RF

VOL. LI NO. 9 | P.O. BOX 3454, TUSTIN, CA 92781-3454 | SEPTEMBER 2010

THE PREZ SEZ:

I hope everyone will be able to make it to San Diego ARRL Convention. It starts the day of our meeting and goes through Sunday. Hopefully you can stop by for one of the days and catch up with old friends and make some new ones. We have an auction coming up at our October meeting, so bring things to sell and get ready to buy! We will be posting more information soon about the holiday party as well. It is hard to believe we are already starting into that time of the year. We have been getting some great feedback and ideas for activities from members. We are working on planning a few of those for the months ahead.

73,
Kristin-K6PEQ

UPCOMING EVENTS

17 September:
OCARC General Meeting

17-19 September:
ARRL SWD Convention.

9 October:
OCARC Breakfast & Board Mtg.

15 October:
OCARC Ham Radio Auction.

15 - 17 October:
Pacificon Convention

30 October [Tentative]:
Party-**E**at-**Q**uaff Pot Luck

19 November:
OCARC 2011 Elections

10 December:
Christmas Party

OCARC Hams in QST!

Dig out your September issue of QST and turn to page 74. Look in the upper right hand corner. There you will find a recent TAPR (Tucson Amateur Packet Radio) Digital Communications Conference DVD. On it you will see the faces of two club members. If you come to our September 17th meeting you can meet our two stars personally.

The Next OCARC Breakfast & open club Board Meeting is on Sat. October 9th.

SEPTEMBER PROGRAM:

Ken - W6HHC and Rob KB6CJZ will present a program on planning a Digital Amateur Television Station.

They have been active experimenting and developing DATV for the City of Orange RACES. Be sure not to miss hearing about this new mode of Amateur TV.

The next meeting is:

Friday September 17th @7:00 PM

In This Issue: ***Page***

THE ORANGE COUNTY AMATEUR RADIO CLUB, INC.
P.O. Box 3454, Tustin, CA 92781

SPECIAL SERVICE CLUB

2010 Board of Directors:

President:
Kristin Dankert, K6PEQ
(714) 544-9846
k6peq@w6ze.org

Vice President:
Paul Gussow, W6GMU
(714) 624-1717
w6gmu@w6ze.org

Secretary:
Kristine Jacob, KC6TOD
(562) 691-7898
kc6tod@w6ze.org

Treasurer:
Ken Konechy, W6HHC
(714) 744-0217
w6hhc@w6ze.org

Membership:
Loran Dargatz AF6PS
(714) 777-9018
af6ps@w6ze.org

Activities:
Dan Dankert, N6PEQ
(714) 544-9846
n6peq@w6ze.org

Publicity:
Robbie Robinson, KB6CJZ
(714) 978-8049
kb6cjz@w6ze.org

Technical:
Bob Eckweiler, AF6C
(714) 639-5074
af6c@w6ze.org

Officers At Large:
Nicholas Haban, AF6CF
(714) 693-9778
af6cf@w6ze.org

Larry Mallek
(714) 396-8770
k6yui@w6ze.org

2010 Club Appointments:

W6ZE License Trustee
Bob Eckweiler, AF6C
(714) 639-5074
af6c@w6ze.org

Club Historian:
Bob Evans, WB6IXN
(714) 543-9111
wb6ixn@w6ze.org

Webmaster:
Ken Konechy, W6HHC
(714) 744-0217
w6hhc@w6ze.org

Assistant Webmaster:
Bob Eckweiler, AF6C
(714) 639-5074
af6c@w6ze.org

ARRL Awards Appointees:
Larry Beilin, K6VDP
(714) 557-7217
k6vdp@w6ze.org

Arnie Shatz, N6HC
(714) 573-2965
n6hc@w6ze.org

OCCARO Delegate:
Steve Brody, N1AB
(714) 974-0338
n1ab@w6ze.org

***RF* Editor - September 2010:**
Bob Eckweiler, AF6C
(714) 639-5074
af6c@w6ze.org

Contact the Newsletter:
Feedback & Corrections
rf_feedback@w6ze.org
Submit Articles:
editors@w6ze.org

Monthly Events:

General Meeting:
Third Friday of the Month
At 7:00 PM **except Dec.**
American Red Cross
600 N. Parkcenter Dr.
(near Tustin Ave. & 4th St)
Santa Ana, CA

Club Breakfast (Board Mtg.):
Second Saturday of the month at 8:00 AM at the
Jägerhaus Restaurant
2525 E. Ball Rd.
(Ball exit west off 57-Fwy)
Anaheim, CA

Club Nets (Listen for W6ZE):

28.375 MHz SSB ± QRM
Wed - 7:30 PM - 8:30 PM
Bob AF6C, Net Control

146.55 MHz Simplex FM
Wed - 8:30 PM - 9:30 PM
Bob, WB6IXN, Net Control

N6ME Repeater –600 Split
Thu - 8:00 PM - 9:00 PM
145.400 MHz 103.5Hz PL
Nicholas AF6CF, Net Control

VISIT OUR WEB SITE
http://www.w6ze.org
for up-to-the-minute club information, the latest membership rosters, special activities, back issues of ***RF***, links to ham-related sites, vendors and manufacturers, pictures of club events and much much more.

Club Dues:

Regular Members	$20
Family Members*	$10
Teenage Members	$10
Club Badge**	$3

Dues run from Jan. thru Dec. & are pro-rated quarterly for new members.

*Additional members in the family of a regular member pay the family rate up to $30 per family.

**There is a $1.50 charge if you'd like to have your badge mailed to you. We prefer you pickup your badge at a meeting.

New members joining after midyear may choose to pay for the remainder of the year and the next year at a savings of $5.

