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SIGNALS

Rockwell Collins

Monthly Newsletter of the

Amateur Radio Club

Volume 36 Issue 5 Web Site http://www.w5rok.us **February 2015**

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RCARC
Membership Meeting

Tuesday 24 February 2015
1700 Social 1730 Meeting
1800 Program

Methodist Richardson Medical Center
At Bush/Renner/Shiloh Intersection
Second Floor Conference Room 200

Subject:
Introduction to Raspberry Pi for Amateur Radio
By Jonathan Brandenburg, KF5IDY

Local Club News

Meeting Notice

At this month's meeting Jonathan Brandenburg, KF5IDY, will present "Introduction to Raspberry Pi for Amateur Radio". The topic begins with a brief overview of the Raspberry Pi followed by a discussion of amateur radio uses for the Raspberry Pi. It will conclude with a demonstration of Jonathan's ongoing research into the Raspberry Pi as a packet radio node and Broadband Hamnet (HSMM) node.

Jonathan Brandenburg, KF5IDY, is a General Class amateur radio operator. He leads the monthly Dallas area Raspberry Pi User Group which meets on the third Saturday of each month on the UTD campus. (See https://brandenburgtech.com for more information, including agenda and maps). In addition, Jonathan is an active member of AMSAT, participating in the design and development of the Fox satellite series.

Sounds like a great meeting, so be sure to be there on Tuesday, 24 February.

VHF Contest Results

W5ROK operated in the ARRL January 2015 VHF Contest. WA8ZBT was the operator with 36 contacts on 4 different bands. Eight different Grid Squares were worked on 2 meters. Here are the results:

Frequency	Mode	QSO's	Grids
50 MHz	USB	9	4
144 MHz	USB	18	8
420 MHz	FM	1	0
420 MHz	USB	7	3
1296 MHz	USB	1	1
Total		36	16

(*Contributed by Dennis Cobb WA8ZBT*)

RCARC Community Service Activities

Siren Testing Dennis Cobb WA8ZBT, Chris Havenridge KF5GUN, John McFadden K5TIP and Jim Skinner WB0UNI participated in the Richardson emergency siren testing on 4 February 2015. The testing was completed as scheduled this month since there was no threat of inclement weather. All but two of the twenty-two sirens operated normally. The siren testing is performed on the first Wednesday of each month. The sirens are monitored by amateur radio operators and reports made using the Richardson Wireless Klub (RWK) repeater at 147.120 MHz.

Crime Watch Patrol Jim Skinner WB0UNI participated in Richardson Duck Creek Crime Watch Patrol (CWP). CWP members, after successful completion of Richardson Police Department Training, patrol their neighborhoods and report all suspicious activities to the Police Department.

Membership Renewals

It is time for membership renewals for 2015. Please get your renewals into Joe Wolf N5UIC. Joe's email address and telephone number are on page 2 of this newsletter.

RCARC OFFICERS

PRESIDENT
Mike Schmit WA9WCC
972.705.1394
maschmi2@rockwellcollins.

VICE-PRESIDENT
OPEN

SECRETARY
Jim Brown AF5MA
972.495.2209
jhksbrown@verizon.net

TREASURER
Mike Montgomery WD5TX
972.705.1498
dmmontgo@rockwellcollins.com

ACTIVITIES
OPEN

WEBSITE MANAGER
Mike Hollingsworth W5QH
972.571.6060
w5qh@arrl.net

STATION TRUSTEE
Steve Phillips K6JT
972.517.3332
k6jt@arrl.net

NEWSLETTER EDITOR
Jim Skinner WB0UNI
214.535.5264
wb0uni@arrl.net

DATABASE MGR
Joe Wolf N5UIC
214.202.2757
n5uic@arrl.net

W5ROK CLUB STATION
972.705.1349
461-290

VE SESSIONS

Dallas tests are held 4th Sat of each month at 1000 hrs. 13350 Floyd Rd. (Old Credit Union) Contact Bob West, WA8YCD 972.917.6362

Irving tests are held 3rd Sat of each month at 0900. Fifth and Main St. Contact Bill Revis, KF5BL 252-8015

McKinney VE test sessions are held at the Heard Museum the first Sunday of the month. The address is 1 Nature Place, McKinney TX. The time of the testing is 1430, ending no later than 1645. ***Note: no tests given on holiday weekends.***

Garland testing is held on the fourth Thursday of each month, excluding November, and begins at 1930 sharp. Location is Freeman Heights Baptist. Church, 1120 N Garland Ave, Garland (between W Walnut and Buckingham Rd). Enter via the north driveway. A HUGE parking lot is located behind the church. Both the parking lot and the Fellowship Hall are located on the east side of the church building, with big signs by the entrance door. Contact Janet Crenshaw, WB9ZPH at 972.302.9992.

