Northern Colorado Amateur Radio Club
P.O. Box 272956
Fort Collins, CO 80527-2956

The Tribander

The monthly Newsletter of the Northern Colorado Amateur Radio Club

Club Meetings are held on the 3rd Saturday of each month
At the Golden Corral, 901 E. Harmony Rd, Fort Collins, CO.

All are welcome and encouraged to attend.

Bring yourself and your appetite at 8:00 am.
The Meeting begins at 9:00 am.

NCARC Club Information

Club Officers

President	**Steve Henry**	**N7GN**	**(970)226-2817**	n7gn@arrl.net
Vice President	**Bill Beach**	**K0UT**	**(970)224-1958**	k0ut@earthlink.net
Secretary	**Dave Langenberg**	**KC9FOO**	**(773)612-8435**	dave@thelangenbergs.com
Treasurer Membership Chair	**Willis Whatley**	**WA5VRL**	**(970)407-6599**	whatley@frii.com
Interference Coordinator	**Mike Bates**	**N7DQ**	**(970)219-3225**	n7dq@comcast.net
Newsletter	**Willis Whatley**	**WA5VRL**	**(970)407-6599**	whatley@frii.com
Technical Chair	**Eric Slutz**	**NØEAS**	**(970)282-3752**	eric@redginger.com
Hamfest Chair	**Matt Kassawara**	**KG0W**	**(970)232-5215**	battery@writeme.com

NCARC Repeaters

W0UPS: 145.115 MHz – (144.515 MHz Input) 100 Hz CTCSS Subtone (1* on, 0* off) Autopatch (40-32.926N, 105-11.898W, 7229 ft) Horsetooth Mountain, west of Fort Collins, CO
W0UPS: 447.275 MHz – (442.275 MHz input) 100 Hz CTCSS Subtone Autopatch (40-32.926N, 105-11.898W, 7229 ft) Horsetooth Mountain, west of Fort Collins, CO
W0UPS: 146.625 MHz – (146.025 MHz Input) 100 Hz CTCSS Subtone (40-50.266N, 105-3.017W, 5600 ft) SW of the Rawhide Power Plant, 17.5 miles north of Fort Collins, CO
W0UPS: 146.850 MHz – (146.250 MHz Input) 100 Hz CTCSS Subtone (1* on, 0* off) (40-25.341N, 104-44.182 W) Greeley, CO
W0UPS-5: 144.390 MHz – APRS Digital Repeater (40-32.926N, 105-11.898W, about 7229 ft) Horsetooth Mountain, west of Fort Collins, CO

Nets

ARES District 10 Information Net	**Wednesday**	**9:00 pm**	**145.115 MHz**
ARES Statewide Net	**Sunday**	**8:30 pm**	**145.310 MHz**
Central Colorado Traffic Net	**Daily**	**7:30 pm**	**145.310 MHz**
Tech Net	**Tuesday**	**7:00 pm**	**145.115 MHz**

Web Page

http://www.ncarc.net

TECH NET Announcement!

This is a reminder that the 145.115 TECH NET is held Tuesday evening 07:00 PM.
It is hosted by N0WIQ, Kerry. All amateur radio operators (with 2M privileges) are welcome to check in.
It is an open forum net with Questions, Answers and Topics of interest.

If the 145.115 repeater is not available, the net will be held on the 447.275 repeater

Local Area Swaplists:

For those who can not wait or can not attend the area swapmeets, below are the websites for some of the regional swaplists found on the internet. These are updated weekly.

Aurora Repeater Assn. Swaplist: http://www.qsl.net/n0ara/swaplist.html
Colorado Repeater Assn. Swaplist: http://www.w0cra.org/swap/craswaplist.htm
Wyoming Swap Shop: http://www.qsl.net/n0ara/wss.htm
New Mexico Swaplist: http://bc-ares.org/swapnet/listings.html

New and renewing members for the current month:
N7DQ – Michael N9GP – Gary KC0ZIH – Rick N0RQV – Ted KC0IGR – Charles WB0YTT – Philip N0KKU – Marcus
N0WGJ – Penny KD6RLL – Jesse **The NCARC thanks you for your support.**

Quarterly NCARC Pizza Party
Monday March 5th

Come and enjoy all the pizza you can eat at Woody's Pizza, 518 W. Laurel in Fort Collins beginning at 5:30 PM.
The cost is $5.99 per person, drinks are extra. Hope to see you there! (Arrangements made by K0OJ.)