Heathkit of the Month:
by Bob, AF6C

The Heath HD-4040 Terminal Node Controller.

Introduction:
In 1985 packet radio was an up and coming ham radio mode, bringing computers and ham radio into the same fold. The Internet was just starting up with *symbolics.com* becoming the first URL in March. It was quickly followed by numerous colleges acquiring *.edu* URLs. Online access for the average home computer enthusiast was usually limited to local bulletin boards over the phone line or isolated online services like *The Source, Compuserve* or *AppleLink* which later became part of *AOL*. Modem speeds were 300 and 1200 baud, and a Hayes 1200 Baud *Smartmodem* sold at a list price of nearly $700; slower 300 baud modems were going for around $300 (Acoustic modems somewhat less).

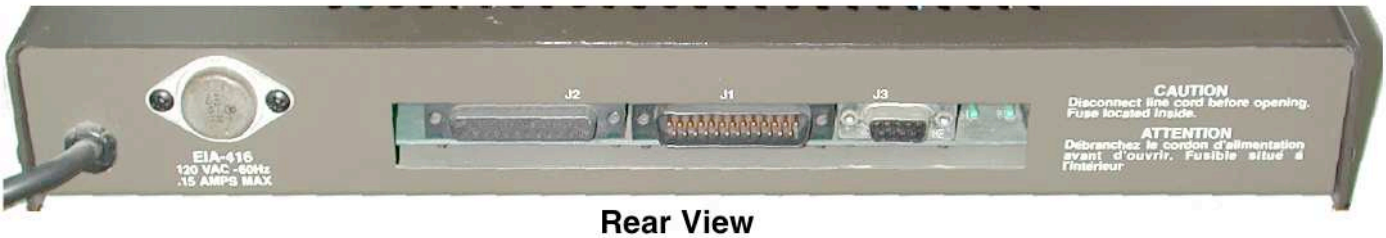
Packet radio offered the ham enthusiast who was also interested in computers a chance to communicate with other hams digitally. It also allowed the forwarding of email, and on-the-air packet bulletin boards where information could be stored and shared. On VHF FCC bandwidth rules allowed 1200 baud operation, but on HF the lower bandwidth limitations allowed only 300 baud. As packet grew in popularity bulletin boards sprang up across the nation, and distant bulletin boards could be accessed on VHF using multiple packet relay stations known as digipeaters and even sometimes hardwired or HF links.

Heath HD-4040 TNC-1 Kit:
Heathkit introduced their first packet radio mode TNC to the ham community in mid 1985 as the HD-4040 Terminal Node Controller (TNC) kit. The HD-4040 was a licensed copy of the TNC-1 designed by Tucson Amateur Packet Radio (TAPR).

First introduced in the Fall 1985 Heathkit catalog (#870) the HD-4040 was originally priced at $299.95, but dropped to $249.95 by the end of the year. There were no accessories available for the HD-4040 in the Fall catalog, but in a later 1985 catalog the HDA-4040-1 TNC Status Indicator ($29.95) and HDA-4040-2 TNC HF Header Kit ($9.95) were introduced. The former shows the status of the TNC mode and connection. The latter allows operation at 300 baud with an HF SSB transceiver. Near the end of 1985 Heath offered an HDS-4040-2 package that included the TNC, Status Indicator and 300 baud HF kit. Shipped to the west coast from Benton Harbor Michigan the package cost $253.91.

As received, the HD-4040 operates at 1200 baud and includes the TAPR TNC firmware in four 8 kilobyte 2764 chips (EPROM). RAM memory is 8 kilobytes in a single 6264 static RAM chip. the board contains an expansion memory socket where an additional 6264 chip can be installed bringing the total RAM to 16 kilobytes. In 1985 a 6264 8Kx8 static RAM memory chip sold for $40. A 128 byte NOVRAM chip (electrically alterable ROM) provides two switchable 64 byte banks where user data (ham call, timing parameters, etc) can be saved. An in-

Front View



Rear View

ternal switch allows switching between banks so two separate sets of parameters can be setup and switched between easily.

To get on packet with the HD-4040, or any other TNC-1 involves doing only two things. First is interfacing the TNC to a radio, and the second is connecting the TNC to a dumb terminal or to a computer using a terminal emulation program. The computer has to have an RS-232 or RS-422 (common on older Macintosh computers) serial port or serial card. In the mid eighties the most common radio used was a two-meter transceiver, as this was where most of the activity was. HF, UHF and other VHF bands were not a popular but were also in use to varying degrees around the country.

Interfacing to a radio can be very simple or difficult depending on the radio and configuration wanted. Many transceivers have multi-pin auxiliary connectors where transmit and receive audio connections can be accessed without having to tie into the speaker and microphone connectors. Some radios even have audio inputs and outputs designed especially for packet where the audio bypasses internal filtering designed to enhance voice signals. The other part of interfacing involves wiring the TNC to the push-to-talk (PTT) line of the radio, so the radio can key the transmitter when needed. The HD-4040 TNC (as well as the nearly identical TNC-1) have a watchdog timer hooked to the PTT circuitry that prevents the radio from being keyed continuously should the TNC lockup. Heath included a three page brochure that shows how to interface to about 30 popular radios of the period. They also included a "Radio Interfacing Data" sheet that you could fill out with information on your radio and send to Heath's Technical Assistance group.

Alternate Firmware:
While the TAPR firmware came with the HD-4040, many hams replaced or reprogrammed the EPROM chips with the WA8DED "host mode" firmware that was offered free on many packet bulletin boards by Ronald Raikes - WA8DED. The WA8DED firmware fit in just 16K of ROM and used only two of the four ROM sockets. With a slight modification that could be done using a header socket and not modifying the board at all, the other two ROM chips could be replaced with two additional 6264 chips bringing the RAM up to 32 kilobytes.

