ATCO NEWSLETTER

VOLUME 21 NUMBER 2 **April 2004**

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 enjoyed a visit with Jeff, K8TPY. I have never seen a more aggressive person when it comes to ATV. Less than 6 months ago he didn't know what ATV was. Now he's one of the top ATVers in the Columbus area. He has sought help from W8DMR and others to bring his knowledge right up to the front of the pack.

He started out by he and W8DMR repairing a PC Electronics 70 cm ATV transmitter and getting it on the air. Now he has 1250 receive capabilities and is working on a 1280 transmitter. He can receive 2.4 g and is working on 10 g! Whew, slow down, Jeff. (His sweatshirt says "What A Ham").


Photo by Vincent Laforet / The New York Times

To add to what he's doing, he is now working on the erection of a new tower in his backyard, which will eventually be about 70 feet tall. I didn't believe he was building a super huge tower so to prove it he sent me a picture. He is seen here on the left doing a power on test of his new 2.4 g dish antenna feed mechanism with an unidentified friend. Boy, this tower looks MUCH taller than 70 feet. Are you sure, Jeff? Also, I didn't notice all of those buildings before when I was at your house. The big question now is," Who took the picture", was it Diana?

ACTIVITIES ... from my "workbench"

Well here it is again…time for the next ATCO Newsletter. Sorry guys, I don't have time for it now…I'm busy working on the link transmitter. No, just kidding. It's been hectic trying to sandwich everything in but it'll all work out sooner or later. OK, lets get to report what I've been up to the last 3 months. I'll outline some "in process" tasks as well as the identification of some new ones.

First, let's talk about a pesky problem with the 427 MHz transmitter. We must understand that it's just about 10 years old and up until now, it was running continuously without problems. So, it's no wonder that problems are starting to creep into the system. The actual problem is not new to me. The PC Electronics exciter has been intermittent for a year or so, operating ok most of the time but on occasion, failing to turn on. Previous trips identified an intermittent in the exciter but some wiggling brought it on and working ok. The apparent problem was a cold solder joint on the exciter but to fix it involved major surgery to open up the transmitter and obtain access to the rear of the circuit card. I opted to wiggle the board and hope it would stay operational till I had more time to pull it out of service. With time it became more intermittent and now the final amp failed so I pulled it out and carted it home for closer inspection. As expected, the intermittent would not show up now. I fixed the final amp, which turned out to be a tantalum capacitor that went up in smoke and blew the fuse. But now an exhaustive search of the intermittent driver PCB turned up nothing. A heat gun and freeze mist still didn't produce the intermittent so I decided to re-solder all components and circuit board traces. A bench test for about 2 hours produced a system working perfectly so I returned it to the repeater. It worked ok for about 3 days then the intermittent reappeared. Go figure! I need to return to try again.

The 2.4 gig transmitter now has a similar intermittent. That item also was returned to my workshop for inspection. No problem was found but I took the opportunity to replace the linear power supply with a switching unit eliminating one fan and a lot of heat. I thought I saw the unit power up once when the final amp didn't come on but during testing it came on so it didn't allow me to trace it. At this time I knew the problem was the final amp but tapping components didn't help. I now believe that the problem is an intermittent relay in the final amp. I must order one from Downeastmicrowave but until then, the 2.4 gig transmitter is back in service working ok most of the time.

The next item is the link transmitter progress. I now have a working 915 and 1250 MHz working amplifier. Each unit outputs in excess of 20 watts, more than enough to send a P5 signal to Dayton and Columbus. I still need to finish the packaging so I can take them to the South Vienna site for an on the air test. The Dayton guys are also working on the link by installing a 915 MHz antenna on their repeater tower near the top and pointed at the South Vienna site. Previous tests involved the antenna only about 25 feet above the ground so no signal was seen. I hope to report more progress on the link construction soon now that warm weather is here.

While designing the 915 and 1250 link transmitters, I created a new circuit to double the 12 volt supply voltage in order to operate the 28 volt antenna relay. Since I find that a number of you have similar relays with no easy way of obtaining 28 volts to operate it, the circuit is described in detail within this Newsletter. It's simple to build and because the control IC is not generally available, I have a few of them for the asking. Yes, you WILL have to drag out that soldering iron to assemble it but I'm sure that won't kill you. I'll help if you get into trouble.

I'm happy to report that the 10 GHz transmitter is operational and working well. As reported last time we installed a 1 watt transmitter at the repeater and were able to receive P5 signals from as far away as 15 miles. The receiver is now complete and ready for installation. When we install the receiver, the transmitter antenna will be moved from its temporary location on the roof to its final position about 30 feet higher. The height increase is no big deal (it's already 625 feet above the street) but then it will be free of any surrounding obstructions providing a better omni directional signal. The receiver antenna will be mounted just below it.

Our new digital system is just about ready also. I was hoping the boards wouldn't arrive till after the link transmitter was installed but no such luck. That makes one more item to multiplex tasks. More details will be available on that one later, possibly at the Spring Event (May 2nd).

The Comtech modules I've been talking about are in the order process right now. Those are the modules that receive and transmit 1200 and 2400 MHz ATV signals. If you have not informed me of your desire to get one or more of these units, don't fear. I have ordered some extra so there should be enough to go around. I'm still waiting for the manufacturer in Taiwan to give me the final price but I should know by Spring Event time. Right now it looks like they will be $20 each including shipping. Jim, W8CQT, is working on a special software program to be able to program the 1200 modules for any frequency between 900 and 1500 MHz and the 2400 modules between 2300 and 2500 MHz. That gives complete coverage for the 900, 1200 and 2400 MHz bands.

That's about it for this time. Don't forget the Spring Event coming up on the 2nd of May at the ABB shelter house. We'll have plenty to eat, door prizes, mini flea market in the parking lot and a business meeting so be sure and come if possible. All are welcome, members or not. See you there!
…WA8RMC

SAMSUNG INTRODUCES CHIP SET FOR U.S. HDTV MARKET

By Yoshiko Hara from EE Times January 20, 2004 (11:12 a.m. ET)
LAS VEGAS — Samsung Electronics has introduced a two-chip solution for digital HDTV and digital HD set-top box applications.

The chip set includes an MPEG2 decoder dubbed S5H2010 and digital TV central processing unit, S3C2800. Samsung's first digital HDTV solution, which is already used in its domestic TV sets, including a 55-inch projection HDTV, wireless HDTV and wireless LCD TVs, targets low- to mid-range priced HDTV sets and HD set tops.

Prices for products in this price range are expected to drop drastically this year to the range of $25 to $30, said Steve Y.H. Noh, a manager at Samsung Semiconductor Inc.

The chip set integrates the main functions necessary for a HD set tops or HDTV for better picture quality and provides a graphical user interface with digital outputs of 1080i, 720p and 480p. It does not support 1080p or a dual HD stream, which are now becoming standard features for high-end HDTV sets. Samsung's chip set integrates a 200-MHz ARM920T 32-bit RISC processor core, an HD-capable MPEG2 decoder, transport demultiplexer, a 2D graphic engine, a proprietary display processor engine, an NTSC/PAL encoder, smart card interface and PCI.

It was fabricated using a 0.18-micron process, and is available now in production quantities to consumer electronics manufacturers in the United States and South Korea, Samsung said. Samsung said it intends to expand its chip solutions to higher-end products, and is also aiming for a more price-competitive range.

"There is a huge market opportunity for digital TVs and the set-top box market," Noh said. Market leaders include ST Microelectronics, ATI, Broadcom, Conexant and Zoran. "Samsung wants to be the leading provider of HDTV solutions."

CHIP SET LOWERS COST BAR FOR WIRELESS

By Patrick Mannion EE Times January 19, 2004 (9:59 a.m. ET)
MANHASSET, N.Y. — Integration Associates Inc. has applied patented technology to a two-piece transmitter/receiver frequency-shift-keying (FSK) chip set pitched as the foundation for low-cost, low-power wireless products such as toys, consumer electronics and tire pressure sensor systems. The chips feature programmable antenna tuning, an on-board clock divider and frequency-hopped transmission to ensure data integrity over a one-way link.

Integration Associates (www.integration.com) has also entered an agreement with Sensory Inc. (www.sensoryinc.com) under which the pair will market the two-piece radio chip set, called EZRadio, along with Sensory's speech-recognition synthesis and control chip set. The combined chip sets will enable voice-activated wireless control of toys and consumer electronics ranging from garage door openers to keyless entry systems, the companies said.

Historically an ASIC design company, 10-year-old Integration Associates has started to make standard products for wireless, wireline and power management applications. "Wireline is our largest segment, but we're now very focused on wireless," said director of business development Nick Dutton. The IA4220 transmitter and IA4320 receiver are its first FSK implementation, targeting the unlicensed industrial, scientific and medical bands at 315, 434 and 915 MHz in the United States and at 434 and 868 MHz in Europe.

A key feature of the set is an ability to monitor and tune the antenna: "The screws and tuning [to adjust capacitor and inductor values] go away on the production line, giving immediate cost savings," Dutton said. The tuning not only sets the base frequency but also compensates for environmental factors. The automatic tuning is accomplished using a 4-bit control word for a capacitance bank. Monitoring and adjustment operate continuously. The integrated implementation includes a power amplifier and an on-board clock divider. "If you're strapping this up to a microcontroller, we can divide down the clock and supply the clock to the micro so [the MCU] doesn't need a crystal," Dutton said.

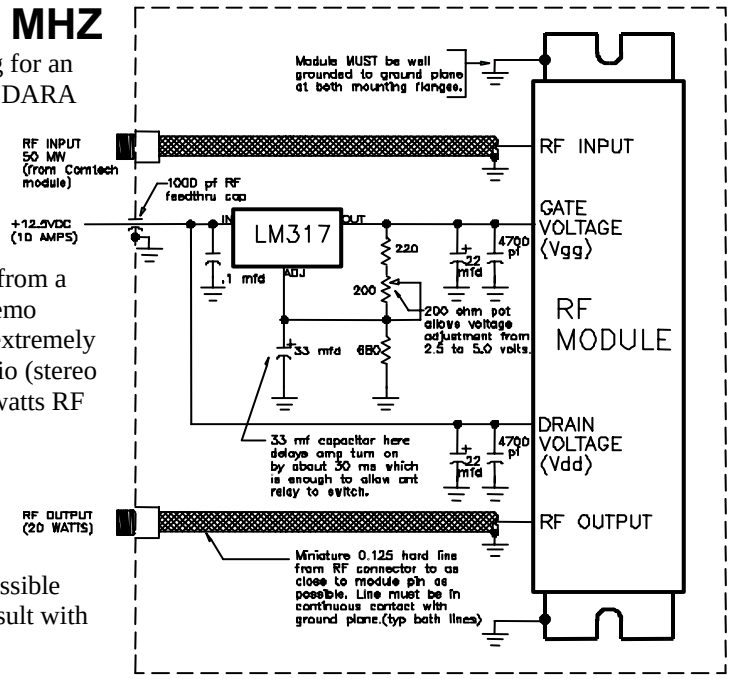
Because the chips perform one-way communication from transmitter to receiver, they cannot perform the error-checking and data resend procedure typically employed by transceivers to ensure data integrity. To overcome this, said Dutton, the EZRadio performs a frequency-hopping-like function in which data is sent three times at three different frequencies within the chosen band. With this scheme, the company is essentially trading error rate for simplicity. "While the scheme doesn't guarantee accurate reception, it does triple the likelihood that the data will be received in the face of multipath losses and other effects, and it's a much lower-cost implementation," Dutton said.

