Amateur Television Society (BATS)

Foreign homepages

http://lea.hamradio.si/~s51kq/	Slovenia ATV **(BEST OF FOREIGN ATV 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
	British Columbia, Canada VE7RTV repeater
	Auckland, New Zealand ATV
http://www.cq-tv.com	British ATV Club and CQ-TV Magazine
http://oh3tr.ele.tut.fi/english/atvindex.html	Finland ATV, OH3TR repeater.

INTERNET MISC HAM RELATED HOME PAGES (list verified 01/18/02)

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.labguysworld.com	Lab Guy Antique TV camera listing
http:\\www.earlytelevision.org	Antique television museum in Hilliard, Ohio
http://radioscanning.wox.org/Scanner/scanner.htm	Radio scanner info for all frequencies in Columbus, Ohio area.
http://www.labguysworld.com/	Television recorder history web page. Lots of tv info.

HAMFEST CALENDAR

This section is reserved for upcoming hamfests. 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 This list will be amended, as further information becomes available.

27 Oct 2002+Massillon ARC http://www.qsl.net/w8np Contact: Terry Russ, N8ATZ 3420 Briardale Circle NW Massillon, OH 44646 Phone: 330-837-3091 Email: w8np@qsl.net Canton, OH
9 Nov 2002+Grant ARC http://www.geocities.com/garcohio Contact: Dot Silman, KB8TQU 502 Lake Waynoka Drive Sardinia, OH 45171 Phone: 937-446-2234 Email: huggee@bright.net Georgetown, OH
16-17 Nov 2002*Indiana State Convention Allen County AR Technical Society http://www.fortwaynehamfest.com Contact: Fort Wayne Hamfest & Computer Expo PO Box 10342 Fort Wayne, IN 46851-0342 Phone: 260-484-1314 Email: kb9ih@arrl.net Fort Wayne, IN
19 Jan 2003 x Sunday Creek AR Federation http://www.hfradio.org/kc8aav Contact: Russ Ellis, N8MWK Phone: 740-767-2226 Email: N8MWK@frognet.net Nelsonville, OH
26 Jan 2003+Tusco ARC Contact: Gary Green, KB8WFN 32210 Norris Road Tippecanoe, OH 44699 Phone: 740-922-4454 Email: kb8wfn@tusco.net New Philadelphia, OH
9 Feb 2003+Inter-City ARC & MASER http://www.maser.org Contact: Dean Wrasse, KB8MG 1094 Beal Road Mansfield, OH 44905 Phone: 419-589-2415 Email: deanwrasse@yahoo.com Mansfield, OH
23 Feb 2003+Cuyahoga Falls ARC http://www.cfarc.org Contact: Ted Sarah, W8TTS 239 Bermont Avenue Munroe Falls, OH 44262 Phone: 330-688-2013 Email: w8tts@arrl.net Cuyahoga Falls, OH
16-18 May 2003 x Dayton Hamvention Dayton ARA http://www.hamvention.org/ Contact: Dayton, 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 30 minutes showing ATCO & W8RUT on four different screens
Transmit antennas:	427.25 MHz - Dual slot horizontally polarized "omni" 7 dBd gain major lobe east/west, 5dBd gain north/south
	1250 MHz - Diamond vertically polarized 12 dBd gain omni
	2433 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni
Receivers:	147.45 MHz - F1 audio input control of touch tones
	439.25 MHz - A5 video input with FM subcarrier audio (**lower sideband**)
	915 MHz - F5 video link data from remote sites
	1280 MHz - F5 video input
	2398 MHz - 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)
	264	Select Channel 4 doppler radar. (Stays up for 5 minutes) Select # to shut down before then.
	697	Select Time Warner radar. (Stays up till turned off). Select # to shut down.

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 02#	Channel 2 915 MHz scan enable
	03* or 03#	Channel 3 1280 MHz scan enable
	04* or 04#	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**)**

CAMERA CONTROLLER KEYPAD FUNCTIONS

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

001 = RETURN TO NORMAL

FOCUS 1	ZOOM 2	APER-ATURE 3	DISABLE AAA A
FILTER (4 STEPS) 4	TILT 5	PAN 6	ENABLE B
IN/RT/DN 7	8	INC SPEED (PAN/TILT) 9	C
OUT/LF/UP *	0	DEC SPEED (PAN/TILT) #	D

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 then 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.