Plano testing is on the third Saturday of each month, 1300 hrs at Williams High School, 1717 17th St. East Plano. Check Repeater 147.180+ for announcements.

Greenville testing is on the Saturday after 3rd Thursday, 1000 hrs at site TBA, contact N5KA, 903.364.5306. Sponsor is Sabine Valley ARA. Repeater 146.780(-) with 118.8 tone.

Richardson The Richardson Wireless Klub (RWK) VE team hold license testing on the third Thursday of each month at St. Barnabas Presbyterian Church, 1220 West Beltline Rd. Testing begins at 1900 hrs in room 12. Enter through the Northern most door on the east side of the church building. For further information contact Dave Russell W2DMR, at 972.690.9894 or E-mail warhog4@tx,rr.com.

President's Message

THIS SPACE RESERVED FOR PRESIDENT'S AND/OR VICE-PRESIDENT'S MESSAGE

Secretary's Report

27 January 2015

The meeting was called to order by Vice President Mike Schmit WA9WCC at 1741.

The following members were present at the meeting:

Jim Brown	AF5MA
Dennis Cobb	WA8ZBT
Kathy Cobb	
Bob Kirby	K3NT
John McFadden	K5TIP
Steve Phillips	K6JT
Mike Schmit	WA9WCC
Jim Skinner	WB0UNI
Joe Wolf	N5UIC

Officers and Committee Reports:

President's Report: There was no formal President's Report.

Vice-President's Report: There was no formal Vice President's Report.

Secretary's Report: The Secretary's Report is in this newsletter.

Treasurer's Report: There was no formal Treasurer's Report.

Website Manager's Report: There was no Website Manager's Report.

Station Trustee's Report: There was no Station Trustee's Report.

Database Manager's Report: There was no Database Manager's Report.

Old Business:

There was no old business.

New Business:

Dennis Cobb WA8ZBT reported that W5ROK participated in the January VHF/UHF contest. He summarized contacts made and bands operated.

Bob Kirby K3NT described contacts made possible with the new Pixel antenna that was recently installed to reduce the W5ROK noise floor. He requested club funding of less than $250 to cover coax and parts to move the Pixel antenna to a quieter location at the corner of the building. It was agreed that no formal motion was required, since the expenditure was below $250.

Bob also requested about $400 to implement remote access for the club station. Hardware required would include a RigExpert WTI-1 remote controller made in the Ukraine plus supporting cables and connectors. Steve Phillips asked whether wi-fi access would be available through Rockwell Collins. This was unknown, but Bob indicated that we could alternately access the Internet through the cellular network by subscription with AT&T Mobility for about $30 per month. The motion to acquire was made but tabled by President Mike Schmit WA9WCC pending a more-thorough investigation of wi-fi options. Mike and Dennis Cobb WA8ZBT will investigate and report back next month.

Bob Kirby raised a potential future safety issue with the 19-year-old TH7DXX tri-band beam antenna on the club site.

Joe Wolf N5UIC, club Database Manager, announced that he will be contacting members for renewal of memberships as required. The necessary forms are available on the club website.

Bob Kirby recommended four books on amateur radio:

> "Ham and Shortwave Radio for the Electronics Hobbyist" by Stan Gibilisco,
>
> "Valve Radio and Audio Repair Handbook" by Chas Miller,
>
> "@War: The Rise of the Military-Internet Complex" by Shane Harris, and
>
> "Old-Time Radios! Restoration and Repair" by Joseph Carr.

All four books are available at the Plano Library and from Amazon.com.

Adjournment:

The meeting was adjourned at 1849.

