The Ragchewer

November 2007

The monthly newsletter of the Lancaster & Fairfield County Amateur Radio Club

On the Web: www.k8qik.org

Send email to K8QIK@columbus.rr.com

Club Meetings :

1st Thursday of every month at 7:30 pm at the club house.

VE Testing:

The third Sunday of every even numbered month. Register at 9:30 am and testing at 10:00 am

Club House Location:

On State Route 37 (Granville Pike) next to Beavers Field.

Nets:

Mondays at 9:00 p.m.
147.03 MHz (+.6)
146.70 MHz (-.6) Alt. Freq.
443.875 MHz (+5)
Thursday at 8:00 p.m.
443.875 MHz (+5)
UHF linked system

Packet BBS 145.53MHz
K8QIK-1 BBS
K8QIK-2: Ohio53

Weather Spotter Net:

146.76 Repeater with 123Hz tone Tuesday at 7:30 pm
Alt frequency 147.24 MHZ

November Birthdays

Robert Snider	W8BLS
Lynda Campbell	KB8ZBY
James Shyrigh	KC8JPZ
Brenda VanDyke	KC8OYP
James Gaffney	N8JEG
Robert VanDyke	W8RVD

Thursday Night Radio Night

Radio night is every Thursday at 6:00 p.m. (except the first Thursday which is the club monthly meeting). Work a little HF, maybe build something? How about a hot cup of coffee. We'll have them all waiting for you.

ARRL Membership

When you join the ARRL, or renew your membership through the club, we retain $15 for each new membership OR lapsed membership (of two years or more), and we retain $2 for each renewal. Please support our club, it doesn't cost any more. Send or give all paperwork to Treasurer with your money.

December VE Test:

The next VE test will be Sunday December 16th at the club house on Route 37. Register at 9:30 a.m. and testing begins at 10:00 a.m. Prepare yourself, take this test and upgrade!

Free Swap and Sell

If you have anything ham radio related, you can swap it or sell it here. List your items for free. Give a price and how to contact you. Send the list to K8QIK@columbus.rr.com

2006-2007 Officers

President:
Charlie Snoke, N8KZN

Vice President:
Mark Urbine, KC8TUW

Treasurer:
Ed Campbell Sr., WD8PGO

Secretary:
Mary Travis, KD8EEI

Trustee:
John Hilliard, W8OF

Station Engineer:
John Hilliard, W8OF

Net Manager:
John Fick, KD8EEK

Activities Manager:
John Fick, KD8EEK

Public Relations:
Allen Sellers, KB8JLG

Flower Fund:
---Open---

Chief Cook and Bottle Washer:
Charlie Snoke, N8KZN

Editor:
Jack Travis, AE8P
(740) 687-1985

November 1, 2007 Meeting Minutes

At 7:30 p.m. the meeting was called to order by Robert Northrup, KC8PSW, who lead the Pledge of Allegiance. Robert asked John, W8OF to swear in the new officers.

John, W8OF, swore in the new officers as follows: Charlie Snoke, N8KZN, President; Mark Urbine, KC8TUW, Vice President; Ed Campbell, WD8PGO, Treasurer; Mary Travis, KD8EEI, Secretary; John Fick, KD8EEK, Activity Manager and then the meeting was turned over to Charlie.

There were 16 members present. There were no new applications to review.

Officer Reports

Secretary Report: Robert Northrup, KC8PSW

Minutes are posted in the Ragchewer. Motion to accept by John, W8OF and seconded by John, W8AGS. Motion carried.

Treasurer's Report: Ed Campbell, Sr., WD8PGO

Ed gave the club financials. Motion to accept by John, W8OF and seconded by Jack, AE8P. Motion carried.