Longmont Amateur Radio Club Swapmeet

04/07/2007
Boulder County Fairgrounds in Longmont 8AM - 1PM
Admission: $5.00
Contact: Longmont Amateur Radio Club, P.O. Box 86, Longmont, CO 80502-0086 for information only, email mail@larclub.org
VE Testing at 10 AM. For more information go to http://www.larclub.org

New 220 MHz Net

There is a new informal net that is being held every Thursday evening at 7:00 pm on the 224.520 Repeater.
This is the **AB0SF** machine located at the Horsetooth Mountain site along with the 145.115 and 447.275 NCARC Repeaters.
This repeater uses the standard offset for the 220 MHz band (input on 222.920) and a 100 Hz CTCSS.
Hosted by KG6TDB, the topics will change each week and all licensed operators are invited to check in.
For those who are interested, it also features IRLP capability (it is node 3902).

EOSS-114

LAUNCH DATE: **March 3, 2007** LAUNCH TIME: **8:00 am MST** LAUNCH SITE: **Windsor, CO**
In-flight Frequencies: HF Net 7.235, Tracking and Recovery 449.450 and 146.550
Onboard the Balloon 147.555 CW BCN, 144.340 APRS, 145.600 Peregrine APRS, 445.975 K0ANI-13, 426.250 ATV
Further details available at http://www.eoss.org

Digital 101: Some Basic Info on some of the various Amateur Radio Digital Modes

RTTY or "Radio Teletype" is the FSK (or AFSK) mode that has probably been in use longer than any other digital mode (except for Morse code). RTTY is a very simple technique, which uses a five-bit code to represent all the letters of the alphabet and the numbers as well as some punctuation and control characters. On the Amateur bands it is usually sent at 45 baud, each bit being 1/45.45 seconds long (or 22 ms), which corresponds to a typing speed of 60 WPM. There is no error correction provided in RTTY, so noise and interference often degrade the reception significantly. Despite these relative disadvantages, RTTY is still popular with many radio amateurs. This mode has been implemented with many commonly available PC sound card software applications.

HF PACKET radio (at 300 baud) is the FSK (or AFSK) mode that is an adaptation of the packet radio used on the VHF FM amateur radio bands at 1200 baud. Although the HF version of Packet uses a much-reduced bandwidth due to the noise levels associated with HF operation, it maintains the same protocols and ability to "node" many stations on one frequency. Even with the reduced bandwidth (the 300 baud rate), this mode is unreliable for general HF ham communications and during the past decade, its use had dwindled to mainly passing routine traffic and data between areas where VHF repeaters maybe lacking. However, a form of HF and VHF Packet have recently enjoyed a resurgence in popularity since it is the protocol used by APRS - Automatic Position Reporting System (mostly on the 2 meter VHF and 30 meter HF bands).

PSK31 is the first new digital mode to find significant popularity on HF bands in many years. It combines the advantages of a simple variable length text code with a narrow bandwidth phase-shift keying (PSK) signal using DSP techniques. This mode is designed for "real time" keyboard operation and the 31-baud rate is just fast enough to keep up with the typical amateur typist. PSK31 enjoys great popularity on the HF bands today and is presently the digital “standard” for live keyboard communications. Most of the ASCII characters are supported. A second version having four (quad) phase shifts (QPSK) is available that provides Forward Error Correction (FEC) at the cost of some reduction in Signal to Noise ratio. Since PSK31 was one of the first new digital sound card modes to be developed and introduced, there are numerous software applications available that support this mode. Most of the programs are available as "freeware".