Almost all of the parts for the HD-4040 mount on a single circuit board which is identical to the TAPR design. The only parts not on the board are the power transformer and switch, the fuse and AC wiring and the LM-309 voltage regulator that mounts on the rear panel. The TAPR board has a place for the LM-309 and an associated heatsink, but Heath decided to take advantage of the chassis to provide a large heatsink.

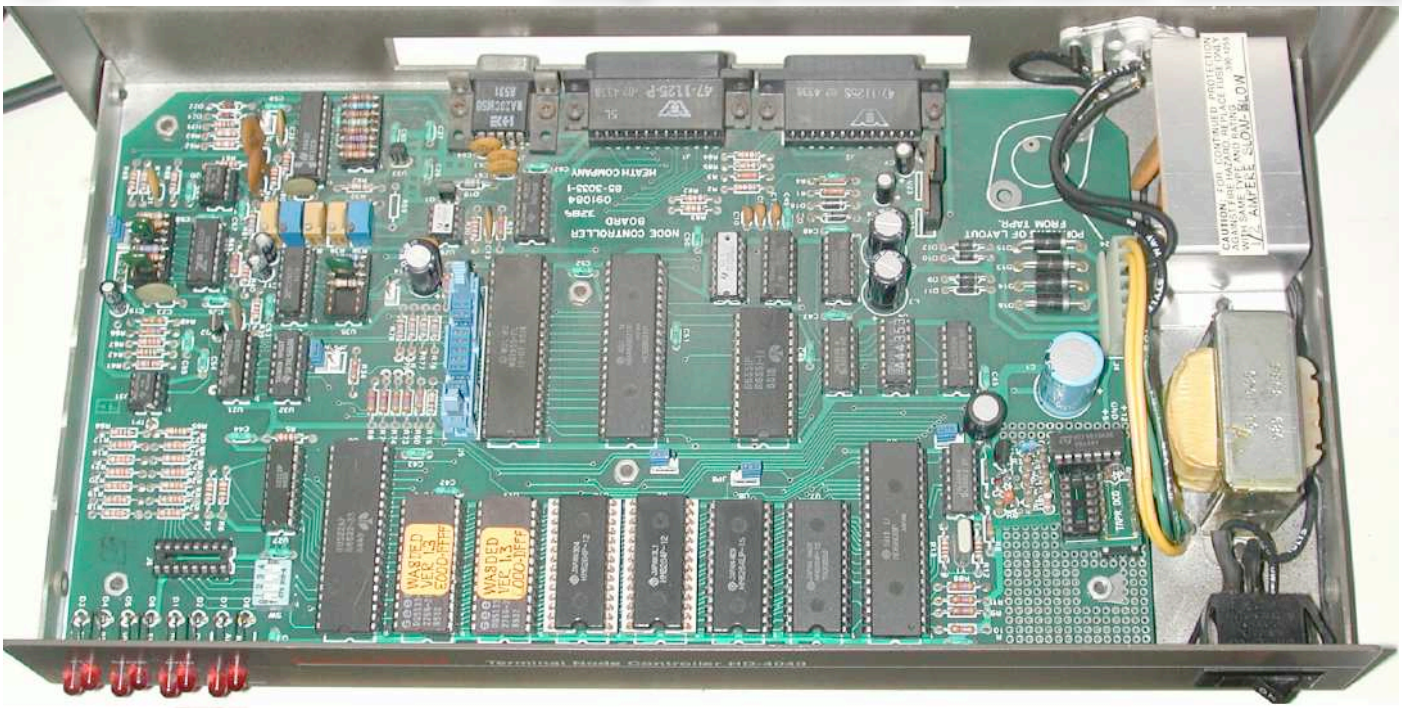
Heath discontinued the HD-4040 in 1987. TAPR had introduced the TNC-2 by then which was smaller and packed in more features.

Heath HDA-4040-1 TNC-1 Status Indicator Kit:
Heathkit offered the HD-4040-1 Status Indicator which decodes information on the parallel port of the HD-4040 (or any TNC-1's parallel port) and provides status in the form of eight LED lamps. It also provides an audio tone to signal when someone connects - this turned out to be a very good feature as it is hard to notice the connect light, and you may not be looking at the terminal screen when a connect occurs. The HD-4040-1 derives its power over the parallel port and requires no other wires except the parallel port connection. It was one of those accessories offered with a lot of equipment that was actually useful.

Heath HDA-4040-2 TNC-1 HF Header Kit:
The HD-4040 came set up to run on VHF at 1200 baud. It can be used at faster rates, such as 9600 baud by employing a separate modem. The TNC-1 has a connector for an external modem. Heath never offered a faster modem. However they did offer a 300 baud HF Header kit called the HDA-4040-2. This simple kit contains 12 resistors and three capacitors, all of which mount on two 16 pin plug-in headers. These replace two headers already plugged into the board (TAPR designation U30 and U34) that control the modem tones and shift.

Heath HK-232 (A) (B) All Mode TNC Kits:
Around 1987 Heath replaced the HD-4040 with the HK-232 which was a kit clone of AEA's PK-232 all-mode TNC which runs Packet, RTTY, AMTOR, NAVTEX, ASCII and even CW. It has two separate ports and can be switched between two radios. It can also copy weather FAX with the right graphics setup.

Heath upgraded the HK-232 to the HK-232A in 1989 and HK-232B in the early 90s. They also later offered the assembled HKA-232-5 Mailbox board that lets you set up your own mailbox or bulletin board; this board works with any of the HK-232 models and sold for $49.95, but



was often offered for free with the later PK-232-B. Power requirements for the HK-232 series are 12 volts at 1 amp. An optional HKA-232-4 12 volt 1 AMP power supply sold for $19.95 assembled.