VP Report: Mark Urbine, KC8TUW

No report

Trustee Report: John Hilliard, W8OF

Nothing to report

Committee Reports

VE Testing: Allan Sellers, KB8JLG

Jack, AE8P, reported that they had four people for testing – 2 passed upgrade for General and 2 passed their Technician

Monday Night Net: John KD8EEK

Nov. 5	John, W8AGS
Nov 12	John, W8OF
Nov 19	John, KD8EEK
Nov 26	Charlie, N8KZN
Dec 3	John, KD8EEK

Ragchewer: Jack Travis, AE8P

Nothing to report. Submit any article, news item, cartoon, or other ham related bits of trivia to Jack at k8qik@columbus.rr.com

Emergency Coordinator: Ed Campbell, WD8PGO

Ed stated he needs about 6 volunteers for the United Way 5K run on Nov 10th at the Fairgrounds and about 10 people for the Holiday Parade on Nov 17th at the Fairgrounds. Volunteers for the Nov 17th were: Mark, KC8TUW; George, KB8USP, Kay, KC8HJW, John, W8OF, Charlie, N8KZN; Connie, N8LPC, John, KD8EEK, Robert, KC8PSW.

Ed also said he would like to get some names to provide the Red Cross and these people would be called if there were a disaster and emergency communications would be required. They would need the name and telephone number. The following people volunteered: George, KB8USP, Charlie, N8KZN, Connie, N8LPC, John, W8OF, Mary, KD8EEI, and John, W8AGS.

Ed also said the Red Cross would like a written agreement from the club that we would provide communications for local events. Ed said that we currently have a verbal agreement with the Red Cross. Charlie asked for a vote on who wanted to keep the verbal agreement and members agreed to stay with the verbal.

Safety: Scott Snoke, WD8IXO

No report

Station Engineer: John, W8OF

John called the mfg. and our new amplifier should be in by the end of next week. He also stated he has the supplies and altered components ready to install as soon as we receive the new amp.

John reported that the new assembled 146.70 repeater unit has been bolted to a cement slab poured by Charlie, N8KZN; Ralph, W8BVH; and John, W8OF earlier this week.

On Oct. 6th two people from southern Ohio Bob Swank, W8LBB, and Ron Erb, WO8Z replaced the UHF antenna on the tower and while doing this it was determined that the 2 meter antenna had been disconnected in 2004 and Ron Erb had some cable with him which he was willing to sell for $102.50 to hook up this antenna also. Ray, W8FLX made motion seconded by Gary, W8GTS to pay Ron Erb the $102.50. Motion carried.

Also, Charlie asked for vote of members present to send $50.00 to Bob Swank for volunteering to climb the tower and put up our new antenna and cable. 6 in favor, none opposed.

Activities Manager: Kay Hanna, KC8HJW

50/50 winner was Robert Ryan, KD8CBV – not present no winner - $8.00 collected. Kay has agreed to work with John, KD8EEK for the Christmas Party. John, KD8EEK asked for members to let him know of any ideas they may have for activities.

Flower Fund: Mary Travis, KD8EEI

$10 collected and $5 went to John, W8OF. **Also we need a volunteer to take over the flower fund since Mary is now going to be secretary,**

Old Business:

John, W8OF agreed to contact the county regarding the possibility of putting in a paved walkway for the handicapped to the building from parking lot.

New Busniess:

The following committee was formed to audit the books and present a five year plan to the members for raising money for operating expenses, Mark Urbine, KC8TUW, Chairman with Ray, W8FLX and Ed, WB8JBZ who will meet with Ed Campbell and report back to members.

Email was read which was received from Kevin Numbers, KC8MTV who has been maintaining the K8QIKwebsite and he has asked for someone else to take it over. John, W8OF agreed to contact him and find out how much money was involved with the website and report back to members in December.

Charlie mentioned the stereo unit that had been purchased by Kay Hanna for raffle to raise money for the club. Don, WD8PCF made a motion to reimburse Kay Hanna $104.10 and seconded by Ed, WB8JBZ. Motion carried.

Charlie said that Sheriff Dave Phalen may be at our January meeting to talk about their new citizen patrol and other items of interest to members.

Ray, W8FLX motion to adjourn, second Gary W8GTS. Motion carried. Meeting adjourned at 8:40 p.m.