Code Course for Beginners

To assist in NTS / ARES / RACES training, here's a link to a Code Course for Beginners:

http://www.pdarrl.org/K6RAU/

It is a course for beginners not knowing the difference between a "dit" or "dah." The learner with pencil and paper simply follows the voice instruction starting with identifying the sound of dits and dahs and then progressing in twelve lessons to five words per minute.

(Editor's note: The website is provided by Fred Silveira, K6RAU)

(*Contributed by Steve Phillips, K6JT*)

Technician Class

If you or if you know anyone Interested: Ham Radio Technician Class, Tuesday evenings, starting next week.

A Technician Class education course will begin on 24 February 2015, at the ECC (1027B Austin St, Garland — see map). Please call 972.494.9533 or email John Abbott to register. The class will run six weeks (ending on 31 March)

and meet on Tuesdays from 19:00 to 21:00. There is a $40 fee ($30 for instruction book; $10 instruction fee) to participate and cover the cost of materials.

You should have your instruction book before class begins. Register in advance to get the course information.

This is offered through the Garland Amateur Radio Club.

Understanding Antennas For The Non-Technical Ham - Part 6

*Each month for the next year or so, we are including in **SIGNALS** excerpts of a book by Jim Abercrombie – N4JA (SK) on antenna design. This book is available online for free and can be located at http:// www.hamuniverse.com/ basicantennas.pdf. Now, part 6...*

Understanding Antennas for the Non-Technical Ham

A Book By Jim Abercrombie, N4JA (SK)

Illustrations by Frank Wamsley, K4EFW

Edited by Judy Haynes, KC4NOR

Copyright July 2005. Second Edition

Edited for the web , N4UJW

IX. ANTENNA BASICS

1. Resistances and Reactance

Two factors measurable in antenna impedance are resistance and reactance. When we refer to antenna resistance, we are referring to its radiation resistance. It is neither a resistance like the electronic component called a "resistor," nor is it the same as the resistance found in all conductors. Those types of resistances, called "loss resistances," change electrical energy into heat energy. Heat energy disappears by radiating out into its surroundings and it dissipates away to infinity. When we feed RF into the antenna, the energy put into the radiation resistance disappears from the antenna by radiation of electromagnetic waves, and that makes an antenna appear to have a resistor in it. Loss resistance robs power from the radiation resistance and lowers the efficiency of an antenna system, but the loss resistance in dipoles is very low if the feed-line loss is low. The efficiency of any antenna system is found from a ratio of radiation resistance and loss resistance. We can either calculate the loss resistance by the loss in the feed-line from published tables and by estimating the loss in tuning units. Feed-line loss and tuning unit loss can be measured, but that is beyond the scope of this book.

Antenna systems having reactance prevent the transmitter from delivering its full power and the reactance needs to be tuned out. There are two kinds of reactance: capacitive and inductive. Antennas have both. In antennas, reactance is a virtual reactance meaning the antenna acts as if there were a capacitor or an inductor in the antenna, but neither is there. You can only measure the sum of both reactances but not a value for either one. Using an antenna analyzer, you can determine whether the sum of the reactance is inductive or capacitive. Inductive reactance is a negative number and capacitive reactance is a positive number.

The reactance of an antenna forms the "J" factor in antenna impedance measurements. The "J" factor is measured in ohms and the reactance is expressed as + or "J" ohms depending on whether it is capacitive or inductive reactance. Capacitive reactance is expressed as +J ohms and inductive reactance is expressed as -J ohms. Capacitive and inductive reactance are opposite factors and one can cancel the other. An antenna having 6 ohms capacitive reactance or + J 6 ohms and an inductive reactance of J 5 ohms will result in an antenna with a reactance of 1 ohm capacitive or + J 1. Since one term is positive and the other term is negative, you subtract smaller value from the larger. The answer has the sign of the larger one. In antennas, the reactance and resistance together determine the overall impedance of the antenna. The J factor is mentioned here only because you may see it in other books and on the extra class examination, but it will not be used further here.