The devices have a range of up to 100 meters, and a maximum data rate of 256 kbits/second. They operate off 2.2 to 5.4 volts. Current consumption is between 9 and 12 milliamps in transmit mode. One potential U.S. market is for tire pressure and temperature monitors, which Washington has mandated, Dutton said. The EZRadio's 0.3-microamps standby power suits the chip set for that application.

The chips are available now, packaged in 16-pin thin shrink small-outline packages. The complete transmit/receiver pair is priced at less than $2 in quantity.

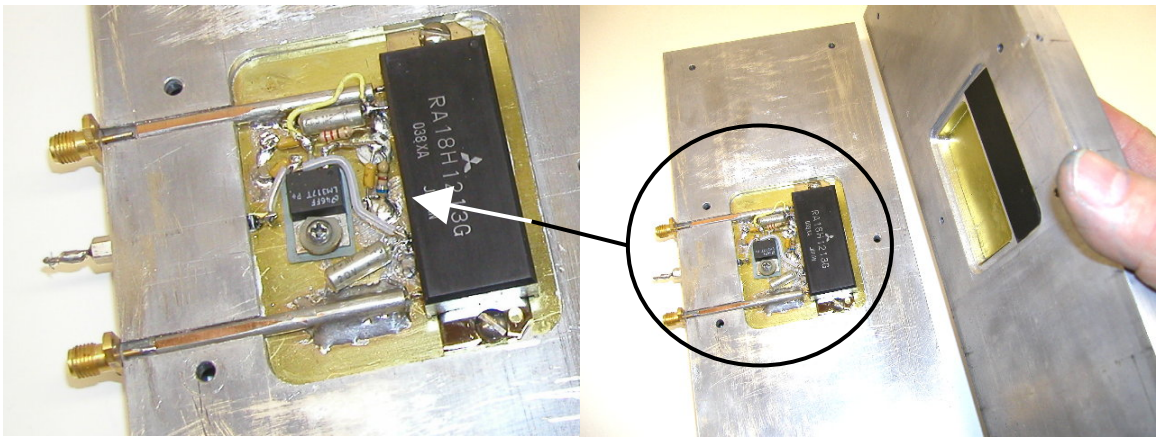
BUILD A POWER AMP FOR 900/1200 MHZ

During the ATCO/DARA link transmitter design phase, I was looking for an easy, simple and reliable way to create both a 915 MHz signal for the DARA repeater and also a 1280 MHz signal for the ATCO repeater. Both needed to be in excess of 10 watts. The search revealed two relatively new brick devices from Mitsubishi, the RA18H1213G for 1240 to 1300 MHz and the RA20H8994M for 896 to 941 MHz. Both devices cost about $73.00 each from RF Parts and perform far better than I expected. Both will provide in excess of 20 watts driven from a 50 milliwatt source. That's perfect for I wanted to use the Comtech demo modules to drive them without an intermediate amp. The result is an extremely compact and simple combination where a 1 volt NTSC video and audio (stereo if desired) signal is fed into the Comtech module for an output of 20 watts RF FM modulated signal.

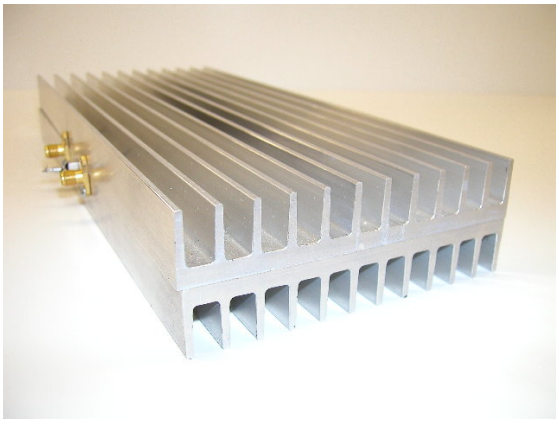


The construction is as simple as could be expected for these types of components. However, good RF construction techniques must be observed. If you haven't built things like this before, either don't do it or make sure you have an experienced friend handy for advice. All possible considerations and cautions cannot be covered here so it's best to consult with an experienced builder before starting.

Good heat sinking is paramount for the bricks are only about 25 to 30% efficient. For an input power of 12 volts @10 amps (that's about 120 watts), about 84 watts will help heat the ham shack. If a good heat sink is not used, all may go up in smoke. Next it's very important to provide a good ground plane for RF. Instead of using a PC board, I used a piece of brass 0.010" shim stock from the hardware store, mounted everything on it including the Mitsubishi brick making sure the brick mounting tabs are in good contact with the brass and coated the bottom with heat sink compound. All components are "dead bug" mounted to the brass also, even the hard line where I soldered it the entire length to the brass. The photos below show it better than I can describe so check it out closely.

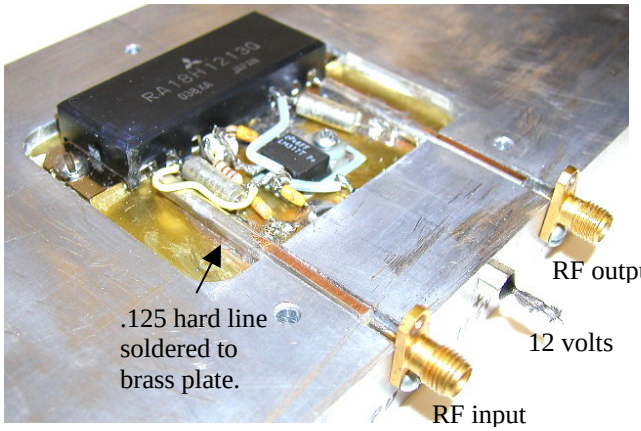


A few words about the operation: The pot as shown provides RF output control where output begins at about 3 volts and exceeds 20 watts at 5.0 volts.(**Do not exceed 5 volts on the Vgg line**). The 33 mf capacitor in my case allowed a 30 ms delay in RF output upon 12 volt power to allow the antenna relay to switch. (I don't like open loop control but have no relay feedback so…). The LM317 regulator should be the TO220 mounting style because it does get slightly warm (don't ground the mounting tab. It's connected to Vout). The resistor divider for voltage adjustment can be altered to suit your resistor and pot selection. Just remember that the LM317 will regulate the output to maintain 1.35 volts from out to Vadj. Higher values will lengthen the delay to on determined by the 33 mf capacitor.



On the left is the finished amp. I used two heat sinks with each half milled out to fit the components. You don't have to get this elaborate. I just get carried away at the milling machine sometimes.

…WA8RMC



FREQUENCY COORDINATION... ON MARS!

While not ATV related, the subject matter intrigues me. I am amazed at what has been accomplished so I thought that others would be interested. Check the Internet links for more details. Enjoy. Ed.

The pictures from Mars rovers Spirit and Opportunity have focused interest in the planet. You may be wondering what frequencies are being used to transmit telemetry and scientific data back to Earth and how they were coordinated. Based on information I found on the Web, the rovers are using frequencies around 430 MHz to communicate with the orbiting spacecraft at data rates up from 128 kbps to 2 Mbps. The link from Mars to Earth uses X-band frequencies in the 8.4 to 8.45 GHz band, while the return link from Earth to Mars uses 7.2 GHz. See Frequencies for Mars Local High-Rate-Links (http://ipnpr.jpl.nasa.gov/tmo/progress_report/42-153/153H.pdf) for an excellent description of the design of future communications systems between Mars and the orbiter and the orbiter and Earth and a limited description of existing links. Also see Mars Relay Telecommunications Design Notes (http://www-mgcm.arc.nasa.gov/mgcm/micromet/mars_relay_comm.html) for has a detailed explanation of Mars-Orbiter and Mars-Earth communications system. Although the document was created in 1995, it appears many of the systems are still in use.

If you watched the landing of Opportunity on Mars last week you heard many references to "tones" that the lander used to send status information back to Earth. These tones are generated by a radio called the Small Deep Space Transponder using a special form of 256-tone MFSK modulation. Note that frequency shift keying rather than phase modulation is used to allow better frequency tracking during periods of high dynamics present during the entry, descent and landing (EDL) process. The radio operates at 8.4 GHz communicates with Earth using the back shell low-gain antenna, switching to the rover low-gain antenna when the lander separates from the back shell. Even with the 70 meter Deep Space Network (DSN) antenna, the signal to noise ratio can drop as low as 22 dB-Hz and the demodulator has to deal with a Doppler rate up to 1200 Hz/second.

As you can imagine, this required an extremely robust modulation system. I found an excellent paper that describes the design and performance of the system -- Direct-to-Earth Communications and Signal Processing for Mars Exploration Rover Entry, Descent, and Landing. (http://ipnpr.jpl.nasa.gov/tmo/progress_report/42-153/153A.pdf) The paper describes the operation of the system this way: "There will be 256 different signal frequencies, modulated one at a time onto a subcarrier, using the spacecraft capability to switch the subcarrier frequency. During hypersonic entry, the signal frequency can be switched every 10 s, resulting in the communication of 8 bits of information each 10 s. When the lander is suspended from the bridle, and the UHF link is prime, the duration of the modulation frequencies may be extended to 20 s to better facilitate detection during this period of highly varying SNR. This would result in fewer messages of higher reliability than would the use of the 10-s duration." The paper includes a detailed mathematical analysis of the system. NASA's Spotlight series has a simpler explanation of the tones. See Spotlight: Tones Break Silence During Mars Exploration Rover Landings. (http://www.jpl.nasa.gov/news/features/tones.cfm

With all the spacecraft converging on Mars this year, you may be wondering how frequencies were coordinated to keep them from interfering with each other. That coordination is the responsibility of the Space Frequency Coordination Group. While some of the documents on the Web site require a password for access, Recommendation 22-1R1 - Frequency Assignment Guidelines for Communications in the Mars Region (http://sfcgonline.org/handbook/rec/rec22-1r1.pdf) as well as the STCG Handbook 2002 (http://sfcgonline.org/handbook/SFCG_Handbook_2002.pdf) and other Resolutions (http://sfcgonline.org/handbook/res/index.shtml) and Recommendations (http://sfcgonline.org/handbook/rec/index.shtml) do not. Recommendation 22-1R1 includes a summary of the frequency bands available for communications on and with Mars and outlines how frequencies are to be selected and coordinated.
…From NASA Tech Briefs Date posted: 2004-01-26

MATSUSHITA UNVEILS NEXT-GENERATION DRY CELL BATTERY

Hey, this is kind of cool! Sorry about the non ATV stuff but just thought you would like to know. Ed.