Respectfully submitted,
Mary Travis, KD8EE

Mary Travis, KD8EEI, Secretary, Charlie Snoke, N8KZN, President; Mark Urbine, KC8TUW, Vice President; John Fick, KD8EEK, Activity Manager, Ed Campbell, WD8PGO, Treasurer. John Hilliard, W8OF, Trustee (far right) ready to swear in the new officers.
Robert, Northrup, KC8PSW (outgoing Secretary in rear)

Upcoming Hamfests

November 17th & 18th is the Fort Wayne Hamfest & Computer Expo. You can get more info at http://www.fortwaynehamfest.com. This one is worth the trip, it's bigger than Findlay and all indoors.

Tubes For Sale

If you need tubes for your boat anchor or TV contact Jeff Bell WD8JLI at 614-774-2973 or email at jbell@imagearray.net he has a huge supply for most needs.

E-mail Addresses

If you are currently receiving The Ragchewer via regular mail but have an Internet account, the Ragchewer can be sent to you and save the club some money. You'll also get your Ragchewer about a week earlier. Send me your e-mail address and tell me to take you off the snail mail list.

If you have a new email address, be sure to also let me know. Send to K8QIK@columbus.rr.com

Juanita R Gaffney, KC8OYO (SK)

Juanita R Gaffney died at 1:40 a.m. Monday, Oct. 8, 2007 at Fairfield Medical Center. She was born on Jan. 16, 1937 in Straitsville, where she lived with her beloved grandmother, Della Hoy, for many years before moving to Lancaster. She was a 1955 graduate of Liberty Union High School. She retired from the village of Baltimore in 1999.

She was a member of VFW Ladies Auxiliary 3761, Lancaster and Fairfield County Amateur Radio Club, Olivedale Senior Center and Charlie's Chippers Carving Club, and attended Trinity United Church of Christ in Baltimore.

She is survived by her loving husband of 52 years, James E Gaffney of Baltimore, daughter, Brenda (Robert) Van Dyke of Baltimore, sons, Michael (Sharon) of Thornville and James E Jr. (Kimmi) of Baltimore; grandchildren, Zachary Gaffney of Thornville, Desirea Gaffney and Beau George of Baltimore; great granddaughter, Layla Gaffney of Thornville; and great-grandson, Legend Icenhower of Pennsylvania. She is also survived by many cousins and friends.

Services were held at Johnson-Smith Funeral Home in Baltimore. Memorials may be given to Trinity United Church of Christ, 105 N High St., Baltimore, OH 43105

The Wayback Machine #17

by Bill Continelli, W2XOY

Repeaters. It seems they are everywhere, and they are. Several thousand amateur repeaters operate on our bands from 29.5 MHZ all the way thru the microwave range. In fact, there are more amateur repeaters in the U.S. & Canada than there are AM Broadcast Stations. How and when did this evolve? Let's take a look at the development of repeaters in the Amateur Community.

If you had to guess when the first repeater came on the air, what would you say? 1970?, 1965?, 1955? Try 1932!!! It was in the early 30'S that the first "Duplex Phone Relay Stations", (as they were then called), came into existence. W1AWW & W1HMO set up a manned relay station in a 90 foot wooden lookout tower near Springfield Mass. They used a superregenerative receiver tuned to 60 MC (the top of the old 5 meter band), and a modulated oscillator transmitter on 56 MC, (the bottom of the band). Stations in Connecticut, Massachusetts or Rhode Island could transmit on 60 MC, and have their signals manually rebroadcast on 56 MC. This relay station, of course, was in operation only when amateurs were on duty at the lookout tower. Fully automatic repeater operation was still over 30 years away.

In the 1950'S and early 60'S, there were a few AM repeaters on the air in California. But for the most part, VHF operations in the 1940'S thru the late 60'S were on AM phone in the simplex mode, with a handful of sideband stations thrown in. Using crystal controlled transmitters with about 10 watts, and single conversion superhets, the typical VHF operator had a range of 10-15 miles, not counting any band openings.

There were a handful of FM stations of course, but the development of FM as a mainstream amateur mode of communication had been pushed aside by sideband. As early as 1940, QST had construction projects for a complete 112 MC FM station, but FM took a back seat in 1947 when sideband appeared. Now, however, thanks to an FCC edict, it was about to make a comeback.