A resonant antenna has equal amounts of inductive and capacitive reactance, and the sum of the reactance equals zero. As an example, when the inductive reactance equals J 5 and the capacitive reactance equals +J 5, their sum equals zero. When the sum of the total reactance of an antenna is tuned to zero, its impedance is totally resistive. The use of an antenna analyzer will tell you if the antenna is too long or too short for resonance. The simplest way to tune out antenna reactance is to change its length. The sum of the reactance of a long antenna will be inductive, and the sum of the reactance of a short antenna will be capacitive. If an antenna is short because it wont fit your property, it can be tuned to resonance by putting an inductor (coil of wire) in each leg. These coils are called "loading coils." An equal amount of inductive reactance will cancel the excessive amount of capacitive reactance. An antenna with loading coils is described in section "X." When an antenna is too long, the sum of its reactance will be inductive, and a variable capacitor can be inserted in each leg to tune out the inductive reactance. This is seldom done because it is easier to shorten the antenna.

A resonant antenna may still have SWR if its radiation resistance is not exactly 50 ohms. Not many resonant antennas have a radiation resistance of exactly 50 ohms, and most real antennas have a small amount of SWR. An antenna is resonant only at one frequency per band. It will also be resonant on its harmonic frequencies, where its radiation resistance will range from high to very high. Hams talk about using resonant antennas. What is meant by this is they use an antenna on its fundamental frequency close to resonance, the resistance is near 50 ohms, and the SWR without a tuner is near 1:1.

To calculate the impedance of an antenna with both resistance and reactance requires a mathematical procedure called the Pythagorean Theorem. That type of math is beyond the scope of this book. However, you should know

how to use the Pythagorean Theorem to solve impedance problems on the Extra-Class test. Otherwise, you will have to memorize the answers from the question pool.

2. Feeding Dipoles Efficiently

For maximum power transfer from transmitter to the antenna, the antenna system must be resonant, and the resistance of the load (antenna system) has to be equal to the internal resistance of the source (transmitter). Notice we said an antenna system, not the antenna, must be resonant. As mentioned previously, an antenna system consists of the antenna, the feed-line, and any matching networks (tuners). A tuner at the input end of the feed-line can make a non-resonant antenna system resonant, and have a resistance of 50 ohms, and that matches the internal resistance of the transmitter. A tuner will not change the SWR between the tuner and the dipole part of an antenna system, and will not remove the reactance from the dipole.

When the load of an antenna system does not match the source and the impedance is high, the load will not draw power from the source and high RF voltages will be present at the output of the final transistors. In this case, high RF voltages can damage the output transistors of the transmitter. When the impedance of the load is low, too much of the power may be dissipated across the internal resistance of the transmitter possibly destroying the output transistors. These are the two reasons why transceivers "fold back" their power when the SWR is high.

It is a myth that the dipole part of an antenna has to be resonant to be efficient. When power reaches the radiating part of the antenna system, it obeys the "The Law of Conservation of Energy." The Law of Conservation of Energy states, "Energy can neither be created nor destroyed. Only its form can be changed." (What is important is to get the power to the dipole itself, because in some systems power is lost in the feed-line, especially when using coax with high SWR) The miniscule amount of power in the dipole that does not radiate is changed into heat, another form of energy. Because the dipole part of an antenna system is made of conductors with low loss resistance, 99% or more of the power reaching it will radiate regardless of its length if that length is reasonable. The loss resistance of the conductors of the radiating part of most antenna system is so low it can be ignored. (Short mobile HF antennas are an exception because they may be lossy because of the very high current flowing in them.)

Not all the energy fed into an antenna system will reach the antenna itself. If the system has a tuner, part of the power is lost in the inductor of the tuner and part is lost in the feed-line. When properly tuned, tuners using T-networks lose about 10% of the power and L-network tuners lose about 5% of the power being fed to them. Notice we said properly tuned. However, improper tuning of the antenna tuner may cause you to believe the feed-line is matched, but when this happens there is a very high circulating current in the inductor causing it to get hot. This causes extremely high losses, and very little power reaches the radiating part of the antenna. In addition, so much heat is produced in the inductor that it can be damaged. We melted the plastic insulation that forms the inductor on one tuner this way. For this reason, some hams don't like tuners, preferring to use resonant antennas. Read the instructions for your tuner for proper tuning or you may wind up with a poor signal and a damaged tuner. The resistive losses in the conductors of the feed-line and the dielectric losses in the feed-line also rob power from the system. These are the reasons for you to use the best tuners and feed-lines possible.