MFSK16 is a format of 16 tones in a narrow bandwidth using the Fast Fourier Transform (FFT) technology of the PC soundcard to decode the ASCII characters, and Constant Phase Frequency Shift Keying to send the coded signal. Continuous Forward Error Correction (FEC) sends all data twice with an interleaving technique to reduce errors from impulse noise and static crashes. A special Varicode is used to increase the efficiency of sending extended ASCII characters, making it possible to transfer short data files between stations under fair to good conditions. The relatively wide bandwidth (316 Hz) for this mode allows faster baud rates (the typing equivalent is about 42 WPM) and greater immunity to multi path phase shift. This is probably the most popular of the new soundcard modes for HF weak signal work. A second version called MFSK8 is available with a lower baud rate but greater reliability for DXing when polar phase shift is a major problem. As with PSK31, there are numerous software applications available that support this mode also.

HELLSCHREIBER is a method of sending and receiving text using facsimile technology. This mode has been around along time. It was actually developed by Germany prior to World War II. The recent use of PC sound cards for DSP processing has increased the interest in Hellschreiber and many programs now support this “new-old” mode. The single-tone version (Feld-Hell) is the method of choice for HF operation. It is an on-off keyed system with 122.5 dots/second (about a 35-WPM text rate) with a fairly narrow bandwidth (about 75 Hz). Text characters are "painted" on the screen, as opposed to being decoded and printed. Because of this presentation method, many different fonts can be used for this mode including some basic graphic characters. A new "designer" version of this mode called PSK HELL has some advantage for weak signal conditions. As with other "fuzzy modes" it has the advantage of using the "human processor" for error correction; making it the best overall mode for live HF keyboard communications. Feld-Hell also has the advantage of having a low duty cycle so that the transmitter will run cooler with this mode than with some of the other digital modes.

“TOR” is an acronym for Teleprinting Over Radio. It is traditionally used to describe several different "error free" communication modes - AMTOR, PACTOR and G-TOR. The main method for the error correction is a technique called ARQ (Automatic Repeat Request) which is sent by the receiving station to verify any missed data. Since they share the same FSK method of transmission, they can all be economically provided together in one Terminal Node Controller (TNC) radio modem that will operate with any modern radio transceiver. There are also software applications available that will allow monitoring of these modes using the computer soundcard.

AMTOR is an FSK mode that is rarely used by radio amateurs in the 21st Century. While a robust mode, it only has 5 bits (as did its predecessor, RTTY) and can not transfer extended ASCII or any binary data. With a set operating rate of 100 baud, it does not effectively compete with the speed and error correction of more modern ARQ modes like Pactor. The non-ARQ version of this mode is known as FEC (forward error correction). It is known as SITOR-B by the Marine Information services.

G-TOR (Golay -TOR) is an FSK mode that offers a fast transfer rate compared to Pactor. It incorporates a data inter-leaving system that assists in minimizing the effects of atmospheric noise and has the ability to fix garbled data. G-TOR tries to perform all transmissions at 300 baud but drops to 200 baud if difficulties are encountered and finally to 100 baud. (The protocol that brought back those good photos of Saturn and Jupiter from the Voyager space shots was devised by M.Golay and adapted for ham radio use.) G-TOR is a proprietary mode developed by Kantronics. Because it is only available with Kantronics multi-mode TNCs, it has never gained in popularity and is rarely used by radio amateurs anymore.

PACTOR is an FSK mode and is a standard on many modern Multi-Mode TNCs. It is designed with a combination of Packet and Amtor Techniques. Although use of this mode is also in decline, it is the most popular ARQ digital mode on amateur HF today and primarily used by amateurs for sending and receiving e-mail over the radio. This mode was a major advancement over AMTOR, with its 200 baud operating rate, Huffman compression technique and true binary data transfer capability.

PACTOR II is a robust and powerful PSK mode, which operates well under varying conditions. It uses strong logic, automatic frequency tracking; it is DSP based and as much as 8 times faster then Pactor. Both PACTOR and PACTOR-2 use the same protocol handshake, making the modes compatible. As with the original Pactor, it is rarely used by radio amateurs since the development of the new PC based sound card modes. Also, like GTOR, it is a proprietary mode owned by SCS (Special Communications Systems) and only available with their line of multi-mode TNC controllers.

PACTOR III is the latest version of proprietary Pactor built on two dimensional orthogonal pulse shaping, advanced error control and efficient source coding. It provides robust communications at fairly high speeds during poor signal conditions using 6 different automatic speeds having from 2 to 18 tones. The transmissions can occupy up to 2.4 KHz using a very expensive modem, which tends to limit its use to operators with a serious desire and available funds.