The HK-232 line sold initially for $299.95 decreasing to $259.95 over several years. The HK-232B was available as a special package with the HKA-232-5, and HKA-232-3 Technical Manual (normally $24.95) for $259.90.

Not long after introducing the HK-232 kit, Heathkit also introduced the *Pocket Packet* TNC called the PK-21 and an optional HKA-21-1 rechargeable battery pack ($17.95). The PK-21 could also run off the ($7.95) multi-purpose PS-2350 battery eliminator. The PK-21 sold for $219.95 and later for $199.95. It came assembled and was not available in kit form.

Final Comments:
Heathkit stopped selling its TNCs just about the time they went out of business in the early nineties.

If you want to know a bit more about the allure of building a Heathkit, check out the following 1992 article from the New York Times announcing the end of Heath's kits. This article originally appeared on the front page of the March 30th 1992 issue of the New York Times:

http://www.nytimes.com/1992/03/30/business/plug-is-pulled-on-heathkits-ending-a-do-it-yourself-era.html?sec=&spon=&scp=1&sq=heathkit&st=cse&pagewanted=all

73, from AF6C

Heath HD-4040 top view showing circuit board

Remember if you come across any old Heathkit Manuals or Catalogs that you do not need, please pass them along to me.

Thanks - AF6C

Captcha!

Do you know what a captcha is? If you've ever been asked to enter letters or digits from a graphic to prove you are a human, that graphic is called a captcha. Captcha is an acronym for "**Completely Automated Public Turing test to tell Computers and Humans Apart**". The Turing test (named for Alan Turing) is a test of a machine's ability to demonstrate intelligence.

Tim - K6GEP sent me the following email:

Bob,

I was going into the Yahoo [website name]*, and they had one of those security things to defeat the spammers. The captcha was your callsign - AF6C !*

See attachment

Amazing!

Tim K6GEP

OCARC General Meeting Minutes: August 20, 2010

The OCARC August General Meeting was held at the Red Cross complex in Santa Ana [600 Parkcenter Drive -ed.] at 7:00 pm on Friday evening, August 20th, 2010. There were a total of 38 members and visitors present. All of the club officers were present for a quorum.

Kristin K6PEQ opened the meeting with the Pledge of Allegiance. She then introduced our guest speaker – Dennis Kidder - W6DQ who spoke on "Grounding Your Station"

Dennis started by explaining the risk involved with improper ground and its effects on your family, home and radio equipment. There is always a chance of potential danger to life and property. The solution to these dangers is proper grounding.

Dennis pointed out the standards that are set through the NEC (National Electric Code) for proper wiring with specifics from homes to factories.

Dennis recommended several products for bonding: Ultra Weld™ and Cadweld™. It is a pleasure hearing Dennis; each of his presentations offer new information and suggestions for making our radio stations safer and more effective.

Thank you Dennis!

Introductions of members and visitors was done and we are pleased with the number of new members as well as former members returning to the group. Fantastic turnout at the meetings!

Kristin thanked the members who assisted at the Orange County Fair, we had two great days ... again, thank you to each person who participated.

The October meeting will be our yearly auction, gather your treasures and bring them to the meeting on October 15th.

SHOW & TELL –

This evenings Show & Tell was presented by Jeff Hall W6UX. Jeff shared his 40 foot spider beam pole and control box tuner cover. Clever ideas. Thank you Jeff..

Remember if you have something for the Show and Tell bring it to the next meeting on September 17th, 2010.

GOOD of THE CLUB – nothing this month.

Just a reminder that the OCARC Board Meetings will now be held on the second Saturday of each month at 8:15 AM at the Jägerhaus Restaurant, 2525 East Ball Road Anaheim. Visitors are welcome.

Motion was made to adjourn at 8:55 pm by Larry K6YUI, seconded by Tom Woodard KI6GOA. Followed by the raffle.

Submitted by:
Kristine Jacob KC6TOD
OCARC Secretary

AUCTION !!!
AUCTION !!!
AUCTION !!!

It's that time of year again. The OCARC annual ham radio auction is Friday, October 15th 2010 at 7:00 PM.

Bring your gear to sell. Come bid on other equipment.

This is always a fun event. Bring your ham radio friends too!

Location and a map to our auction are on the next page or visit our website for info.

The Orange County Amateur Radio Club "OCARC"
P.O. Box 3454
Tustin, CA 92781

Web: www.w6ze.org

Email: ocarc_info@w6ze.org

ANNUAL RADIO AUCTION

Friday, October 15, 2010

Auction Rules

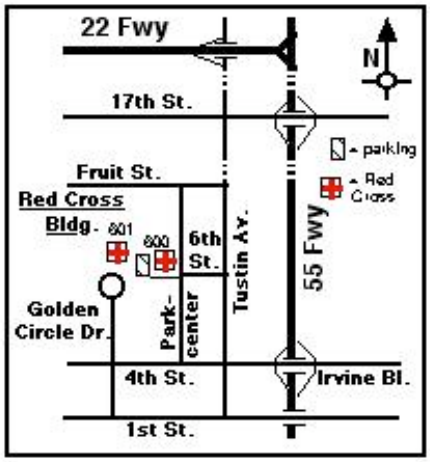
The OCARC Annual Auction will take place on Friday evening, October 15th, 2010, at 7:00 PM at the American Red Cross facility located at 600 N. Parkcenter Drive, Santa Ana. The room will open at 6:00 PM to allow registration, set-up and viewing. All buyers and sellers are welcome. The following rules for the auction will be in effect:

1. Only ham radio or electronic equipment / items will be auctioned (i.e.: no fishing equipment, etc)
2. Buyers and Sellers must register at the door with the OCARC Treasurer. **There is NO registration fee.**
3. Sellers should number each item in their lot. A tag should indicate the minimum bid they expect.
4. Only 3 items from a Sellers lot will be auctioned during each turn. After auctioning 3 items, the auctioneer will move on to the next lot. After the first 3 items from every lot have been offered for bidding, the auctioneer will start the second round of auctioning with the next 3 items in lot #1.
5. Auction bidding will take place as follows:
   (a) $0.00-to-$5.00 bidding will take place in $0.50 increments.
   (b) Over-$5.00-to-$50.00 bidding will take place in $1.00 increments.
   (c) Over-$50.00-to-$100.00 bidding will take place in $5.00 increments.
   (d) Over-$100.00 bidding will be in $10.00 increments.
6. **Rules 4 and 5 may be changed at the auctioneer's discretion to expedite the auction**.
7. Payments for purchased items are due at the end of the auction and shall be by cash or check with the appropriate ID. No two-party checks or credit cards are allowed. Disbursements to the Sellers will be by OCARC check, only. Sellers will be charged 10% of the selling price for items sold by OCARC.

A special table will be set up for donated items. The proceeds of donated items will go to the OCARC.

The American Red Cross
George M. Chitty Building
600 Parkcenter Drive
Santa Ana, CA.
Second Floor, Room 208*
(Enter from the West Side.)
Note: The door locks after 7 PM. If no one is there to let you in call W6ZE on the talk-in frequency for admittance.
TALK-IN 146.55 MHz Simplex

* Room is subject to change.



OCARC Board Meeting Minutes: August 14, 2010

The board meeting was held on Saturday August 14th, 2001 at *The Jägerhaus* in Anaheim. The meeting was called to order by Kristin - K6PEQ at 8:17 AM.

Officers present were:

President - K6PEQ
VP - W6GMU
Treasurer - W6HHC
Publicity - KB6CJZ
Technical - AF6C
DAL - AF6CF
DAL - K6YUI

Absent were:

Secretary - KC6TOD
Activities - N6PEQ
Membership - AF6PS

Bob - AF6C volunteered to take minutes for the Secretary - KC6TOD who was at class.

Officer Reports:

VP: A guest speaker is needed for the November elections meeting.

Treasurer: Income this year to date is $2,968.69; expenses this year to date is $3,147.75. With the expensive Field Day event over, we are in good shape. Current total balance is: $5,370.52.

Publicity: Additional Tri-fold club brochures have been printed and some will be made available at HRO. The tri-fold brochure should be due for a update in the coming year.

Technical: Nothing to report.

Director at Large: - AF6CF: Nothing to report.

Director at Large: - K6YUI: Commented on there being a lot of young interest in the OCCARO booth at the OC Fair.

Old Business:

WARA Antenna Trailer: (Tabled from last month) This trailer has been sold to a group in Fontana for $400 and is no longer available.

OC Fair:

The OCCARO ham radio booth won the 1st Place (Blue Ribbon). Judges noted that the booth was always well manned and that the people manning the booth were enthusiastic and well organized.

Meeting Speakers:

August: W6DQ on Grounding.
Sept: W6HHC and KB6CJZ on DATV.
Oct: [Annual Auction - no speaker]
Nov: **[open]** Also club elections for 2011
Dec: [No meeting - Holiday party]

Speakers are also needed for January through March of next year to assure speaker continuity.

New Business:

Auction: Web master to put rules up on the web. Auction team needs to review the rules; last year they were lax. Remaining items from the estate of K6JGN will be auctioned off. See the For Sale webpage for items still available. Kristin will see if Chip - K7JA and N6PEQ will be available as auctioneers.

Holiday Party: Tentative date is the second Friday in December (Dec 10th). This will be the day before the Board Breakfast - which may be an issue. The party will again be held at *The Jägerhaus*; the club already has a deposit for this year at the restaurant. Food logistics will be discussed with the restaurant, some people seated in the middle found some dishes low by the time it reached them. A budget needs to be set for the opportunity drawing to be held at the dinner.

Good of the Club:

AF6C recently took his TS-440SAT to John - N6AX for repair and was impressed. John repairs most Kenwood models, many Yaesu and Icom units as well as others. He has years of experience, both at HRO and on his own. He currently does repairs part-time and is reasonable. Turn around time depends on his workload, but is comparable to or better than other repair places. W6HHC reports that the Kenwood facility in Long Beach no longer does repairs; instead they will send you to a place in City of Industry.

The meeting was adjourned at 8:43 AM.

Breakfast attendees: K6PEQ, W6GMU, WB6FRV, AF6CF, N6VNI, KB6CJZ, future ham guests Erin and Wade from Placentia, AF6C, K6YUI, W6HHC, Diane (XYL of W6HHC), and Diane's sister Pat and brother-in law Jerry.

Respectfully submitted by Bob - AF6C
for Kris - KC6TOD

Bob's TechTalk #42 (TechTalk #89)
by Bob, AF6C

Inductors (Coils)

In previous TechTalk articles resistance and capacitance were discussed. This month we will begin discussion of the third common passive element, the inductor or coil. This component is at the heart of RF circuitry and is the complement to the capacitor.

While the capacitor stores energy in an electric field, the inductor stores energy in a magnetic field. The amount of energy a capacitor can store per volt is related to its capacitance which is measured in Farads. The amount of energy an inductor can store per ampere is related to its inductance which is measured in Henrys.

For the curious the two energy equations are shown in table 1.