Matsushita has developed a new dry cell battery with 1.5 to 2 times better performance than alkaline dry cell batteries. "The Oxyride dry cell battery is the first breakthrough in 40 years when alkaline dry cells hit the market," said Yoji Kajikawa, president of the Primary Battery Co., part of Matsushita Battery Industrial Co. Ltd.

Matsushita demonstrated the new dry cell by running a car on two AA batteries. The two cells drove the 18.5 kg car with a driver for a distance of 1,200 meters, according to a Matsushita spokeswoman. Using new materials for the anode along with new production processes, Matsushita claimed the battery provided twice the performance for applications like digital still cameras that require high electric current. According to Matsusita, its digital still camera took 315 pictures using Oxyride batteries compared to 144 frames with alkaline batteries. It took 5.74 seconds to charge a strobe light with Oxyride cells while it alkaline batteries took 9.29 seconds.

For applications using a small electric current such as MP3 players and portable headphone stereo players, the Oxyride performance of the Oxyride battery was less than 1.5 times better than alkaline cells. Fully compatible with current alkaline batteries, Matsushita said it intends to offer both so consumers can buy them according to applications. Matsushita will begin marketing new AA dry cells in April in Japan, eventually expanding sales worldwide. AAA cells will be available next spring. "Though the applications that use rechargeable batteries are increasing, demand for dry cells is still strong because people can use them anytime, anywhere without worrying charging. We hope that the high performance Oxyride dry cell batteries will stimulate the emergence of new devices," said Kajikawa.

By Yoshiko Hara EE Times January 29, 2004 TOKYO reprinted by permission.

ROVING EYE FOR MARS FORCES CCD RETHINK

SANTA CRUZ, Calif. — Behind the spectacular panoramic images beamed back from Mars in recent weeks is a full-custom CCD imaging chip designed to meet the stringent demands and environmental conditions of the Martian surface. The 1,024 x 2,048-pixel chip,
which handles imaging for each of the nine cameras on both the Spirit and Opportunity rovers, mandated a rethinking of CCD design.

The frame-transfer charge-coupled device takes in photons, converts them to electrons and then converts them back into the voltage domain for processing by camera electronics. But the Mars rover cameras aren't ordinary digital cameras, as Mark Wadsworth, the former Jet Propulsion Laboratory (JPL) principal engineer who designed the chip, found out.

The first challenge was that all nine cameras on board each rover had to use identical CCD imaging chips to restrain costs. In addition to
the two science “pancams” (panoramic cameras) that beam back color photos from Mars, these include four engineering “hazcams” (hazard avoidance cameras), two “navcams” (navigation cameras) and one microscopic imager. “The specs were all over the map, and we needed one device to meet them all,” Wadsworth said.

Factor in the radiation from the space voyage and the Martian surface, the daily temperature swings from -90°C to +20°C, the need for extreme photosensitivity and the limited bandwidth in Mars-to-Earth communications, and the result is an imaging chip that's very different from what you find in a commercial digital camera. “We were trying to come up with ways to push CCDs a little further than they've been pushed before, to improve performance, lower the power and lower the peripheral circuitry needed to operate them,” said Wadsworth, who today heads a design startup called Tangent Technologies.

An off-the-shelf CCD camera chip wouldn't work, he said, so the design was done at JPL. “The device had to be incredibly low-noise, very sensitive optically and able to run extremely fast,” Wadsworth said. “You can pick any two of these three and meet them with something off the shelf, but to find all three required a custom design.”

All of the requirements had to be met because of the functions of the different cameras. With the pancams, Wadsworth said, photosensitivity is key. “If there's a photon out there, the science guys want to know about it,” he said. But with the navcams and hazcams, the priority is getting fast images so the rovers don't crash into things as they move about.

All of the rover cameras are, in effect, 1-megapixel monochrome digital cameras. The colors in the pancam images come from a sophisticated set of color filter wheels, and the sweeping panoramas are mosaics of many individual images. Why only 1 Mpixel, when your digital camera at home probably has 3 or 5? “It's a matter of what you do with the images after you take them,” Wadsworth said. “It takes a finite amount of time to get images out of the rover, link them and transfer them.” Indeed, the rovers' direct-to-Earth data transfer rate is a mere 12 kbits/second, whereas communication with the Mars orbiters goes up to 128 kbits/s.

Further, Wadsworth noted, NASA is extremely conservative when it comes to technology. “They demand that something have a heritage and some number of years of application somewhere before they allow it anywhere near a mission,” he said.

The CCD chip includes a 1,024 x 1,024 imaging area and a 1,024 x 1,024 image storage area. At three gates per pixel, it yields a little over 6 million gates. It can transfer an acquired image to the frame storage area in about 20 milliseconds and read out images at 200 kpixels/s. The chip is fabricated in a 3-micron CCD process using three levels of polysilicon and two levels of metal.

A charge-to-voltage conversion circuit demanded particular design attention. “Everyone calls it an amplifier, but it's basically an electrometer that measures electrons and converts them to voltage,” said Wadsworth. “We get a conversion of about 5 microvolts of signal
for every electron that's put on the sensor node.”

The chip took a good deal of design work, Wadsworth said, to provide low noise, low-light-level image fidelity and an ability to handle very large signals. In the lab, he noted, the imager can detect signals of as few as four photons; in the camera, minimal signal detection is probably around 20 photons, far lower than commercial digital cameras.

The CCD chip also has extremely large “storage wells” behind each pixel. The chip can store a little more than 200,000 electrons in each well, Wadsworth said, compared with perhaps 20,000 for a commercial digital camera. Larger well sizes help the cameras cope with radiation and also with the extreme temperature range, since thermally generated background charge can fill the wells.

Ironically, it's not the cold of the night but the “heat” of the Martian day that produces this background charge — along with the long exposure times required to form an image. “The colder you go, the better fidelity you have with the image,” Wadsworth said. “The devices have some cooling built in, but they're really at the mercy of what's going on temperature-wise on the surface of Mars.”

The large well capacity didn't jibe with submicron design rules, Wadsworth noted, which is one reason for the 3-micron CCD process.

“We have lots of room, so using looser design rules allowed us to get to where we wanted to be and build in extra yield margin” he said.

The chip is an analog, full-custom design, constructed using a layout editor and Spice simulator from Tanner EDA. “The layout of the imaging area was fairly straightforward and would probably bore most designers,” commented Wadsworth, who said it took him four weeks overall to design the CCD. “The real design challenge was in the electrometer circuit.”

Wadsworth noted that transistors on CCDs are made in buried-channel technology and cannot be turned off completely. “I had to generate [Spice] models that reproduced that behavior, and come up with a substantial amount of noise modeling,” he said. “I created as simple a circuit as I could that produced not only very high sensitivity, in terms of microvolts per electron, but was also very linear over a large number of electrons.”

The circuit, said Wadsworth, demonstrates about 99 percent linearity over a signal size of 450,000 electrons — comparable to a 2.5-to 3-volt signal swing. Wadsworth said that Tanner EDA, which provides low-cost custom-design tools, fit the bill for this design mission. “One thing I've learned is that if you don't have to use a complicated layout tool, don't do it,” he said. “The nice thing about the Tanner tools is that when you buy them, they're usable, unlike some of the larger packages, where you have to define basic components and models.”

Yet, there's room for improvement. “I hope somebody, someday, comes out with a good automated layout tool for analog,” Wadsworth said. “I haven't seen it.”
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W8DMR WILL BE WORKING HARD AT DAYTON

Among Bill’s many tasks at Dayton is his involvement with antenna basics in a forum hosted by Tim Duffy, K3LR. As you know, Bill’s expertise with this subject is without question. He is no doubt the authority in antenna theory so I encourage you to find the forum and attend. Below are the topics to be presented. Ed.

Moderator: Tim Duffy, K3LR
"The Basics of How Antennas Work" Bill Parker, W8DMR
"Selective Terrain Studies for Optimum HF Station Performance" Dean Straw, N6BV
"The W8JI Antenna Notebook" Tom Rauch, W8JI
"An Investigation Into Ground Systems for Best HF Performance" Rudy Severns, N6LF
"Propagation Software Review" Carl Luetzelschwab, K9LA

In addition, Bill will be our moderator for the Saturday afternoon ATV forum. The location and topics are shown below. Ed.

FSATV Forum Speakers, for Saturday, May 15, 2004, Hara Arena, Hamvention, Dayton, Ohio
12:15 - 2:30 Amateur Television ..... Room 1
Moderator: Bill Parker, W8DMR
Speakers:

Dr. David Clingerman, W6OAL - "Antennas for Rockets, Balloons, and Portable Operation"
Horizontally polarized, omni-directional antenna(s), the theory of operation and improvements. A 7 element, circular polarized, Yagi antenna for ground support operation. Dave plans to donate a mini-wheel antenna as a door prize.

Dr. Ralph E. Taggart, WB8DQT - "The New ARRL Image Communications Handbook"
Complete with CD-ROM and software utilities, Narrow-Band Television (NBTV), Amateur Television (ATV), Slow Scan Television (SSTV), and Weather Satellite Imaging (WEFAX), the Handbook and a homecomputer opens the possibilities of many imaging modes. Ralph is donating a copy of his new handbook as a door prize.