Another loss to be considered is feed-line radiation. Any energy that radiates from the feed-line does not reach the radiating part of the antenna, and it may be absorbed by near-by objects and may not radiate in the desired direction. When coax radiates, it is called common-mode radiation. If the feed line can radiate, it can also receive signals. This can be detrimental because the coax can then pick up noise from near-by power lines, etc. Feed-line radiation will also destroy the directional pattern of a beam antenna. The causes of feed-line radiation will be described in the next section.

As we pointed out earlier, when you are using a half-wave resonant dipole fed with low-loss coax without using a tuner, almost all of the power coming out of the transmitter will radiate. On its resonant frequency, the dipole is one of the most efficient antenna systems a ham can use. However, a half-wave resonant dipole has a finite bandwidth. Why use a tuner with resonant antennas? On 160 and 80 meters the bands are wide compared to the percentage of frequency. The width of 80 meters is 500 kHz and its frequency is 3500 kHz. The width of 80 meters is 14% of the frequency. The 350 kHz of 40 meters is 5% of the frequency and most of the band can be covered without a tuner. The 350 kHz width of the 20 meter band is 350 divided by 14000 kHz, or 2.5 % of the frequency, etc. The percentage of frequency for a band will determine if a resonant dipole will work the whole band without a tuner. If you are planning to move around on 160 or 80 meter bands, it makes sense to have a tuner, because the bandwidth of resonant dipoles on those two bands is narrow. For example, the normal 2:1 SWR bandwidth of an 80 meter dipole is less than 200 kHz and the band is 500 kHz wide. However, if you have an antenna resonant for the voice portion of the band, you can still use a tuner to work the CW part of the band without inducing more than a dB of loss. Except for 40 and 10 meters, full-sized resonant dipoles on the rest of the HF bands will have enough bandwidth for them to cover the whole band.

The best place to insert a tuner is up at the antenna feedpoint. However, if it is placed there, you wont be able to reach the tuners controls. Therefore, it is more practical to place it between the transceiver and the shack-end of the antenna feed-line. A piece of 50-ohm coax connects the

radio to the tuner. With the tuner located in the shack, adjustments can be made. Remote automatic antenna tuners can be placed at the antennas feed-point, but the disadvantage of them is that the ones available today will not handle high power.

A coax-fed dipole and a tuner should not be used to feed an antenna on its even harmonically related bands. The even harmonics are 2, 4, 6, etc, times the fundamental resonant frequency. If an 80-meter antenna being fed with coax through a tuner is used on 40 meters, it will put out a weak signal because the SWR will be around a hundred to one. Coax has a tremendous loss with SWR this high. Only a few Watts from a hundred-Watt transmitter will reach the antenna. However, you will be able to make contacts with those few Watts. If you want to use any antenna having high SWR, ladder-line has much less loss than coax. If you feed an 80-meter dipole on 40 meters using ladder-line and a tuner, it will only be slightly less efficient than a half-wave 40-meter coax-fed resonant dipole. However, the SWR will still be high between the tuner and the antenna, but this doesnt matter since ladder-line has an insignificant loss. Since the feed-point impedance will be high, the SWR will only be about 9:1 in the ladder-line because ladder-line is a high impedance feed-line.

Extremely short antennas may not work at all because of the above mentioned reasons. To reiterate, the extremely high capacitive reactance may make it impossible for its reactance to be tuned out and reactance prevents a transmitter from delivering power to the antenna. Even if you are able to tune out the capacitive reactance, tuning it out requires an inductor and most of the power will be lost in the inductor. Do not take the statement about the Conservation of Energy to mean you can put up any piece of wire and it will radiate your entire signal.

3. The Cause of Feed-Line Radiation

Contrary to popular myth, SWR in a feed-line will not cause it to radiate. The cause of feed-line radiation is unequal current in the two conductors of the feed-line. What are the causes of unbalanced current in a feed-line? They are an unbalanced feed-line feeding a balanced antenna; the feed-line being brought away from and parallel to one leg of the antenna; the antenna not being fed in its center; and one leg of the antenna being close to metal objects. In coax, unbalance causes RF to travel on the outside surface of the coax shield, and the shield radiates. When everything is balanced, coax normally has current flowing on its center conductor and on the inside of its shield. The shield prevents it from radiating.