In 1960, the FCC issued new requirements for the users of VHF commercial frequencies. Over the period from 1960 to 1970, commercial users gradually phased in narrow band (5 KC deviation) equipment to replace the wide band (15 KC) transceivers they had been using. Rather than revamp the older equipment to meet the new standards, they simply purchased new radios. The old units made their way to the surplus market, where they were quickly snapped up by amateurs. Converting this equipment to ham frequencies was relatively easy, and soon hundreds of stations were operating on 52.525 MC and 146.940. Why those frequencies? Well, 52.525 was the lowest 6 meter frequency on which wide band FM was allowed, and

146.94 was chosen to accommodate Technicians who weren't allowed above 147 MC. Thus, these became the first "calling Channels".

It wasn't long before some surplus commercial equipment was revamped into repeaters. Unlike the 1932 setup, these were fully automatic devices, with no need for a control operator to be present. This, however, presented problems. Part 97 at that time contained no provision for repeater operation, and it was unclear as to whether it was legal to operate a repeater without a control operator present. Many proposals were presented to the FCC to clarify the rules in regards to repeaters. FM and repeaters received considerable publicity in 1969 when Hurricane Camille caused widespread destruction in the Gulf Coast and Virginia. This was the first time mobile rigs, FM and repeaters were used extensively in an emergency. FM activity increased in late 1969 and early 1970 with the ARRL's announcement that it no longer considered Technicians to be just experimenters, but rather full fledged Communicators. Also adding to the popularity of FM was the introduction of the first commercial rigs for the amateur market, from manufacturers such as Galaxy, Clegg, and Drake. By 1970, it was clear that coordinated, legal growth of FM and repeaters was necessary.

In early 1970, the FCC proposed its first repeater rules. They were as follows:: On 6 meters, repeater inputs would be from 52.5 TO 52.7, with the outputs at 53.0 to 53.2 MHZ.. For 2 meters, repeater inputs would be authorized from 146.3 to 146.6, and the corresponding outputs would be from 146.9 TO 147.2. On our 220 band, the input/output subbands were 223.1--223.3 and 224.1--224.3, while on 440 repeaters would be authorized on 447.7--448.9 for inputs and 449.1--449.3 for outputs. (By the way, it looks like the 1970 FCC proposal contained a typo in the 440 MHZ segments). "Whistle on" or other coded access would be required--carrier activated repeaters would NOT be allowed. No cross band, linked or chain repeaters or multiple outputs would be allowed. The maximum power permitted was 600 watts input (about 400 watts output). And, finally, the FCC declined to allow fully automatic repeater operation, the proposed rules required the licensee of a repeater station to be in attendance at the transmitter or at an authorized fixed control point and to monitor all transmissions of the station.

The proposed repeater rules appeared unduly restrictive to many hams. Except for 2 meters, each band had only a 200 KHZ wide input/output window. On 2 meters the input/output subbands were 300 KHZ wide--but 2/3 of the repeater output subband was above 147 MHZ--where Technicians weren't allowed!! The FCC had still not acted on the ARRL's 1969 proposal to open all VHF frequencies to Technicians. When the FCC was questioned on the legality of a Technician using a repeater whose input was within the 145-147 subband, but whose output was above 147, they said the Technician operator COULD NOT USE THE REPEATER. The FCC went on to say "the licensee of such a repeater should sit there with the latest Callbook showing license class and keep his finger on the NO-NO button". (Yes, this is an actual quote). So much for liberal repeater rules.

Despite the FCC's rather restricted proposed rules, repeater operations flourished throughout 1970 & 1971. Over 200 repeaters were on the air by 1971, almost all of them in the 146--147 MHZ range so they could be used by Technicians. But, with the uncertain status of future FCC rules, the lack of national frequency standards, and the inability of Technicians to operate the full 2 meter band, a dark cloud hung over the FM world.

In our next installment, we will review the ARRL's national plan for 2 meter FM, as well as the revised FCC rules on repeater operation. I hope you will join me.