Bill Brown, WB8ELK - "Recent Balloon Launches/Retrievals"

Announcements:
DARA ATV Repeater Status, KB8OFF, ATVQ, Editor, WB9MMM, ATCO, Editor, WA8RMC, ATNA Activities, K3ZKO

FRIDAY AND SATURDAY NIGHTS AT DAYTON 2004

THE A.T.N.A. PROGRAM FOR DAYTON 2004
Friday May 14, 2004

Stockyards Inn
1065 Springfield St.
Dayton, OH 45403
Phone 937-254-3576

Starting time 1800 Hrs.
Dinner from menu with separate check. Please dine with ATNA.
First Prize Drawing by Art Towslee, WA8RMC.
We will hear about ATV repeaters around the country.
Second Prize Drawing by Art Towslee, WA8RMC
Mike Collis will explain how Microwave is used with ATV
Third and last Prize Drawing by Art Towslee, WA8RMC
Upcoming Balloon flights by Bill Brown, WB8ELK
Ending at 2200 Hrs.

SATURDAY MAY, 15, 2004

Stockyards Inn
1065 Springfield St.
Dayton, OH 45403
Phone 937-254-3576

Starting time 1800 Hrs. Informal dining with the ATVers and their friends. Ending at 2200 Hrs.

THE FORCES AT WORK BEHIND THE NTSC STANDARDS

INTRODUCTION:
The work of the first **NTSC** (National Television System Committee) was built on the basis of earlier standardization attempts. The first NTSC laid the foundations that made monochrome television a practical reality in the United States. The standards it endorsed in 1941 are still in use today. At the dawn of color television it seemed at first that it was not going to be compatible with monochrome television and would need special receivers. A tug of war of compatible versus incompatible color television systems ensued. The compatible system won. The second NTSC set up the compatible standards that have been adopted by the U.S. and by the rest of the world in many major respects.

Casual observers of technical progress often assume that the basic forces at work are merely those of new science and improved technology. But seasoned veterans of the technical wars know that many other forces are also at work. Prominent among them are the pride and prejudice of technical, industrial, and political leaders; the pursuit of power and profit; the rivalry for command of patents and markets; as well as the forces of government: inertia, misunderstanding, and, occasionally, foresight. The development of television in the United States is a prime example of the conflicting interplay of these forces and their ultimate resolution for the public good. The body on which these forces were principally brought to bear was the National Television System Committee.

Its initials "NTSC" are the hallmark of American television practice and, for that matter, the hallmark of much worldwide practice.

Monochrome Television The First NTSC . The first NTSC reviewed in 1940 and 1941 the existing arts of television and brought forth standards which were thereupon promptly adopted by the FCC (Federal Communications Commission) as the basis of the black-and-white service. Most of the new science and technology involved had been worked out previously by two committees of the RMA (Radio Manufacturers Association - now the Electronics Industries Association). In 1935, RCA had demonstrated a fully electronic 343 line television system. This event raised the ambitions of many in the radio industry to open a new market, and a spirited industrial contest was thereby joined.

The FCC presided over the arena and its then Chief Engineer, Commander T.A.M. Craven, set forth the ground rules: frequency allocations had to be agreed upon, and standards written which would insure a high quality service, one permitting every receiver in the hands of the public to derive pictures from every transmitter licensed by the Commission. Thereupon, in 1936, the RMA Television Allocations Committee, one of the two RMA groups, made the most basic proposal of them all: that the channel should be 6-MHz wide. This was a very wide channel indeed for its time, and it was chosen with the explicit understanding that double sideband amplitude modulation would be used for picture transmission, permitting no more than 2.5 MHz of video bandwidth.

The other group, the RMA Television Standards Committee, also in 1936, then proposed system standards suitable for the 6-MHz channel. Recommended were 441-line scanning, 30 frames per second interlaced 2 to 1, double-sideband negative modulation for the picture signal, an aspect ratio of 4 by 3, and frequency modulation for the sound signal. All this occurred only 11 years after tile first demonstration of halftone modulation in motion by Jenkins and by Baird, using Nipkowdisk mechanical scanning. In 1938, the RMA Television Standards Committee added proposals for the transmission of brightness, horizontal polarization, detailed specifications of the synchronizing,, signals (including equalizing pulses), and most important, vestigial sideband transmission which thereby increased the available video bandwidth from 2.5 to 4.2 MHz.

The great enhancement of the video band should, of course, have been accompanied by an appropriate increase in the number of lines. But this was not done. It can hardly have been an oversight. More likely, the 441-line picture remained because it was a plank in the bandwagon on which so many industrial giants were about to climb. In any event, the error was corrected by the NTSC at its last meeting, March 8, 1941, when the 525-line figure was adopted, after long argument among representatives of RCA, Philco, and DuMont.

Formation of the First NTSC. Aside from the cited important correction of the previous work, the first NTSC made no significant changes in the recommendations of the RMA Committees, and it was able to complete its work in nine months. Why then was the NTSC necessary? Did it serve a purpose? The second question is easily answered.
The review of prior work by the NTSC was conducted thoroughly and across the board, by competent and devoted engineers having conflicting Opinions and company positions. So, when the standards were approved by this diverse group, they were on immeasurably sounder ground than were the RMA standards.

The other question--Why an NTSC?--requires a more complex, but largely nontechnical answer. What happened - as has so often been the case in the history of applied technology - was a conflict between powerful men bent on capturing for themselves and their companies the lion's share of a new and potentially massive industry: television broadcasting and receiver manufacture.

The story begins with the FCC which, in December 1939, announced its intention to authorize limited commercialization of television broadcasting. At the same time it noted that standards had not been set and warned against any attempt to set standards arbitrarily by the authorized broadcasts. RCA had previously, in April 1939, inaugurated service for the public in New York using the RMA standards, and limited production of receivers had been started by RCA in January of that year. Early in 1940, RCA announced plans to step up production of receivers, to lower prices, and to augment its broadcast schedule.

Faced with this evidence of fast-paced action by their principal competitor, others in the industry went to the FCC. In a hearing held in January 1940, they complained that RCA's activity was in fact "freezing" the standards without industry agreement. They also raised technical objections to some of the RMA standards. The FCC agreed with the objectors, and in March 1940, announced that the permission to broadcast commercially was rescinded, that standards would not be set until "the engineering opinion of the industry is prepared to approve any one of the competing systems of broadcasting as the standard system," and that no commercial operation would be authorized until such agreement was, reached. This was the clarion call for the formation ot' the first NTSC. Until this group could resolve differences and agree with near unanimity on a set of standards, commercial television was stopped dead in its tracks.

The impasse was cleared by the NTSC. It began in a meeting between Dr. Walter R. G. Baker and James Lawrence Fly, Chair-man of the FCC, in 1940. At this meeting, at the urging of Chairman Fly, Baker agreed to set up the NTSC. Baker, a General Electric Vice-President who was also RMA's Director of Engineering, was well aware of the depth of the industry conflict that had to be resolved and he went about the job in masterful fashion. All organizations, whether members of RMA or not, were invited to name representatives to the NTSC, the only requirement being technical competence to deal with the issues involved. Complete minutes would record the stands taken by all members of the NTSC and its panels.

The industry responded promptly and well. Indeed, it had no choice, if the television industry was to resume its growth. In all, the first NTSC had 168 committee and panel members, it devoted 4,000 man-hours to meetings and left a record of 60,000 words. By the time it finished its work, in March 1941, it had reviewed and endorsed the NTSC standards. They are still in use today in the United States, Canada, Mexico, Japan and some ten other countries. The only present change is their narrower tolerances on the scanning rates to accommodate color television. The net effect on the industry was, of course, that the field was opened up to all comers on a more even-handed basis. RCA continued to maintain its preeminent position, but there is little doubt that the market was greatly extended by the presence of many powerful competitors.

THE COLOR TELEVISION WARS:

The first NTSC explicitly disavowed the possibility of compatible color (if indeed it ever imagined that compatibility was possible). At the insistence of CBS representatives, NTSC proposed to the FCC that field tests of color systems be encouraged, using the NTSC monochrome standards in all respects except the number of lines and the field and frame frequencies. This was early evidence of CBS's long, hard and costly battle, ultimately unsuccessful, to put across adoption of its incompatible field-sequential system. As a matter of fact, the coming of color television was marked by an epic battle between , two strong personalities: David Sarnoff, Chairman of RCA-NBC, and William Paley, Chairman of CBS. During the meetings of the first NTSC in November 1940, Peter Goldmark of CBS presented to it an impressive demonstration of field-sequential color, using 343 lines, 120 fields per second and a video channel of 6 MHz. Later proposals to use two or three contiguous 6-MHz channels for higher definition and/or lower flicker, were dashed by the fact that, in 1948, the FCC, dismayed by the shortage of channels for the burgeoning monochrome service, had ordered a freeze on the licensing of further stations that did not end until July 1952.

This interruption of the progress of the industry had an immediate and powerful effect on Sarnoff and Paley. Sarnoff then decided that a wideband color service would never be authorized and that a compatible system, which would preserve the existing black-and-white service, had to be invented. Paley, for his part, ordered an all-court press in favor of the CBS field-sequential approach. This resulted, in 1949, in a CBS petition to the FCC for immediate authorization of a field-sequential system employing 405 lines, 144 fields per second and a 6-MHz channel. The FCC in July had requested information on the practicability of all color systems planned for the 6-MHz channel.

In September 1949, at a hearing that lasted many months, the FCC received a reply to its inquiry from the JTAC (Joint Technical Advisory Committee), a joint creature of the IRE (Institute of Radio Engineers) and RMA. JTAC's tabulation included the field-sequential CBS proposal, a line-sequential proposal by CTI, and a dot-sequential proposal by Philco. Everyone in the industry knew that RCA also was hard at work on a dot-sequential, compatible system but (presumably under the direction of its Patent Department) RCA had not revealed its work. Just before the JTAC made its presentation, on August 25, 1949, RCA broke its silence and the JTAC table was amended accordingly. Thereafter RCA engineers took the stand, reported the details of their system, and recommended a complete list of standards to implement their system.

The FCC, in its orders following that hearing, completely misread the portents. It disqualified the line-sequential and dot-sequential systems and ruled that the CBS incompatible field-sequential system could proceed with commercial broadcasts. After litigation brought by RCA reached the Supreme Court, and the FCC position was upheld, the CBS color broadcasts began on June 25, 1951. In retrospect it can easily be understood why the public resolutely paid no attention whatever. The CBS broadcasts, being incompatible in their scanning standards with those of the black-and-white receivers in the hands of the public, could not be received in any fashion by the public at large. The Korean War provided a timely opportunity for the abandonment by CBS of its color broadcasts, which ceased October 19, 1951, less than four months after they had started.

Second Calling of the NTSC. Meanwhile, back in 1949, it was clear to Dr. Baker that the time had come for a second calling of the NTSC to provide industry wide agreement on a set of standards for compatible color. This second incarnation began in January 1950.

At its last meeting, in March 1953, the NTSC approved unanimously the present compatible color standards, and Peter Goldmark of CBS seconded the motion to approve.