Energy in a Capacitor:	Energy in an Inductor:
$U = \frac{1}{2}CV^2$	$U = \frac{1}{2}LI^2$
Eq. 1	Eq.2

Where:
U = Energy in Joules (Watt Seconds)
C = Capacitance in Farads
V = Voltage in Volts
L = Inductance in Henrys
I = Current in Amperes

Table 1

Inductance:

When an electric current is passed through a length of wire a magnetic field is created around the wire. The strength of the field is dependent on the current and can be detected by bringing a small compass near the wire. The creation of this magnetic field draws energy from the circuit. Should the current in the circuit increase, the magnetic field will become stronger as more energy is drawn from the circuit; likewise should the current decrease, the magnetic field will become weaker and energy will be given back to the circuit. In an ideal inductor the total energy taken and returned will be equal when the current returns to its initial point. This property of storing energy in a magnetic field is called inductance and can affect circuit behavior. At DC and low frequencies the inductance of a length of wire is minimal and has little effect on a circuit; however in mid-VHF and higher frequencies, the designer must take into consideration the inductance of straight wire. The creation of a magnetic field by passing current through a conductor is called **"self inductance"**.

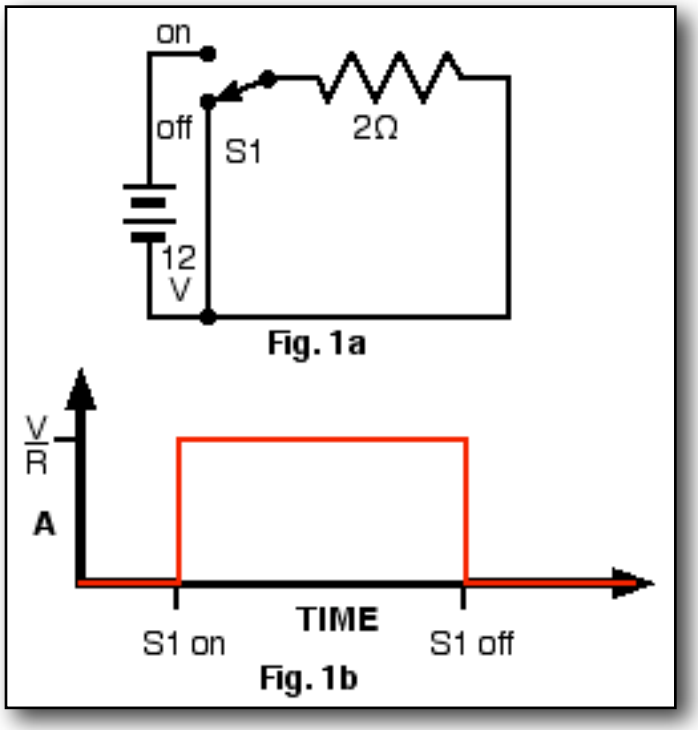
There are ways to increase the inductance of a piece of wire. Winding the wire in a coil shape is the most common way to substantially increase the inductance, and winding the coil around material with magnetic properties can strongly further increase the inductance. The inductance of a coil wound in air depends upon the number of turns, the diameter of the turns and the turns per inch. The wire size itself plays a lesser role. If a material other than air is used the inductance also depends upon the a magnetic property of the material called its **"permeability"**. The actual design of a coil is a topic in itself, which won't be pursued in this article. Instead let's see if we can get a grasp on how the magnetic field in a coil affects a circuit.

The voltage across an inductor is given by the equation:

$$V = L\frac{d(i)}{dt} \qquad \text{Eq. 3}$$

Don't let the "d/dt" scare you; The d(i)/dt is just the rate at which the current "i" is changing. This equations says: ***The voltage across an inductor is equal to the coil's inductance (in Henrys) times the rate at which the current through the coil is***

changing (in amperes per second). Assuming a perfect inductor, the voltage across an inductor is zero if the current passing through it is constant. A perfect inductor is one that has no DC resistance and has no external leakage of the magnetic field. If the current is changing then a voltage appears across the inductor, and vise versa. The voltage created is higher when the current is changing rapidly and lower when changing slowly. Also the voltage polarity across an inductor depends upon whether the current is increasing or decreasing.



Inertia is a mechanical property that most are familiar with. If you push a car (on level ground) it's hard to get it moving, but once moving it tends to move easily and is hard to get it to stop. Inductance has a similar effect on current. ***The voltage created across an inductor is always in the direction that tends to resist the change in current.***

Look at Figure 1a. It is a simple circuit with a 12 volt battery, a switch and a 2 ohm resistor. When the switch is thrown to ON a current of 6 amperes immediately flows through the resistor. This current is equal to the voltage divided by the resistance or V/R as per Ohm's law. When the switch is thrown to off the current stops immediately. The current in relationship to the switch timing is shown in Figure 1b.