Help With Information On Member Status

Since I don't always get or read the newspaper, I need to be notified of the death of a member so flowers or a contribution to an organization can be sent from the club. Please call me at 740-687-1985 or send an email at metravis@columbus.rr.com.

If you are aware of a member who is sick or recuperating from surgery; or has been recognized for any achievement in the community, notify me so a card can be sent.

Thank you for your help.

Mary, KD8EEI

Ham Dipole As A Practical and Portable Limited-Space HF Antenna

By Steve Cuccio, NB30 and Ed Harris, KE4SKY

When setting up portable or space restricted antennas, stand-alone mobile whips are often avoided due to the lack of a good grounding method. Stringing ground radials or using a ground rod in the field or the attic becomes increasingly difficult. While using one mobile whip by itself requires a good ground or counterpoise (usually the car body), a pair can be operated as a dipole. Lakeview (www.hamstick.com) makes a universal dipole mount for $13.95. They also supply quick-disconnect fittings with 3/8 X 24 threads which allow push-and-twist assembly of the mobile whips to the dipole mount within seconds for those of us wishing to make a quick setup or band change without tools.

Pro-Am makes Valor HF linear loaded whips that disassemble in half using a single threaded nut. This has the advantage that tuning adjustment is not lost when the antenna is disassembled. Hamstick whips have two small set screws that must be loosened to remove the stinger portion. Both brands cost about $24 per whip. The eightfoot whip disassembles to two four-foot pieces. Each whip is designed to cover one amateur band and can be adjusted from the phone to the CW sub-bands by changing the stinger length.

The 2:1 VSWR bandwidth is narrower on the lower bands since the whips are proportionally smaller compared to the longer electrical wavelengths. The 20-meter whips measured about 100 kHz, the 40-meter at 40 kHz and the 75-meter about 20 kHz. If your HF rig has a built-in tuner, the useable frequency span approximately doubles without significant loss of antenna efficiency.

An on-the-air comparison was made between the portable whip dipoles up 20 feet and half-wave dipoles for 40 and 75 meters. On 40 meters, two whips were about 1-1/2 Sunits (about 10 dB) below the half-wave 40-meter dipole. Two 75-meter whips were almost three S-units (about 18 dB) below a half-wave 75-meter dipole (no wonder, since a 75-meter half wave dipole is 130 feet compared to the 16 feet of the two whips). On 20 meters, there was only about one S-unit (6-dB) difference from a G5RV dipole antenna. Getting the portable whip dipole higher than 20 feet would also improve efficiency.

This portable dipole system was used to make contacts with European Russia on 20 meters from a condo in San Luis, CA as well as by Ed to San Juan Puerto Rico, Prince Edward Island and Mexico City from the Pentagon south parking lot in Washington, DC during the 2000 Marine Corps Marathon.

A pair of Radio Shack 10-foot TV mast sections supported my antenna parallel to the plastic rain gutter on the corner of the house. Bungee cords were used to hold it in place. Raising and lowering the antenna and masts to change bands can be done by one person, but two make the job easier when the wind is blowing.

Ed uses four 5-ft. mast sections for ease of storage in a vehicle. He recommends that whips all be equipped with quick-disconnects, be color-coded by band and stored with a 4' ground rod in capped 3" diameter PVC pipe. ARES / RACES may need to set up in a paved area such as an EOC parking lot. To do so bolt a folding 3-ft. TV roof tripod onto a triangular support frame constructed of three 5' pieces of 1" angle iron, using 1/4-20x3" bolts and wing nuts. Similarly attach a length of 2x6" across the open end opposite the TV tripod. Park a front tire of your vehicle on the board or place sandbags across it to provide wind stability. All stash easily in an SUV. With practice, you can erect the antenna in 5 minutes!

A variation provides dual HF band coverage with a single coaxial feedline. Two hamstick dipole mounts were bolted together with their center-isolated posts connected together using #12 gauge wire. Two sets of whips for 40 and 75 meters were assembled. Coax was attached to one of the mounts. There is minor interaction between the whips, although the #12 gauge wire looks slightly capacitive.