Here was an example of what can happen in a free society. Despite vigorous government opposition, the truth or falsity of counter claims could be worked out, painfully, but worked out to the satisfaction of the many contesting parties. The new science and technology of compatible color were laid out in all their confusing glory before 315 NTSC Committee, Panel, and Subpoena members. After 32 months (nearly four times the time taken by the first NTSC), it reached agreement, leaving behind a record of 18 mimeographed volumes totaling 4,100 pages and the better part of a million words.

Principles Adopted in 1953. The dot-sequential system of RCA was the starting point for compatible color, but refinements from other sources proved essential and these were introduced after lengthy discussion and field tests. Perhaps the most significant of these improvements was the constant luminance principle invented by Loughlin, of Hazeltine, and his proposal to bypass the luminance signal around the color-sampiing circuits. These techniques removed the dot-interference effects that had been the principal shortcoming of dot-sequential systems. Other work by the second NTSC included the comprehensive study of the color subcarrier modulation system, the choice of angles and modulation method, and sideband distributions for the I and Q subcarrier signals. Extensive field tests included a confirmation of the ability of the color synchronizing burst to withstand the effects of severe noise. Many other proposals were discussed, tested, modified, and accepted or rejected.

Turn of the Tide. As can be imagined from this re-call of history, the second NTSC was not welcomed by the FCC. One of the Commissioners, R. F. Jones, went so far as to assert that the engineers testifying in favor of a compatible system were in a conspiracy against the public interest. In fact, the FCC pointedly ignored the NTSC for two years after it began work, at the end of which time FCC engineers were permitted by the Commissioners to attend NTSC meetings and demonstrations. By that time, 1952, the general embarrassment in Washington over the earlier incompatible color fiasco had subsided. By 1953, industry wide agreement had been obtained on the NTSC standards, and the FCC authorized their use effective December 23, 1953.
Thereafter Mr. Paley had to follow in General Sarnoff's footsteps, but this disadvantage was tempered by the ensuing history. It was not until ten years later, in 1964, that the public finally took the bait and began to buy color receivers in substantial numbers. During that decade, Mr. Paley had time to catch up, while General Sarnoff presided over a total investment by RCA in excess of $100 million before the tide turned. Sarnoff's faith and perseverance, without which color television service would have been longer delayed, were recognized at a banquet commemorating his 70th birthday, at which the CBS President served as toastmaster.

"It can fairly be claimed that the second NTSC was the most effective operation in the history of technical standardization. The standards it set up have been adopted by the rest of the world in nearly all major respects."

THE IMPACT OF NTSC ON THE WORLD:

Difference between NTSC, PAL, and SECAM. It can fairly be claimed that the second NTSC was the most effective operation in the history of technical standardization. The standards it set up have been adopted by the rest of the world in nearly all major respects. The most widely used system of color television, PAL, employs a chrominance subcarrier, frequency interleaving of luminance and chrominance components, the constant luminance principle - all taken from the NTSC scheme. The major differences are that, in PAL, the phase of the color components is reversed from line to line, with corresponding reversal at the receiver, and that simple color-difference signals are used in place of the NTSC I and Q signals. The effect is to achieve more accurate color values in the presence of multipath and some other types of interference and to reduce quadrature crosstalk. The SECAM system (considered by most engineers not practicing in France, Russia or their dependencies to be inferior in design to the PAL system) requires the receiver to memorize the content of each line, successive line signals being transmitted in the two color components. The color signals are sent on a chrominance subcarrier by frequency modulation, thus precluding the use of frequency interleaving. Both PAL and SECAM require somewhat more complex receivers and have somewhat lower vertical color resolution, but highly satisfactory reception is achieved by each system.

By all odds, the major difference in performance among NTSC, PAL, and SECAM is the superior horizontal resolution of the latter systems. This arises from two causes: more fundamentally from the wider channels (7 and 8 MHz) used, with correspondingly wider video bandwidths (variously set at 5.5, 6, and 6.5 MHz); less fundamentally from the lower frame rate (25 frames per second) which in turn has the deleterious effect of increasing their susceptibility to flicker problems. These comparisons prompt a strictly personal view of the ways in which the NTSC standards could be improved, if we had it to do over again.

Some Possible Improvements of the NTSC Standards. Clearly, we would have been better advised to choose a wide channel width, say 8 MHz. This choice would have cut station allocations in the ratio of 8 to 6, but on balance the improvement in the service would have been, in the author's opinion, well worth it. The NTSC field rate of 60 fields per second is clearly the right choice, agreed upon throughout the world as the proper base for future high definition standards. With an 8-MHz channel, the 525-line image could have been properly chosen at a considerably higher value, say in the vicinity of 700 lines. Finally, the NTSC I and Q components which have served us so well are now considered to, have no particular advantage over the simple color-difference signals of PAL, and have some disadvantages indicated by experience with the PAL system.

Despite these minor faults showing that the NTSC system (which preceded the others by ten years) is not perfect in all respects, it remains a system having far more potential than we currently extract from it. Troubles with cross-color effects in the overlap regions

between the luminance and chrominance spectra, have forced designers to limit the luminance bandwidth of receivers produced to date to less than 3 MHz. This results in a loss in luminance resolution compared to that permitted by the 4.2 MHz offered in the NTSC standards.
Only recently has the announcement been made that comb filters are available in some top-of-the-line receivers, with substantial increase in luminance resolution. Also, the earlier introduction of the vertical interval reference (VIR) system, which constrains the receiver settings of chroma and luminance to follow the values set at the studio, is now increasingly popular. So it is that many of the problems of the NTSC standards are being solved by new technology.

Fortunately, also, the problem of program exchange between originations on different standards has been solved by the digital video frame store, at a cost that only large networks can afford. It is very effective indeed.

Outlook on the Future. The frame store is, in fact, the occasion for asking whether, in the not too distant future, the call may arise for a third NTSC, hopefully under international auspices. If and when frame stores are so reduced in complexity and cost that they can be incorporated in receivers, then narrow band transmission of television may be in prospect, among several other attractive possibilities. The eye, as we well know, cannot consciously respond to information clues at any rate faster than about 50 bits per second. A whole audience, reacting in different ways to different aspects of the presentation, probably could be satisfied with a rate of information clues not greater than a few thousand bits per second. To achieve such low rates of information transfer in television, we must eliminate the redundancy in scanning by concentrating only on the changes between frames. Total scene changes will, in this case, require time for full-store accumulation, much indeed as does natural vision. To adopt this approach requires the digital storage of whole frames and adroit changes in the storage to follow the significant information clues and ignore all else.
This possibility has been understood in its essentials throughout the history of television engineering, and it is still far from practical reality. But when we consider how much digital processing and storage can now be bought in a hand calculator priced at $7.50, we need, perhaps, not be too discouraged about future possibilities.

If the experience of the two NTSCs is any guide--and I believe it is--we need not only to practice new science and economical reductions. We must also deal with the human factors of ambition, foresight, strong drives for profit and power, and knowledgeable coordination by government and within the industry. That such human factors are at work in the world today, pushing for a new day in television, no one among the readers should ever doubt. The only question is from whence and when will the great push come.

…DONALD G. FINK http://www.ntsc-tv.com A paper presented at the 122nd annual SMPTE Technical Conference, November 9-14, 1980, New York, N.Y. AUTHOR: Director Emeritus of the IEEE and Chairman of the SMPTE Study Group on High-Definition TV.

ATV FREQUENCIES, WHERE DID IT START?

Ron Coen, K3ZKO asks…
I remember at one time we used "On Carrier" sound if you keyed your two meter rig. The received ATV On-Carrier audio would then be heard on your subcarrier TV receiver, but that was long ago and maybe I'm wrong. Do you know why we are using the ATV frequencies we have and who thought of the idea way back it time.
Ron, K3ZKO

Henry AA9XW answers…
It was chosen so the third harmonic would not interfere with the video on 439.25. All weak signal users were on the same frequencies (432.1) when it was decided that the EME and SSB/CW ops wanted to have a clearer band because TV was getting popular and the wider video signal meant only one could be on at a time verses 432.1, 432.14, 432.188 etc. So video moved to 439.25, which kept all of its products above 434.00. This was considered the top end of the DX and weak signal band of 430-434. FM didn't come until later, and it was mostly at 443.00 and up. Remember most VHF UHF work was done with a frequency multiplier from a 10 meter transceiver. It was not designed for a crystal oscillator chain. Receivers were all down converters and preamps so CW operators on 2 meters would triple from 144.033 to 432.1, and an ATV carrier would triple from 146.41 giving everyone lots of room and no side band splatter or local oscillator/multiplier birdies. Operators with HF gear would 5X from 28.8 and 29.28. From that convention, again, lots of room. Most hardware was wide open front ends, no preselector circuits (band pass filters) were used which meant most of the oscillator/multiplier chain was on all the time, and only the finals were switched, so lots of stray RF around to cause problems in TX and RX.
…Henry AA9XW

THE TROUBLE WITH ROVER IS REVEALED

Maybe it's too much information about Mars vehicles, but I think it's really exciting and amazing that NASA can accomplish a feat like that so I like to share it. Who knows…maybe someday soon, we'll have someone sending ATV from there. ED.

SAN MATEO, Calif. — When the Mars rover Spirit went dark on Jan.21 a Jet Propulsion Laboratory team undertook to reprogram the craft's computer only to find themselves introducing an unpredictable sequences of events. The trouble with the Mars rover Spirit started much earlier in the mission than the day the craft stopped communicating with ground controllers.

"It was recognized just after [the June 2003] launch that there were some serious shortcomings in the code that had been put into the launch load of software," said JPL data management engineer Roger Klemm. "The code was reworked, and a complete new memory image was uploaded to the spacecraft and installed on the rover shortly after launch." That appeared to fix the problems that had been identified with the initial load. But what no one at JPL could have anticipated was that the new load also made possible a totally implausible sequence of events that would, many months later, silence Spirit.

The Spirit rover has a radiation-hardened R6000 CPU from Lockheed-Martin Federal Systems at the heart of the system. The processor accesses 120 Mbytes of RAM and 256 Mbytes of flash. Mounted in a 6U VME chassis, the processor board also has access to custom cards that interface to systems on the rover. The operating system is Wind River Systems' Vx-Works version 5.3.1, used with its flash file system extension. In operation, the real-time OS and all other executable code are RAM-resident. The flash memory stores executable images that are loaded into RAM at system boot. Separately, about 230 Mbytes are used to implement a flash file system that stores "data products," or data files that are created by the rover's subsystems and held for transmission to Earth.