ATCO

2002 FALL EVENT

1:00 PM - SUNDAY

OCTOBER 27, 2002

ABB PROCESS AUTOMATION
(ACCURAY)
*** SHELTERHOUSE ***
650 ACKERMAN ROAD
FOR MORE DETAILS, CONTACT
ART - WA8RMC 891-9273

LUNCH PROVIDED - DOOR PRIZES -

BRING A FRIEND AND SEE OLD BUDDYS

MINI HAMFEST - SHOW AND TELL

DIRECTIONS TO THE ATCO EVENT

From I-70 either EAST or WEST Bound:

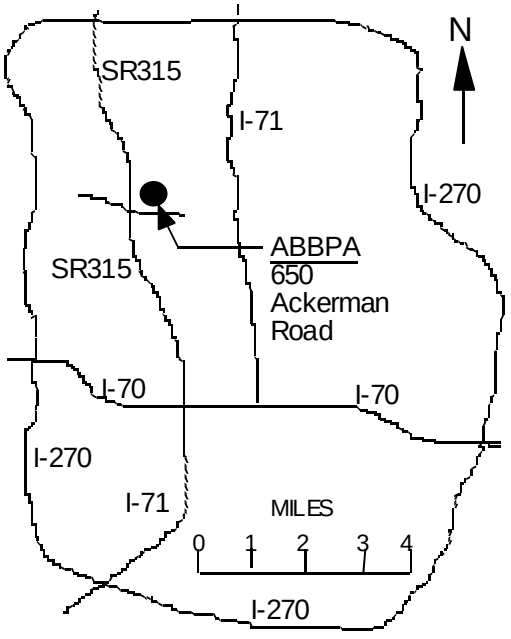
Take I-70 to SR-315 near downtown Columbus. Exit onto SR-315 north about 4 miles to Ackerman Road. Turn east on Ackerman about 200 yards to first driveway on left.

From I-71 traveling NORTH bound toward Columbus:

While traveling north on I-71, continue past I-70 and onto SR-315 north. Travel on SR 315 north about 4 miles to Ackerman Road. Turn east on Ackerman about 200 yards to first driveway on left.

From I-71 traveling SOUTH bound toward Columbus:

(DIRECTIONS IF YOU'RE "NORTH" OF I-270).
Take I-71 SOUTH to I-270 Bypass Loop & head WEST on I-270 to SR 315. Take SR 315 south about 5 miles to Ackerman Road. Turn east on Ackerman (under SR 315) about 200 yards to first driveway on left.