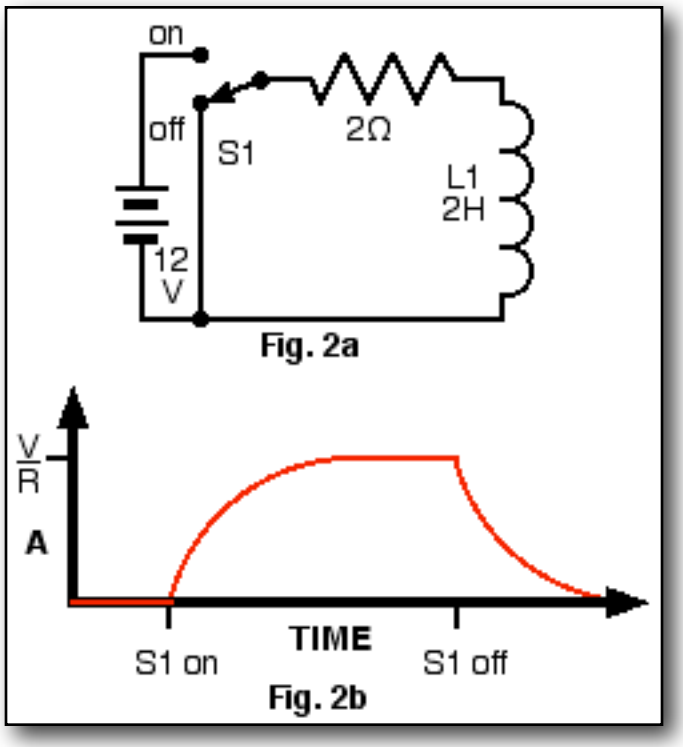


Figure 2a adds an inductor L1 in series with the resistor. At the moment the switch is thrown to ON there is no current flowing in the circuit and the full 12 volts appears across the inductor L1. If the inductor is 2 Henrys then the current starts changing from zero at an initial rate of 6 amps per second (from eq. 3). At the same time the inductor is storing energy in its magnetic field. As the current increases the voltage across the resistor increases per Ohm's law, and thus the voltage across the inductor is reduced causing the rate of change of the current to decrease, causing the magnetic field to grow more slowly and the voltage across the resistor to build up more slowly. After a period of time, all the voltage is across the resistor and the current has reached V/R, or in this example 6 amperes (just like in the Figure 1 case). The voltage across the inductor has now dropped to zero since the current is not longer changing; but there is 36 Joules energy stored in the magnetic field of L1 (From table 1).

When the switch is thrown to OFF The external source of energy is removed from the circuit. and the only energy in the circuit is that stored

in the magnetic field of the L1. The current wants to drop to zero, but the coil's inertia keeps the current flowing. To do that the coil's polarity becomes reversed form when the magnetic field was building up. Initially -12 volts is across the which drops off as the energy is dissipated in the resistor. Both the increase in current when the switch is turned on, and the decrease in current when the switch is turned to off change exponentially. It is very similar to a capacitor being charged and discharged through a resistor; except now the discussion is current instead of voltage. this theme appears regularly when comparing properties of inductors and capacitors. Look again at Table 1.

You may wonder about the reason for the wire between the OFF contact of the switch and ground. It does nothing in Figure 1a, but is needed in figure 2. If it is not there an interesting thing happens: When the switch is thrown back to OFF the coil has energy stored in it, but there is no place for the current to go. The circuit is open! Actually, there is a place for the current to go. Remember the voltage across a coil depends on the rate of change of the current, which just changed almost instantaneously. The voltage gets really high - high enough to jump the gap of the opening switch. If the inductance is large, and hence the energy is large this spark across the switch contact can damage the switch over time. There are ways to prevent this by providing an additional path for the energy - a topic worth a future discussion.

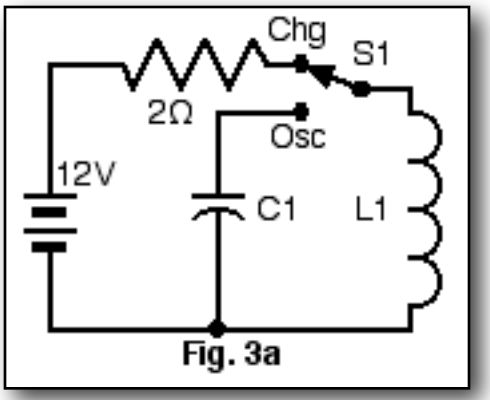


Fig. 3a

Finally we'll discuss the operation of the circuit shown in Figure 3a. Here an inductor is brought to a steady-state current of 6 amperes with the switch in the "Chg" position and then switched in series with a discharged capacitor in the Osc position. Since the two components are also in parallel, ***they always share the same current through them and the same voltage across them***. The graph of Figure 3b shows how the voltage (the orange line) and the current (the blue line) change with time. Initially, when the switch is first thrown (Point 'a' in Figure 3b), the voltage is zero. There is no energy in the circuit except the energy stored in the magnetic field of the inductor. However, the coil is passing 6 amperes at the moment the switch is thrown. The inductor tries to keep this current flowing using the energy in its magnetic field. That continued current starts charging the capacitor which begins building up the voltage. From equation 3, as the voltage builds it is increasing the rate at which the current is changing (decreasing in this case) causing it to decrease more rapidly. Finally the point is reached where the current is zero and the voltage is at a maximum. (point 'b') At this point the current is changing at its fastest rate, and the energy is now mostly in the electric field of the capacitor and not the magnetic field of the inductor. However the continued high rate of change of the current due to the large voltage, causes the current to continue right past zero and go negative. This starts to take energy from the capacitor and build back up the magnetic field in the inductor - but in the opposite magnetic polarity. As energy is removed from the capacitor the voltage drops causing the inductor to reduce the rate at which the current is changing. This continues until the rate of current change reaches zero because the voltage has reached zero (point 'c'). Here the current is at a maximum.

At this point the circuit is in the same state as it was except the current and the magnetic field are reversed. The circuit continues as described above (except for the reversed polarity) through point 'd' and to point 'e'. At which point conditions are the same as they were at point 'a', where we started.

If the capacitor and inductor are perfect, so there is no energy loss, this oscillation will continue indefinitely as the energy moves between the coil and capacitor, swapping polarity each time.