Connecting the coax to the lower band dipole mount reduces the effect of the #12 gauge wire. A 25-foot length of coax was coiled at the base of the mast as an RF choke to reduce any stray RF from coupling onto the shield. The same could be accomplished by using ferrite beads on the coax feed near the dipole mount.

Either arrangement provides a viable, convenient, portable, horizontally polarized, high-angle antenna for NVIS operation on 40 and 75 meters. It is also a directional antenna on the higher frequencies, which is an effective performer for those who live in antenna restricted communities.

As with any transmitting antenna, be sure the radiating elements, especially the stinger end sections, are kept safely away from bystanders.

CTCSS Explained

In telecommunications, Continuous Tone-Coded Squelch System or CTCSS is a circuit that is used to reduce the annoyance of listening to other users on a shared two-way radio communications channel. Where more than one user group is on the same channel, (called co-channel users,) CTCSS filters out other users if they are using a different CTCSS tone or no CTCSS.

Instead of turning on the receive audio for any signal, the two-way radio receiver's audio turns on only in the presence of the correct tone. This is akin to the use of a lock on a door. A carrier squelch or noise squelch receiver is unlocked and will let any signal in. A receiver with CTCSS locks out all signals except ones encoded with the correct tone. CTCSS can be regarded as a form of in-band signaling.

Example

For example, suppose a pizza restaurant offering delivery and a landscape maintenance service share the same two-way radio frequency of 151.925 Mhz. Conventional radios without CTCSS would hear all transmissions from both groups. The landscapers would have to listen to the pizza shop. The pizza shop would have to hear about landscape customer complaints. If both installed CTCSS, units from each group would only hear radios from their own group. This is supposed to reduce missed messages and the distraction of unnecessary radio chatter.

Theory of operation

Radios in a professional two-way radio system using CTCSS always transmit their own tone code whenever the transmit button is pressed. This is called CTCSS encoding. CTCSS continuously superimposes any one of about 50 low-pitch audio tones on the transmitted signal, ranging from 67 to 257 Hz. The tones used may be referred to as sub-audible tones. In an FM two-way radio system, CTCSS encoder levels are usually set for 15% of system deviation. For example, in a 5 KHz deviation system, the CTCSS tone level would normally be set to 750 Hz deviation. Engineered systems may call for different level settings in the 500 Hz to 1 KHz (10-20%) range.

The ability of a receiver to mute the audio until it detects the correct CTCSS tone is called decoding. Receivers are equipped with features to allow the CTCSS "lock" to be disabled. In professional US licensed systems, Federal Communications Commission rules require CTCSS users on shared channels to disable their receiver's CTCSS to check if co-channel users are talking before transmitting. On a base station console, a microphone may have a split push-to-talk button. Pressing one half of the button, (often marked with a speaker icon or the letters "mon",) disables the CTCSS decoder and reverts the receiver to hearing any signal on the channel. This is called the monitor function. There is sometimes a mechanical interlock: the user must push down the monitor button or the transmit button is locked and cannot be pressed. This interlock option is called, compulsory monitor before transmit. (The user is forced to monitor by the equipment.) On mobile radios, the microphone is usually stored in a hang-up box. When the user pulls the microphone out of the hang-up box to make a call, the receiver reverts to carrier squelch, ("monitor"). In hand-held radios, an LED indicator may glow green, yellow, or orange to indicate another user is talking on the channel. Hand-held radios usually have a toggle switch or push button to monitor.

A CTCSS decoder is a very narrow bandpass filter which passes the desired CTCSS tone. The filter's output is amplified and rectified, creating a DC voltage whenever the desired tone is present. The DC voltage is used to turn on the receiver's audio stages.

In a professional communications receiver designed for CTCSS, a high-pass audio filter is supposed to block CTCSS tones (below 300 Hz) so they are not heard in the speaker. Since audio curves vary from one receiver to another, some radios may pass an audible level of the CTCSS tone to the speaker. Lower tone frequencies generally are less audible. If the magenta audio curve shown at right were plotted from a CTCSS-equipped receiver, it would drop nearly straight down below 300 Hz.