ATCO MEMBERS AS OF 15 October 2002

Call	Name	Address	City	St	Zip	Phone	URL
AA8XA	Stan Diggs	2825 Southridge Dr	Columbus	Oh	43224-3011		sdiggs4590@aol.com
K8AEH	Wilbur Wollerman	1672 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	kc8asd1@aol.com
W8CQT	Jim McConnell	350 N. State Road	Deleware	Oh	43015-9644	740-363-1008	w8cqt@arrl.net
WB8CJW	Dale Elshoff	8904 Winoak Pl	Powell	Oh	43065	614-210-0551	delshoff@columbus.rr.com
WA8DNI	John Busic	2700 Bixby Road	Groveport	Oh	43125	614-491-8198	jbusic@copper.net
W8DLB	Denny Beardmore	PO Box 313	Bethesda	Oh	43719-0313	740-484-4822	dlb@1st.net
K8DW	Dave Wagner	2045 Maginnis Rd	Oregon	Oh	42616	419-691-1625	
WA3DTO	Rick White	133Concord Way	Cranberry Twp.	Pa	16066	724-776-2436	wa3dto@aol.com
WB8DZW	Roger McEldowney	5420 Madison St	Hilliard	Oh	43026	614-876-6033	wb8dzw@aol.com
KB8FLY	Rod Shaner	124 West Walnut St.	Lancaster	Oh	43130-4344	740-654-5694	rshaner@copper.net
KS4GL	John Barnes	216 Hillsboro Ave	Lexington	Ky	40511	606-253-1178	jrbarnes@iglou.com
W8FZ	Fred Stutske	8737 Ashford Lane	Pickerington	Oh	43147		
KA8HAK	Jim Reese	1106 Tonawanda Ave	Akron	Oh	44305		
KC8HCE	Adam Porr	6825 Ridgeway Ct.	Pickerington	Oh	43147	614-837-6489	Kc8hce@arrl.net
WA8HFK,KC8HIP	Frank, Pat Amore	3630 Dayspring Dr	Hilliard	Oh	43026	614-777-4621	
W3HMS	John Jaminet	912 Roberts St	Mechanicsburg	Pa	17055-3451		w3hms@aol.com
N8IJ (ex w8jnd)	Richard Knowles	2318 Britt Ave	Lima	Oh	45806		
WD8ITF	Larry Fields	953 W. Hopocan Ave	Barberton	Oh	44203-7007	330-825-7148	lfields@neo.rr.com
K8KDR,KC8NKB	Matt & Nancy Gilbert	5167 Drumcliff Ct.	Columbus	Oh	43221-5207	614-771-7259	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	614-276-1820	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
N8LRG	Phillip Humphries	3226 Deerpath Drive	Grove City	Oh	43123	614-871-0751	phumphries@columbus.rr.com
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	614-876-2127	rtournou@columbus.rr.com
WD8OBT,KB8ESR	Tom Camm & sons	1634 Dundee Court	Columbus	Oh	43227	614-860-9807	
N8OCQ	Robert Hodge	PO Box 23473	Columbus	Oh	43223	614-875-7067	
N8OPB	Chris Huhn	146 South Hague Ave	Columbus	Oh	43204	614-279-7577	
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	
KC8OZV	George Biundo	3675 Inverary Drive	Columbus	Oh	43228	614-274-7261	kilowatt@biundo.org
WB8PJZ	Dave Morris	2323 Allentown Road	Lima	Oh	45805	419-226-6997	dave@towercomminc.com
KE8PN	James Easley	1507 Michigan Ave	Columbus	Oh	43201	614-421-1492	jeasley11@hotmail.com
W8PGP,WD8BGG	Richard, Roger Burggraf	5701 Winchester So. Rd	Stoutsville	Oh	43154	614-474-3884	rgburggraf@juno.com
K4PRS	Peter R. Sinkowski	4532 W Kennedy Bl #114	Tampa	Fl	33609-2042		k4prs@yahoo.com
WA8RMC	Art Towslee	180 Fairdale Ave	Westerville	Oh	43081	614-891-9273	towslee1@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	614-882-6527	
W8RUT,N8KCB	Ken & Chris Morris	3181 Gerbert Rd	Columbus	Oh	43224	614-261-8583	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
W8RWR	Bob Rector	135 S. Algonquin Ave	Columbus	Oh	43204-1904	614-276-1689	rrector677@aol.com
W8RXX	John Perone	3477 Africa Road	Galena	Oh	43021	740-548-7707	
WA8SAR	Gary Obee	3691 Chamberlain	Lambertville	Mi	48144		
N8SFC	Larry Campbell	316 Eastcreek Dr	Galloway	Oh	43119		
W8SJV	John Beal & family	5001 State Rt. 37 East	Deleware	Oh	43015	740-369-5856	w8sjv@midohio.net
N8SNG	Terry Rankin	414 Walnut Street	Findlay	Oh	45840		
W3SST	John Shaffer	2596 Church Road	York	Pa	17404		w3sst@juno.com
K8STV	Jim Carpenter	823 Quailwood Dr	Mason	Oh	45040		
KB8TRP,KB8TCF	Tom, Ed Flanagan	1751 N. Eastfield Dr	Columbus	Oh	43223	614-272-5784	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	614-879-7482	
WA8UZP	James R. Reed	818 Northwest Blvd	Columbus	Oh	43212	614-297-1328	wa8uzp@qsl.net
WB8VJD	Rick Morris	203 Merton Street	Holland	Oh	43528		wb8vjd@glasscity.net
KB8VUQ	Jack Wolff	2682 Hiawatha Ave	Columbus	Oh	43212	614-263-4816	kb8vuq@arrl.net
W2WIA,KA2EVC	Ed & John Kuligowski	63 Connecticut Ave	Massapequa	Ny	11758	516-541-3172	w2wia@netscape.net
KB8WBK	David Hunter	45 Sheppard Dr	Pataskala	Oh	43062	740-927-3883	hiramhunter@aol.com
KB8YMN	Mark Griggs	2160 Autumn Place	Columbus	Oh	43223	614-272-8266	mmgriggs@aol.com
KB8YMQ	Jay Caldwell	4740 Timmons Dr	Plain City	Oh	43064		
N8YZ	DaveTkach	2063 Torchwood Loop S	Columbus	Oh	43229	614-882-0771	
KB8ZLB	Dave Kibler	243 Dwyer Rd	Greenfield	Oh	45123	937-981-4007	Bricks@dragonbbs.com
KA8ZNY,N8OOY	Tom & Cheryl Taft	386 Cherry Street	Groveport	Oh	43125	614-836-3519	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. As an option for those joining after mid July, they can elect to receive a complementary October issue with the membership commencing the following year Your support of ATCO is welcomed and encouraged.

ATCO CLUB OFFICERS

President:	Art Towslee WA8RMC	Repeater trustees:	Art Towslee WA8RMC
V. President:	Ken Morris W8RUT		Ken Morris W8RUT
Treasurer:	Bob Tournoux N8NT		Dale Elshoff WB8CJW
Secretary:	Frank Amore WA8HFK		Statutory agent: (open)
Corporate trustees:	Same as officers	Newsletter editor:	Art Towslee WA8RMC

ATCO MEMBERSHIP APPLICATION

RENEWAL O NEW MEMBER O DATE _____
CALL _____
OK TO PUBLISH PHONE # IN NEWSLETTER YES O NO O
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 O MONEY ORDER O
Make check payable to ATCO or Bob Tournoux & mail to: Bob Tournoux N8NT 3569 Oarlock CT Hilliard, Ohio 43026. Or, if you prefer, 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 (7/18/02).....	$1237.50
RECEIPTS(dues).....	*
OTHER INCOME (bank interest.....	*
July Newsletter postage.....	$ (56.00)
Pay Pal charges.....	*
Check cashing charges.....	*
CLOSING BALANCE (10/18/02).....	*

Note: Totals for items marked * are unavailable at this time. They will be reported in the next Newsletter.

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.