Among the data products are the images created by the rover's cameras. "Part of my responsibility in the data management team is to keep track of the data files that are created, transmitted and deleted on the rover during the mission," Klemm explained. "We recognized early in the planning process that the flash file system had a limited capacity for files. It is not just a limitation in the flash itself but also in the directory structure."

Klemm explained that as data is collected by Spirit, files are created and stored in the flash file system until a communications window opens — an opportunity to transmit the data either directly to Earth or to one of the two orbiters circling the Red Planet. Then the files are transmitted. They are still held in the flash system until retrieved and error-corrected on Earth. If data is missing, requests are sent for retransmission. If the data is intact, a command is sent to delete the received files.

"But there were also directories of files already placed into the file system in the launch load," Klemm said. "When we uploaded a new image to the rover, we recognized that those files would have to be deleted, because they were being replaced by a new set using different directories." Accordingly, on Martian day 15 (or "sol 15") of rover operation, a utility was uploaded to the rover to find and delete the old directories.

Murphy strikes on Mars

But the transmission that uploaded the utility was a partial failure: Only one of the utility program's two parts was received successfully. The second part was not received, and so in accordance with the communications protocol it was scheduled for retransmission on sol 19.

Thus was the fuse lit on a software hand grenade. The data management team's calculations had not made any provision for leftover directories from a previous load still sitting in the flash file system.

As Murphy would have it, earlier, sol 19 Spirit attempted to allocate more files than the RAM-based directory structure could accommodate. That caused an exception, which caused the task that had attempted the allocation to be suspended. That in turn led to a reboot, which attempted to mount the flash file system. But the utility software was unable to allocate enough memory for the directory structure in RAM, causing it to terminate, and so on.

Spirit fell silent, alone on the emptiness of Mars, trying and trying to reboot. And its human handlers at JPL seemed at a loss to help, unable to diagnose a system they could not see. Luckily, early in the process of proposing failure scenarios, someone remembered the earlier failure to upload the second piece of the utility. The scenario was modeled, and it was discovered that a VxWorks flag that causes a task to be suspended on a memory allocation failure was set in the existing image.

"The irony of it was that the operating system was doing exactly what we'd told it to do," Klemm lamented. Working on the theory that the rover was in fact listening and rebooting, the team commanded Spirit to reboot without mounting the flash file system. The team then uploaded a script of low-level file manipulation commands that worked directly on the flash memory without mounting the volume or building the directory table in RAM. Using the low-level commands, about a thousand files and their directories — the leftovers from the initial launch load — were removed.

"At that point we mounted the flash file system and ran a checkdisk utility," Klemm said. To everyone's enormous relief, the mount was successful. "As we had anticipated, there was some corruption from the event, so that was corrected," Klemm added. "In the process of going through the contents of the file system, we discovered a system log in which the problem was documented, step by step, right up to the allocation request that failed."

Klemm said that with the leftover directories and their files removed, the system is now functioning well. But just in case, the team is working on an exception-handler routine that will more gracefully recover from an allocation failure.

As a postscript, Klemm noted that the other day he heard a car commercial on the radio that made reference to the Mars rover, comparing, for example, the car's speed over the ground to Spirit's. In the process of touting the car's extended-warranty program, the ad noted that the Mars rover came with "interplanetary roadside assistance." "That phrase just stuck in my mind," Klemm said. " love it."
…EE TimesBy Ron Wilson 2/20/04 Reprinted by permission http://newsletter.eetimes.com/cgi-bin4/DM/y/efaA0FyTcj0FrK0COoY0Au

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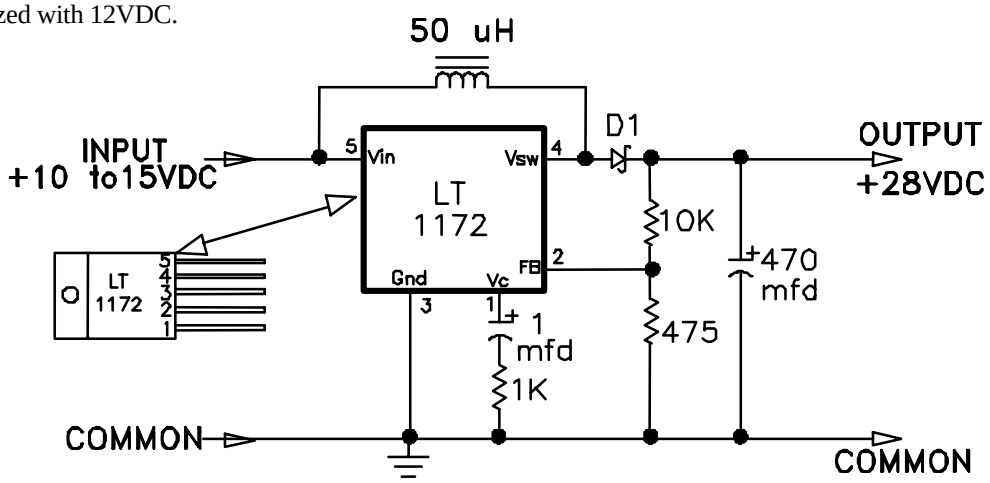
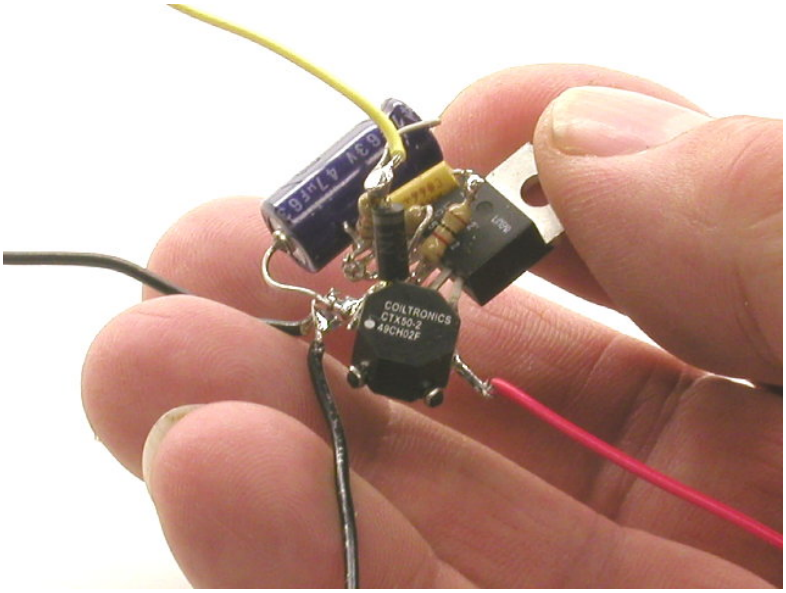
BUILD A 10-14V TO 28V DOUBLER…to run your 28v antenna relays

A number of us have obtained those valuable sealed antenna relays ideal for microwave use. They have just about everything we could possibly want in a relay: SMA connectors, sealed construction, very low loss even up to and including 10 GHz and they're relatively cheap (about $10-$15 at flea markets) except for one thing…they all operate on 28VDC. A circuit has been published before to create a "poor mans doubler circuit" by charging a capacitor at 12v and discharging it in series with 12V producing an instantaneous 24VDC for a time long enough to switch the relay, then hold it at 12V. This works and is simple as long as a double pole switch is available and the relay will stay energized with 12VDC.



A more reliable circuit is shown above. It is a true voltage multiplier and has a regulated output so it can be used for more than just switching relays. The circuit efficiency is about 85% so not much power is wasted either. For 28V @100 mA at the output, the input will require about 220mA. Not bad and the IC doesn't even get warm in the process. The circuit below operates at about 150khZ storing energy in the series inductor and through current mode operation, switches it into the output as determined by the resistor divider feedback into pin 2. The resistor ratio may be altered to give any output voltage from about 1 volt above the input to 35 volts. The inductor is not critical and can be from 50 to about 800 microhenries, the later figure for output currents in the 200 mA and up range. I've not tested the output voltage and current limits so if you depart too far from what I show here, keep your fire extinguisher handy. The circuit is compact and needs no heat sinking for currents in the 100 mA range. The output diode must be a high speed unit and preferably Shottkey for the highest efficiency. If you want to build the circuit and can't find any LT1172 IC's, let me know…I have a few extra.

The actual "breadboard circuit" is shown at the right. There is no attempt to make it neat here. I just "dead bug" connected the parts together. In fact, it's best to do it this way so the leads are short and direct. Later, I will clean it up a bit. In fact, I am considering packing the components in a little tighter, putting them into a small plastic box and filling the box with epoxy. That way I will create a small self contained module that doesn't need mounting. I may then simply TY Rap it to the antenna relay. Neat huh?
…WA8RMC



ANALOG TV TO DIGITAL TV CONVERSION PLANS

Plan considered to speed digital-TV shift Regulators want broadcasters to convert signals to analog. Federal regulators are considering an aggressive plan that would speed the transition to digital TV but would force consumers who don't have cable or satellite service to buy new gear by December 2006.

The plan would require the pay-TV services to convert digital signals to analog so they could be viewed on analog TV sets, the kind most people now have, FCC officials told USA TODAY.

That would let the government reclaim broadcasters' analog TV channels in 2006 so they can be auctioned to wireless firms, paving the way for new and improved services and raising billions for the U.S. Treasury. Also, police and fire agencies are expected to use the airwaves to improve spotty radio systems.

Federal Communications Commission Chairman Michael Powell and the agency's media bureau generally support the proposal. But it's unclear if the other four commissioners would back it.

Broadcasters have greeted the idea coolly. And lawmakers will be concerned about a plan that imposes costs on over-the-air viewers, Capitol Hill staffers say.

Nearly all TV stations also are beaming at least some of their programs in digital as well as analog. Federal law requires them to be all-digital and return their analog channels to the government by December 2006 -- but only if 85% of households in a market can receive all the digital broadcast signals.

Nine million consumers have digital monitors, but just 1.2 million have the tuners needed to receive digital broadcast signals. An FCC mandate requires all new TVs to include digital tuners by 2007. But it could be up to 20 years before most consumers replace their sets.

Cable and satellite systems offer a short cut because they serve about 85% of U.S. homes. Currently, cable systems must carry all local broadcasters' analog signals for free, unless the parties reach private deals that involve compensation. And satellite services must carry all analog channels if they carry any, as they do in a growing number of markets.

Under the plan, the government in 2006 would immediately reclaim broadcasters' analog channels in the dozens of markets where cable and satellite serve 85% of homes. The "must-carry" rules would then apply to broadcasters' digital signals. And the pay-TV systems would be required to convert digital signals to analog for consumers with analog sets.