Because period and tone frequency have a relationship in physics, lower tone frequencies take longer to decode. Receivers in a system using 67.0 Hz will take longer to decode than ones using 203.5 Hz. In some repeater systems, the time lag can be significant. The lower tone may cause one or two syllables to be clipped before the receiver audio is heard. This is because receivers are decoding in a chain. The repeater receiver must first decode the

CTCSS tone on the input. When that occurs, its transmitter turns on, encoding the CTCSS tone on the output. All radios in the system start decoding after they recognize the tone on the output as valid.

Engineered systems often use tones in the 127.3 Hz to 162.2 Hz range to balance fast decoding with keeping the tones out of the audible part of the receive audio.

In early systems, it was common to avoid the use of adjacent tones. On channels where every available tone is not in use, this is good practice. For example, an ideal would be to avoid using 97.4 Hz and 100.0 Hz on the same channel. The tones are so close that some decoders may periodically false. The user occasionally hears a syllable or two of co-channel users on a different CTCSS tone talking. As electronic components age, or through production variances, some radios in a system may be better than others at rejecting nearby tone frequencies.

List of tones

CTCSS tones are standardized and may be listed in equipment manuals or by entities like the Electronics Industry Association. A few systems may use non-standard tones. Commonly-used tones (in Hz) include:

67.0	71.9	74.4	77.0	79.7	82.5
85.4	88.5	91.5	94.8	97.4	100.0
103.5	107.2	110.9	114.8	118.8	123.0
127.3	131.8	136.5	141.3	146.2	151.4
156.7	162.2	167.9	173.8	179.9	186.2
192.8	203.5	206.5	210.7	218.1	225.7
229.7	233.6	241.8	250.3	256.3	

Vendors may assign codes or names to these tones. For example, Motorola may call 127.3 Hz "3A" while another manufacturer may refer to it by its position on a list in a programming table, (say "19" or "20").

Vendor names

CTCSS is often called PL tone (for Private Line, a trademark of Motorola), or simply tone squelch. General Electric's implementation of CTCSS is called Channel Guard (or CG). Vintage RCA radios called their implementation, Quiet Channel. Kenwood radios call the feature, QT. There are many other company-specific names used by radio vendors to describe compatible options. Any CTCSS system that has compatible tones is interchangeable. Old and new radios with CTCSS and radios across manufacturers are compatible.

In amateur radio, the terms PL tone, PL and simply tone are used most commonly. Often, there is a distinction between the terms tone and tone squelch, in which the former refers to the use of transmitting a CTCSS tone while using standard carrier squelch on the receiver. Use of transmit-only CTCSS allows stations to communicate with repeaters and other stations using CTCSS while the link is marginal and the CTCSS tones may not be properly decoded.

One caveat about all CTCSS being interchangeable is that some professional systems use a phase-reversal of the CTCSS tone at the end of a transmission to eliminate the squelch crash or squelch tail. This is common with General Electric Mobile Radio and Motorola systems and may be patented. The CTCSS tone does either a 180- or 270-degree phase shift for about 200 milliseconds at the end of a transmission. In old systems, decoders used mechanical reeds to decode CTCSS tones. When audio at a resonant pitch was fed into the reed, it would vibrate on a set of springs, turning on the speaker audio. The end-of-transmission phase reversal caused the reed to abruptly stop vibrating and the receive audio would mute. These systems often have audio muting logic set for CTCSS only. If a non-Motorola transmitter, (without the phase reversal feature,) is used, the squelch can remain unmuted for as long as the reed continues to vibrate — up to 1.5 seconds at the end of a transmission.

Intermodulation interference

In non-critical uses, CTCSS can also be used to hide the presence of interfering signals such as receiver-produced intermodulation. Receivers with poor specifications — such as scanners or low-cost mobile radios — cannot reject the strong signals present in urban environments. The interference will still be present but the decoder will block it from being heard. It will still degrade system performance but by using selective calling the user will not have to hear the noises produced by receiving the interference.