Ladder-line will also radiate when it is fed from the output of a tuner not having a balun. Baluns are discussed in the next section. Since the output of a transceivers tuner is unbalanced and feeding ladderline directly from your transceivers tuner, the currents in the ladder-line will not be balanced. When balanced, ladder-line has equal currents with a 180-degree phase difference, which produce waves that null each other out, and no radiation takes place. Hams mistakenly refuse to bring ladder-line into the shack because of a fear of feed-line radiation, but ladder-line does not radiate when balanced. The simple cure for feed-line radiation is to use a balun at the antenna feed-point for coax and a balun at the output of the tuner when using ladder-line.

4. Baluns

The word "Balun" is a contraction of " balanced-to-unbalanced." It is pronounced "bal-un" like "bal" in "balanced and like "un" in "unbalanced". Many hams mistakenly pronounce an "M" at the end of the word making it "balum." A balun transforms the unbalanced transmitter output to a balanced feedline such as ladder-line. It is also used to connect an unbalanced feed-line such as coax to a balanced dipole. In the latter case, the balun is located at the antenna feed-point and is constructed so the balun takes the place of the center insulator.

There are two kinds of baluns: voltage baluns and current baluns. They both accomplish the same thing. The difference in baluns is in the way they are wound. A voltage balun produces equal voltage with opposite polarity at its output. As its name implies, a current balun provides equal currents with opposite polarity at its output.

Running the coax through ferrite beads can make a 1 to 1 current balun. In addition, you can build a 1 to 1choke current balun by winding 8 to 10 turns of coax around a two-liter soda bottle and placing the coiled coax at the antenna feed-point. Any balun is designed to "divorce" your antenna from the feed line. It is used to prevent common mode radiation of coax, which makes the coax to be part of your antenna. You want it to be able to deliver all your power to the radiator itself. A choke balun does this perfectly, without using any ferrite beads or toroids. In most cases common mode coax radiation does not occur when a balun is not used, but it is preferable to use one to be safe.

Other baluns provide a step-up or step-down impedance transformation. A 4-to-1 balun steps up the impedance four times. It will transform a 50-ohm impedance to 200 ohms. This type of balun transformer is used at the output of tuners to increase the tuning range of a tuner 4 times. If a tuner without a balun can match 500 ohms, a 4-to-1 balun will increase the range of impedances it can match to 2000 ohms. Many hams think the 4-to-1 balun is used to match 50 ohms to 450-ohm ladder-line but it is not. It would take a 9-to-1 balun to match 50 ohms to 450 ohms, and it is not important to match the impedance to ladder-line.

A balun should always be placed at the input end of ladder-line or open wire feeders to prevent feed-line radiation. When using ladder-line a step up balun is commonly used although a 1:1 balun will work.

Ham Radio Outlet Store Update

(The following was posted at rwk-ntx@yahoogroups.com)

Plano Texas Ham Radio Outlet Grand Opening Schedule of Events February and March 2015

Ham Radio Outlet's newest location is excited to announce our Grand Opening Schedule starting on the weekend of February 28th 2015 and continuing every weekend through March 28, 2015.

701 E. Plano Parkway, Suite 406, Plano, TX 75074 Store Hours 10AM-5:30PM Monday - Saturday

We will have refreshments on hand and will be having many of our manufacturers in to answer question on the products they produce and we sell.

February 28th - ICOM, MFJ, Heil

Ray Novak from ICOM, Bob Heil of Heil Sound and Martin Jue founder of MFJ and Richard Stubbs of MFJ will be in attendance this weekend

March 7th - Kenwood, Gordon West, Comet/NCG/Daiwa/Lido, ABR Industries

Gordon West with W5YI, Phil Parton from Kenwood, Mic Stwertnik from Comet and Marc Abramson from ABR Industries

March 14th - RT Systems, Yaesu, Pryme, HRD (Ham Radio Deluxe)

Karin from RT Systems, Dennis Motschenbacher and Chris Wilson from Yaesu, Jim Newcomb from Pryme and Rick Ruhl from Ham Radio Deluxe

March 21st - Powerwerx, Diamond Antennas, US Towers

Kevin Karamanos from Powerwerx, Wayne & Denise Bauman from Diamond Antenna and Vicki Contreras from US Tower Corporation.