The providers would still be able to supply pure digital signals to people with digital sets, FCC officials say.

Broadcasters, though, worry that consumers who don't have cable or satellite would have to shell out more than $100 for a digital-to-analog converter box, though FCC officials say a subsidy program could be arranged.
…Paul Davidson USA TODAY 3/17/04

BPL LEAVE-IT-WITH-THEM INFORMATION BACKGROUNDER

Again, not directly ATV related but important for all. Read carefully for at some time you may be directly affected. A video is available on the internet at `http://216.167.96.120/BPL_Trial-web.mpg` *which shows a test in Dublin, Ohio. ED.*

I thought you may be interested in the following discussion regarding BPL and Amateur Radio. It is the text of a Leave-it-With-Them document that unfortunately cannot be sent in its original form via this ARRL reflector. If you would like to receive a copy that includes artwork at the top of the first page and is suitable for printing more formally, let me know. I will E-mail it directly to you. This may take a little time if there are many requests. I expect to send the BPL grassroots lobbying information packet to you within about two weeks.

Broadband over Power Line: Why Amateur Radio Is Concerned about Its Deployment?
Radio amateurs are not opposed to broadband services. On the contrary, they tend to be early adopters of new technology. However, there are ways to deliver broadband that do not pollute the radio spectrum as Broadband over Power Line (BPL) does. These include fiber-to-the-home, cable, DSL, and wireless broadband. The ARRL--The National Association for Amateur Radio-- is supportive of broadband access for all Americans; however, it opposes the use of BPL as a solution to achieving this goal.

What is Broadband over Power Line?
BPL is the delivery of broadband Internet signals using electrical wiring to conduct high-speed digital signals to homes and businesses.

BPL systems are designed to deliver Internet services using medium voltage power lines as the distribution medium and generally use the
frequency range between 1.7 and 80 megahertz (MHz).

What is the status of BPL?
BPL has been deployed at several locations around the country for testing purposes. After receiving over 5100 responses to an April 2003
Notice of Inquiry in ET Docket No. 03-104 (most of which were from radio amateurs and others opposing BPL because of its potential interference to licensed radio services), the Federal Communications Commission adopted a Notice of Proposed Rule Making (NPRM) in ET Docket No. 04-37 with new requirements and measurement guidelines for BPL systems. The NPRM was released on February 23. The deadline for comments is May 3, 2004.

The Concern: Broadband + Power Lines = Interference
Because power lines are not designed to prevent radiation of RF energy, BPL represents a significant potential interference source for all radio services using this frequency range, including the Amateur Radio Service. Overhead electrical power lines and residential wiring act as antennas that unintentionally radiate the broadband signals as radio signals throughout entire neighborhoods and along roadsides.
Interference has been observed nearly one mile from the nearest BPL source.

What about regulations already in place to protect Amateurs?
The FCC Rules require that unlicensed emitters such as BPL systems must protect licensed radio services from interference, and that they must accept any interference to their operation that is the result of normal operation by licensed radio services. However, in practice it is often difficult to resolve such interference problems in the field.

The present FCC Part 15 limits, which BPL must comply with, are set with short-duration and narrowband emissions in mind. Such emissions, like those from a garage door opener, have a small potential to cause harmful interference. The same limits cannot be applied to long-duration, broadband emissions without greatly increasing the risk of harmful interference. At existing FCC Part 15 rules limits, BPL signals radiated from these power lines have a significant potential for interfering with nearby radio receivers. Instead of the radio signals one would normally hear, one will hear either tones or noise radiated from the BPL system.

Has the interference potential been proven?
The ARRL laboratory has made observations of BPL radiation at a number of trial areas. The lab's findings of interference and related information are available on the Web at www.arrl.org/bpl. There have been other observations of radio-frequency interference at BPL test
sites in the US and are a matter of public record in Docket 03-104.

In late 2003, the National Telecommunications and Information Administration (NTIA) performed measurements of BPL radiation at a
number of test sites. ARRL has also commissioned independent measurements of BPL field strengths based on objective, international standards. The results of both of these studies are to be published soon.

Although BPL proponents dispute these claims of interference to licensed services, they have provided little in the way of calculations or
measurements of BPL radiation levels. Until now, BPL systems have been limited to small, little-publicized test areas. Even so, the number of complaints of actual interference is growing steadily and efforts to resolve them have had limited success.

Others at risk
- The SHORT WAVES - the only part of the radio spectrum that supports long-distance, intercontinental radio communication. The short waves are used for international broadcasting, aeronautical, maritime, disaster relief, and other services including the military.
- The LOW-BAND VHF frequency range that is heavily used by volunteer fire departments, police, and other first responders.
- Depending on their distance from a BPL system, some public safety and federal government radio systems could receive harmful interference.

…Jim, K8JE k8je@arrl.org 513-459-0142 March 2004 www.arrl.org · Newington, CT 06111

ATV IN THE PITTSBURG, PA AREA…K3ZKO reports.

The Central Atlantic Amateur Television (CAATN) group has for several years been meeting four times a year in different cities and at locations of interest to ATVers with the purpose of linking the cities of Baltimore, MD, Philadelphia, PA, Wilmington, DE, York, PA, Cornwall, PA, Pottstown, PA, and then spreading to other areas.

To date we have Philadelphia linked transmitting 2.4 GHz towards Wilmington and the return is on 1.25 GHz a 26 mile path. The Wilmington ATV repeater is linked South to a relay site about 28 miles near Rising Sun, MD using 1.25 GHz and 923 MHz. From this relay site we need to complete the path into Baltimore about 29 miles. This relay site is located central to the other cities. It is vertical polarized so the other ATV repeater cities may also link into the system.

In Philadelphia we have just completed installing ATV on the Battleship New Jersey which is parked on the Philadelphia, PA / Camden, NJ waterfront. Maybe some day soon we will be able to have live ATV from the ship to a military ship in the Baltimore harbor.

The Philadelphia area has three high schools with an ATV station in operation.

ATV is also used for Emergency Management in our area. Here in Montgomery County, Pennsylvania the county has supported Amateur Television to the level of funding an ATV repeater, there are monies out there to help you with the costs of your equipment and at the same time providing eyes for federal, county, city, and local township agencies.

When the N.R.C. comes to our area every two years for a test of the Limerick Nuke plant we set up our cameras at the Limerick airport where we can obtain a good view of the cooling towers. We then transmit this picture ten miles to the County Underground Communications Center. I was told that someone in the WAR room asked what the direction the wind was blowing. They were then directed to the video monitor that was showing a live picture of the steam from the cooling towers.

The local townships directed that our local Comcast Cable Company allow us to install an ATV antenna and receiver at their head-end to receive signals from our ATV repeater. When we are out in the field transmitting to our ATV repeater, the signal is picked up at Comcast and inserted into the public access channel to allow the local police dispatchers to view the scene in real time. This also allows the police to tap in anywhere along the cable to feed their mobile command van.

We also use voice repeaters, packet and APRS to keep track of the mobile stations. MARS stations are also in use which incorporate SHARES and FEMA.
…Ron Cohen, K3ZKO

ATCO

2004 SPRING EVENT

1:00 PM - SUNDAY

MAY 02, 2004

ABB PROCESS AUTOMATION

*** 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:

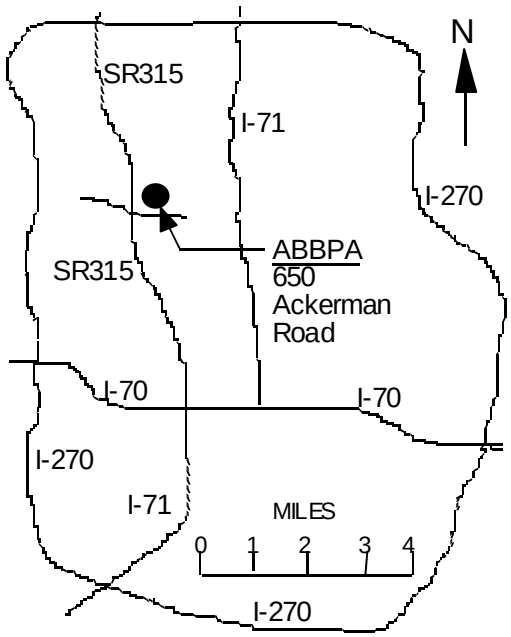
Take I-70 to SR-315 near downtown Columbus. Exit onto SR-315 north about 4 miles to Ackerman Road. Turn east on Ackerman about 200 yards to first driveway on left.

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.



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.

25 Apr 2004 Athens County ARA http://www.ac-ara.org**Contact:** Drew McDaniel, W8MHV 61 Briarwood Drive Athens, OH 45701 Phone: 740-592-2106 Email: mcdanied@ohiou.edu Athens, OH

25 Apr 2004 Twenty Over Nine Radio Club **Contact:** Don Stoddard, KI8SS 55 Whitney Avenue South Youngstown, OH 44509 Phone: 330-793-7072 Email: N8LNE2@JUNO.COM Canfield, OH

14-16 May 2004 Dayton Hamvention Dayton ARA http://www.hamvention.org/ **Contact:** Gary Des Combes, N8EMO PO Box 964 Dayton, OH 45401-0964 Phone: 937-276-6930 or 937-276-6934 Email: info@hamvention.org Dayton, OH

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30 May 2004 **FRANKLIN COUNTY HAMFEST**

> > *AN ELECTRONICS FLEA MARKET OPEN TO ALL* **< <**

BUY --- SELL --- TRADE

>>> AMATEUR RADIO EQUIPMENT <<<

ALSO

AVIATION, MARINE, ANTIQUE RADIO, AUDIO, TELEPHONE, COMPUTER.

SUNDAY MAY 30, 2004 9:00 AM

FRANKLIN COUNTY FAIRGROUNDS, JUST WEST OF COLUMBUS (IN HILLIARD, OHIO)

Take the I-270 outerbelt to west side of Columbus, Ohio. Exit at Cemetery Road (Hilliard). Drive 1.5 miles west on Cemetery Road to Norwitch Street and turn RIGHT (just before R/R overpass). Go 0.5 mile north on Norwitch (look for fairgrounds signs) and turn right onto Columbia Street then strait ahead to fairgrounds entrance. Free Parking.

>>>> <<<<

Admission at the door is $5.00 per person to buy or sell.

Call in frequency 146.760 / 146.16 Mhz with ctcss tone of 123.0 hz. Courtesy C.O.R.C.

Inside sellers tables (8ft.) or outside sellers spaces are $5.00 each. Set up time: 730AM.