The true destination of "Reflected Power"

The idea of operating with a high VSWR, even on an ideally "lossless" feedline, is not very easy to accept if you have a personal bias against such operation with your transmitter. Even though this situation does not exist in the real world, a moderately high VSWR on a station with a low-loss feedline does occur and will usually provide acceptable performance in the real world. The negligible losses incurred with this situation are usually worth the trade-off for the due to the advantages of; freedom from critical feedline length, the ease of impedance matching at the output of the transmitter and the ability to operate the antenna away from its resonant frequency. One of the most common and convenient arrangements uses a transmatch at the sending end of the feedline. A better arrangement would be to place the transmatch between the feedline and the feedpoint of the antenna so that the feedline would be "flat" (no change in impedance along the length of the feedline). Such a flat feedline can be of any reasonable length and its losses will be less than a "resonant" feedline (one where non-ideal impedance is being matched to the transmitter by the transmatch inserted between the TX and the feedline). The problem with the "better arrangement" is that it is not practical in many station installations.

When considering the reflected power on a "resonant" feedline system, you must drop the notion that the reflected power re-enters the transmitter. It does cause heating issues for the transmitter tank circuit and feedline. But the reality is that it gets re-reflected and once again, part of it gets absorbed by the antenna, the remainder again journeys back down the feedline and is again 100% re-reflected at the transmitter output. This cycle of events repeats until the antenna absorbs most of this cycling power. For a "lossless" feedline, the antenna would eventually absorb all of this forward and reflected power. It is in this process that the interference between the forward and reflected energy creates the phenomenon of standing waves on the feedline. This process also explains the reason that a directional RF wattmeter can indicate that the forward power exceeds the actual power output of the transmitter. It happens because the froward power is being assisted by the re-reflected power (but the actual net power transfer is still the difference between the forward and the reflected power). Some years ago, it was not uncommon to see a visual illustration of this phenomenon as a ghost image on a TV screen where there was impedance mismatch between the feedline and the antenna or TV receiver. In that situation, the antenna was the source for the RF energy and the TV was the "load" on the line. Just as with the ham station, the RF energy was cycling up and down the feedline. As with the ham station the load (TV) absorbed most of the energy, just not in a desirable way for viewing of the picture. Another source for those ghost images came from reflections of the signal by hills, building and other objects rather than any impedance mismatch in the receiving system.

EOSS Future Flight Schedule through August 2007

All dates and launch locations should be considered tentative. Most flights have a WX delay date of the day after scheduled flight. Visit the EOSS website at http://www.eoss.org for further details.

Flight ID	Date	Comments		Launch Site
EOSS-115	17-Mar-2007	Big Blue IV	1 x 54K cu.ft.	**Windsor**
EOSS-116/117	14-Apr-2007	CU SD & Demosats	2 x 3000 g	**Windsor**
EOSS-118/119	30-Jun-2007	SHOT	2 x 3000 g	Deer Trail
EOSS-120	07-Jul-2007	GPSL 2007	1 x 1200 g	Grand Island NE
EOSS-121/122	21-Jul-2007	Workshop/Upward Bound	2 x 3000 g	Deer Trail
EOSS-123/124	04-Aug-2007	CO SGC Demosat V	2 x 3000 g	Deer Trail

Northern Colorado Amateur Radio Club Information/Application Form

____ I would like more information on Amateur Radio.

____ I want to join the NCARC. My payment is enclosed.

____ I want to renew my membership. My payment is enclosed.

Annual Dues:
Family Membership: $25.00
Full Time Students: $5.00

BEFORE FILLING THIS OUT, READ THIS MESSAGE ----------
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Name: _____

Callsign: _____

Street: _____

City: _____

State: _____

Zip: _____

Telephone: _____

License Class: _____

E-mail Address: _____

Receive Newsletter by E-mail? YES NO

Student? YES NO

ARRL Member? YES NO

You only need to fill in your name or callsign and anything that has changed. Any items left blank will be assumed to be correct in the NCARC database.

If you would like to receive the newsletter by E-mail, please indicate so here.
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