CTCSS is very commonly used in amateur radio for this purpose. Wideband and extremely sensitive transceivers are common in amateur radio, which imposes limits on achievable intermodulation and adjacent-channel performance. Often all repeaters in a geographical region share the same CTCSS tone as a method of reducing co-channel interference from adjacent regions and increasing frequency reuse. This is a practice linked back to an old FCC practice of

coordinating CTCSS tones for business services. In areas where no coordination is necessary, a default of 100 Hz has become a de facto standard.

In systems with life-safety uses such as search and rescue or ambulance company dispatching, the presence of interfering signals should be corrected rather than masked with CTCSS tone squelch. Interfering signals masked by tone squelch will eventually produce apparently random missed messages. Users will not understand why they could not hear a call. The intermittent nature of interfering signals will make the problem difficult to reproduce and troubleshoot.

VHF Packet Isn't Dead Yet

By Bruce Randall, W1ZE

Many of you have upgraded your tickets over the past several months so you can get those HF privileges. Many of you may want to try you hand at DXing.

You may be asking, What does that have to do with VHF Packet, and isn't packet dead in Maine. No packet is not dead; it has been evolving here in Maine. There is a growing group in the state using APRS, a form of packet that marries GPS, packet, PCs and 2- meters and lets you know where your friends are and still communicate in the digital packet format. Another and older use of packet is a digital communications system and network known as the DX PACKET CLUSTER. The packet cluster system doesn't require anything different than what you needed to get on the old packet network. A TNC, PC (or dumb terminal) and a 2-meter FM transceiver.

Have I got your interest yet? If so read on: The cluster is a network of packet nodes connected to one another via a radio backbone, sat-link or Internet link and is dedicated to DX spotting, propagation and other DX related subjects. What makes it different than the old packet network is that you do not connect to just one other packet station, you connect to the whole system and when you make an announcement it appears on the screen of everyone connected to the system. Say you are tuning across the 10-meter band and hear Ben, 4X4AA in Haifa on 28410 kHz calling CQ. You work him, but want to let the rest of the DX hungry crowd on the cluster know Ben is on and where he is.

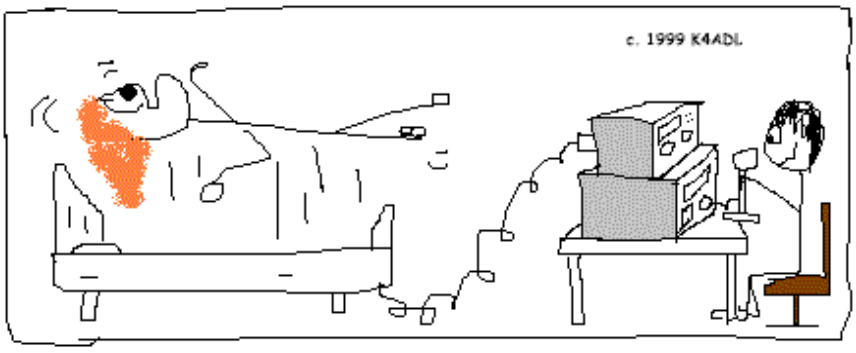
You can make a simple entry on the keyboard that goes something like this: SH/DX 4X4AA 28410 BEN IN HAIFA, CQ US/CANADA.

The crowd knows in a few seconds and can tune to Ben's frequency. The system is not limited to Maine but is connected to nodes all over the northeast and on occasion all the way to the West Coast and across the pond into Europe.

You can use the cluster system to have a station to station chat with another individual connected to the system by going into the TALK mode. You can carry on a "blind" keyboard conversation without anyone else seeing your packets.

We here in southern Maine are fortunate to have two DX Packet Cluster nodes, K1EU in Cape Elizabeth on 144.91 MHz and W1AO in Augusta on 144.93 MHz. We here on the mid coast should be able to connect to one or both of the cluster nodes with a modest antenna and modest power levels.

For you flea market scroungers, you should be able to get an old PK-88 or similar TNC for dirt cheep prices, but I wouldn't expect them to stay cheep forever with the increasing popularity of APRS and DX packet clusters.



ONCE A COMMON PRACTICE FOR APARTMENT DWELLERS,
LOADING UP THE BEDSPRINGS IS NOW CONSIDERED POLITICALLY INCORRECT.

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