March 28th _ Alinco, Davis RF, Uniden (Tentative)

Raj Gounder from Alinco, Davis RF and a representative from Uniden America.

If you have any questions please contact our local manager, Charity Milam at our Plano Store. texas@hamradio.com or 972-424-6219.

(Posted by Steven E. Johnson KE5SVR)

Bencher Keys for Sale

Anyone need a new key? George, K5BMR, has some for sale. He wrote: I have 2 Bencher BY keys that I am planning to sell on eBay unless someone wants them. Both have nicks and old springs, but I will include a new spring from Bencher with each one. One of the keys has 2 screws at the bottom of the paddles back to the main frame. I asked Bencher about it and they said in 1982, they discontinued the screws as they were not needed for stabilization. Both are in good condition.

I plan to list them on eBay for $85.00 each plus shipping, but I will take less if some one can use one or both of them.

73 George K5BMR

(Let me know if you are interested, and I'll hook you up with George – Steve K6JT)

(*Contributed by Steve Phillips K6JT*)

Upcoming Events

FEBRUARY

21-22	**International DX – CW—Objective:** To encourage W/VE stations to expand knowledge of DX propagation on the HF and MF bands, improve operating skills, and improve station capability by creating a competition in which DX stations may only contact W/VE stations. W/VE amateurs work as many DX stations in as many DXCC entities as possible on the 160, 80, 40, 20, 15, and 10 meter bands. DX stations work as many W/VE stations in as many of the 48 contiguous states and provinces as possible. **Contest Period:** Starts 0000 UTC Saturday; ends 2359 UTC Sunday. No contest QSOS may be made on 12, 17, 30 or 60 Meters. More info at http://www.arrl.org/arrl-dx.

MARCH

7-8	**International DX – Phone—Objective:** To encourage W/VE stations to expand knowledge of DX propagation on the HF and MF bands, improve operating skills, and improve station capability by creating a competition in which DX stations may only contact W/VE stations. W/VE amateurs work as many DX stations in as many DXCC entities as possible on the 160, 80, 40, 20, 15, and 10 meter bands. DX stations work as many W/VE stations in as many of the 48 contiguous states and provinces as possible. **Contest Period:** Starts 0000 UTC Saturday; ends 2359 UTC Sunday. No contest QSOS may be made on 12, 17, 30 or 60 Meters. More info at http://www.arrl.org/arrl-dx

REGULAR ACTIVITIES

Daily	DFW Early Traffic Net (NTS) at 6:30pm 146.88 – PL 110.9Hz
Daily	DFW Late Traffic Net (NTS) at 10:30pm 146.72 – PL 110.9Hz
Daily	Texas CW Traffic Net (NTS) at 7:00pm and at 10pm on 3541 KHz www.k6jt.com
1st Wednesday	Richardson Emergency Siren Test. At noon using the Richardson Wireless Klub (RWK) repeater at 147.120 MHz.
2nd Wednesday	ARES North Texas HF Net Every month—3860 KHz at 830 pm—930pm

Rockwell-Collins

Amateur Radio Club

Mail Station 461-290

P.O. Box 833807

Richardson, TX 75083-3807

TO:

CLUB STATIONS
(972) 705-1349

W5ROK REPEATER
441.875 MHz +5 MHz Input
131.8 Hz PL - RX and TX

W5ROK-1 PACKET BBS ROK Node
145.05 MHz

W5ROK-N1, W5ROK-N2 & W5ROK-N3 HSMM-MESHNET Nodes 2.4 GHz

Tuesday 24 Febuary 2015

1700 Social 1730 Meeting

Methodist Richardson Medical Ctr
At Bush/Renner/Shiloh Intersection

Second Floor Conference Room 200

NEXT SIGNALS INPUTS DEADLINE:
➔➔➔ 13 March 2015 ➔➔➔