Hotels, restaurants, and shopping are all near-by.

For more information, contact Chris Lind , KC8BUO, P.O. Box 14281, Columbus, Ohio, 43214

Ph. 614/ 267-7779 FAX 614/263-7934 clind2@juno.com

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13 Jun 2004 Fulton County ARC http://www.fcarc.8m.com **Contact:** Angela Infante, KB2AVN PO Box 521Wauseon, OH 43567 Phone: 419-822-4382 Email: fcarc@hotmail.com Wauseon, OH

19 Jun 2004 Milford ARC **Contact:** Chris Reinfelder, KB8SNH 3782 Grovedale Place Cincinnati, OH 45208 Phone: 513-351-2776 Email: kb8snh@cs.com Milford, OH

11 Jul 2004 Wood County ARC **Contact:** Bill Wilkins, WD8JWJ PO Box 534 Bowling Green, OH 43402 Phone: 419-353-9165 Email: wd8jwj@wcnet.org Bowling Green, OH

18 Jul 2004 Van Wert ARC **Contact:** Stephen Kouts, WA8WKF PO Box 347 Van Wert, OH 45891 Email: skouts@bright.net Van Wert, OH

24 Jul 2004 OH-KY-IN ARS http://www.ohkyin.org **Contact:** Bruce Vanselow, N8BV 4309 Skylark Drive Cincinnati, OH 45238-5535 Phone: 513-251-1555 Email: n8bv@juno.com Cincinnati, OH

25 Jul 2004 Portage ARC http://www.parc.portage.oh.us **Contact:** Joanne Solak, KJ3O 9971 Diagonal Road Mantua, OH 44255 Phone: 330-274-8240 Email: ljs@config.com Randolph, OH

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02 Aug 2004 **13th Annual HAM "OH" RAMA**

Sponsored by the **VOICE OF ALADDIN** Amateur Radio Club

Saturday, August 2, 2003 8:00 a.m. - 2:00 p.m. Free Parking on site (vendor setup at 6:30am)

Located in the Air Conditioned Aladdin Shrine Complex at 3850 Stelzer Road

TALK IN: 147.24 (+600 MHz input)

DIRECTIONS: Exit I-270 at the EASTON exit. Proceed West to the first light then turn North (right). The Aladdin Complex is located about 1/10 of a mile up the road on the right. Entrance to the HAMFEST is near the rear of the building.

Commercial Exhibits, Flea Market, Free Seminars, Refreshments, Prizes and VE Sessions. Exams begin at 9:30 a.m. Please be on site to register no later than 9:00 a.m. if you are planning to take an exam.

Admission tickets are $5.00 at the door, $4.00 presale. Children under 10 are free. Advance sales available at Universal Radio and Hall Electronics in Columbus, Ohio, the Aladdin Shrine Complex or with a SASE sent to: Jim Morton KB8KPJ, 6070 Northgap Drive, Columbus, OH 43229-1945. Telephone (614) 846-7790 evenings for further information. (Tickets will be available after June 10, 2002.) Club website http://www.qsl.net/w8fez

Indoor Display Tables (6 ft.) are $8.00 each at the door, $6.00 presale. Outdoor flea market is $5.00 per marked parking space, the day of the HAMFEST. Presale requests must be received no later than **July 20, 2003.**

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15 Aug 2004 Warren ARA http://www.w8vtd.org/ **Contact:** Renee McCaman, KB8SVF 317 Raymond Avenue NW Warren, OH 44483 Phone: 330-847-8478 Email: rnrmccaman@earthlink.net Warren, OH

12 Sep 2004 Findlay Radio Club http://www.findlayradioclub.org **Contact:** Bill Kelsey, N8ET 3521 Spring Lake Drive Findlay, OH 45840 Phone: 419-423-5643 Email: kanga@bright.net Findlay, OH

26 Sep 2004 Hamfest Association of Cleveland http://www.hac.org **Contact:** William Beckman, N8LXY 4360 Metropolitan Drive Cleveland, OH 44135 Phone: 800-CLE-FEST or 216-999-7388 Email: info@hac.org Cleveland, OH

10 Oct 2004 Medina 2 Meter Group http://www.qsl.net/m2m **Contact:** Ed Eyerdom, K8NVR 3312 State Road Medina, OH 44256 Phone: 330-239-1686 Email: k8nvr@arrl.net Medina, OH

31 Oct 2004 Massillon ARC http://www.marcradio.org **Contact:** Terry Russ, N8ATZ 3420 Briardale Circle NW Massillon, OH 44646 Phone: 330-837-3091 Email: truss@sssnet.com Canton, OH

6 Nov 2004 Grant ARC http://www.geocities.com/garcohio/ **Contact:** Rodney Crawford, WD8CTX PO Box 76 Buford, OH 45110 Phone: 937-446-2338 Email: wd8ctx@juno.com Georgetown, OH

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, Phoenix 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.

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, 2433 MHz FM modulation and 10.350 GHz 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
10.350 GHz 1 watt continuous
Link transmitter - 446.350 MHz 1 watt NBFM 5 kHz audio
Identification: 427, 1250, 2433 & 10.35 GHz transmitters video identify every 30 minutes showing ATCO & WR8ATV 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
10.350 GHz - Commercial 40 slot waveguide horizontally polarized 16 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
10.350 GHz - F5 video input (future – not installed yet)
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 7 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
10.450 GHz - Commercial 40 slot waveguide horizontally polarized 16 dBd gain omni (future – not installed yet)

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 *(TEMPORARILY OUT OF SERVICE)*

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 MEMBERS AS OF April 24, 2004

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@comcast.net
KC8ASD	Bud Nichols	3200 Walker Rd	Hilliard	OH	43026	614-876-6135	kc8asd1@netzero.com
KC8ASF	Tom Pallone	3437 Dresden St.	Columbus	OH	43224	614-268-4873	
W8CQT	Jim McConnell	350 N. State Road	Delaware	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
K8DW	Dave Wagner	2045 Maginnis Rd	Oregon	OH	42616	419-691-1625	
WA3DTO	Rick White	133 Concord 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
W8FZ	Fred Stutske	8737 Ashford Lane	Pickerington	OH	43147		w8fz@arrl.net
WA8HFK,KC8HIP	Frank, Pat Amore	3630 Dayspring Dr	Hilliard	OH	43026	614-777-4621	famore@wowway.com
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	k8kdr@arrl.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.com
N8LRG	Phillip Humphries	3226 Deerpath Drive	Grove City	OH	43123	614-871-0751	phumphries@columbus.rr.com
WB8LGA	Charles Beener	2540 State Route 61	Marengo	OH	43334		cbeener@columbus.rr.com
WB2LTS	Manny Diaz	74 Lincoln Rd	Medford	NY	11763		mvdiaz@suffolk.lib.ny.us
KC8LZC	Tom Walter	15704 St Rt 161 West	Plain City	OH	43064	614-733-0722	twalter@emec.us
W8MA(ex wa8tte)	Phil Morrison	154 Llewellyn Ave	Westerville	OH	43081		
WD8MDI	Dave Mathews	2404 Hoose Drive	Grove City	OH	43123		wd8mdi@qsl.net
KA8MID	Bill Dean	2630 Green Ridge Rd	Peebles	OH	45660		ka8mid@qsl.net
WB8MMR	Mike Knies	1715 Winding Hollow Dr.	Columbus	OH	43223	614-875-4236	
N8NT	Bob Tournoux	3569 Oarlock Ct	Hilliard	OH	43026	614-876-2127	n8nt@wowway.com
WD8OBT	Tom Camm	63 Goings Lane	Reynoldsburg	OH	43068	740-964-6881	firefoxtom11@netzero.com
KB8OFF	Jess Nicely	742 Carlisle Ave	Dayton	OH	45410		kb8off@prosurvisp.com
N8OPB	Chris Huhn	2720 Wood Leaf Lane	Reynoldsburg	OH	43068	614-866-2632	cjhuhn@aep.com
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
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	w8rwr@sbcglobal.net
W8RXX,KA8IWB	John Perone	3477 Africa Road	Galena	OH	43021	740-548-7707	
N8SFC	Larry Campbell	316 Eastcreek Dr	Galloway	OH	43119		
W8SJV, KA8LTG	John & Linda Beal	5001 State Rt. 37 East	Delaware	OH	43015	740-369-5856	w8sjv@bright.net
W8SMK	Ken Bird	244 N Parkway Dr	Delaware	OH	43015	740-548-4669	ken@midohio.net
N8SNG	Terry Rankin	414 Walnut Street	Findlay	OH	45840		
W3SST	John Shaffer	1635 Haft Dr.	Reynoldsburg	OH	43068		w3sst@juno.com
K8STV	Jim Carpenter	823 Quailwood Dr	Mason	OH	45040		me@jamescarpenter.com
K8TPY,K8FRB	Jeff Patton & Diana	3886 Agler Road	Columbus	OH	43219		cqcqk8tpy@juno.com
KB8TRP,KB8TCF	Tom, Ed Flanagan	1751 N. Eastfield Dr	Columbus	OH	43223	614-272-5784	ed48@columbus.rr.com
KB8UGH	Steve Caruso	6463Blacks Rd SW	Pataskala	OH	43062-7756	740-927-1196	dae14@copper.net
KC8UQS	David Dominy	7017 Taway Road	Radnor	OH	43066		
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	
KB8UWI	Milton McFarland	8287 Creekstone Lane	Blacklick	OH	43004	614-751-0476	
WA8UZP	James R. Reed	818 Northwest Blvd	Columbus	OH	43212	614-297-1328	wa8uzp@qsl.net
KB8WBK	David Hunter	45 Sheppard Dr	Pataskala	OH	43062	740-927-3883	hiramhunter@aol.com
KC8WRI	Tom Bloomer	PO Box 595	Grove City	OH	43123		
N8XYZ	Dan Baughman	4269 Hanging Rock Ct.	Gahanna	OH	43230		dbaughma@insight.rr.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

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
V. President: Ken Morris W8RUT
Treasurer: Bob Tournoux N8NT
Secretary: Frank Amore WA8HFK
Corporate trustees: Same as officers

Repeater trustees: Art Towslee WA8RMC
Ken Morris W8RUT
Dale Elshoff WB8CJW
Statutory agent: Frank Amore WA8HFK
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 (01/18/04)..... $2477.73
RECEIPTS(dues)..... $ 120.00
Pay Pal verification deposit..... $ 0.18
Pay Pal charges..... $ (1.77)
Pizza party pizza..... $ (172.04)
CLOSING BALANCE (04/24/04)..... $ 2424.10

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.