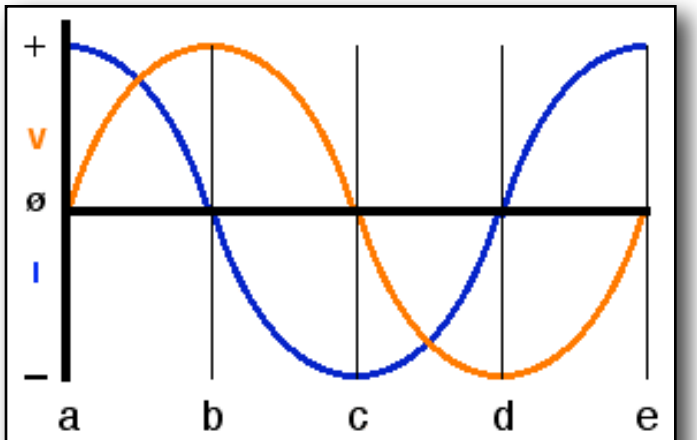


Fig. 3b

In the real world of course the oscillations will dampen out over time. But, if external energy is applied briefly at the correct moments (Say the switch is momentarily thrown back to 'Chg' at every point 'a', the oscillation will continue and energy can be removed for other use. The fact that such an LC oscillator tends to produce low harmonic sine waves at a single frequency makes the LC circuit ideal for oscillators and filters.

In the next Bob's Tech Talk we'll delve a little further into the wonders of the inductor. I hope this explanation of how a coil works will be easy to understand. All the representations I've seen were mathematical and took a good understanding of calculus to fathom.

The trick to understanding the coil is to remember that ***when the value of the current through a coil is changing, a voltage is produced across the coil proportional to how fast the current is changing. And conversely, if a voltage is placed across a coil the current is being forced to change at a rate proportional to that voltage.***

de Bob - AF6C

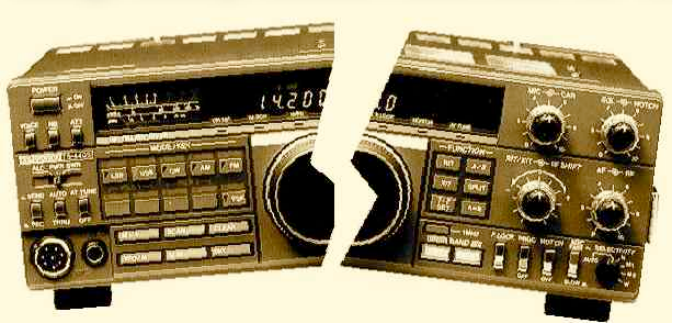
Say Hello To April - KG6CJI

Army Sgt. April Flores - KG6CJI, OCARC member, and daughter of Don - KC6ONZ and Cindy - KC6OPI, prepares for deployment to the Middle East. She has grown up from the young girl we remember coming to the meetings with Don and Cindy. This is April's 3rd deployment since joining the Army in 2003. Show your support and send her a QSL or postcard at the following address:

Sgt. Flores, April B.
13th CSSB 289th QM Co
APO AE 09391

5 Billion Internet Devices

According to ***Network World*** the five billionth device will be plugged into the Internet sometime shortly before this newsletter goes to publication. That number is expected to grow to twenty billion in the next ten years. You can read more at:
http://www.networkworld.com/news/2010/081610-5billion-devices-internet.html.



Broken Radio?

Today's ham equipment is very reliable, but sometimes they do fail. If the radio is under warranty then you need to get it to a factory authorized repair station. However, if the warranty period has expired you have a few other choices. First you can fix the radio yourself; this is becoming more and more difficult as the radios get smaller and the owners get older. Surface mount technologies and RoHS soldering require special tools and a steady hand to do the job right. Swapping at board level can be less difficult, but usually at a premium cost; and often, higher priced components, such as filters need to be changed out to the new board. Second you can take your radio to a factory authorized repair facility. And third you can take it to an independent repair service.

Ken - W6HHC recently needed to get his Kenwood Tri-band VHF / UHF radio repaired. When he called the Kenwood facility in Long Beach, he was told that Kenwood no longer does repair work at the facility. Instead they sent him to a factory authorized repair depot in the City of Industry:

FTH Group (Kenwood)
16685 E, Johnson Drive
Industry, CA 91745
(626) 333-2443
http://fthgroupinc.com/

Bob - AF6C recently lost the PLL in his Kenwood TS-440SAT. On recommendation from Dan - N6PEQ he took the radio to John Klewer - N6AX in Placentia. John has a lot of experience repairing most models of Kenwood, ICOM and Yaesu radios. He spent several years repairing radios for HRO in Anaheim and is very familiar with today's transceivers. John, now works for Boeing, and his ham repair efforts are secondary to his daily job. Contact John, let him know the type of radio and problem and John will advise you about the repair. He has some impressive test equipment in his lab.

Upon getting his radio back, Bob - AF6C had nothing but praise for John. *"He knew immediately what the problem was and called me the next day to let me know the radio was ready to be picked up. Along with repairing the radio, John replaced the memory battery and checked through the radio. It is now working like new. I'm very happy and add my recommendation to Dan's for John - N6AX's repair service".*

The one day return from John is not to be normally expected; repair times depend on his full time job requirements and his part time repair workload. More information for John may be found on QRZ:

http://www.qrz.com/db/n6ax/

or ask club members Dan - N6PEQ, or Bob - AF6C for John's contact information.

Yaesu repair is available at their facility in nearby Cypress:

Vertex Standard (Yaesu)
10900 Walker St.
Cypress, CA 90630
(714) 827-7600 ext 1300
http://www.yaesu.com/

Icom does not have a local factory service facility. For warranty repair you will most likely have to ship the radio to their west coast repair center. Be sure to contact them before shipping:

Icom America, Inc.
Service Department
2380 116th Ave NE
Bellevue, WA 98004
(800) 306-1380
http://www.icomamerica.com/

A Little Club Badge History:

Over the years the club has had numerous styles of club badges. From the earliest badges I'm aware of until *the turn of the century*, the club badge was round.

The first badges, worn years back by some of our longtime members were round stamped metal badges about 2" in diameter with a pin on the back. On the front was the member's name and call and **Orange County Amateur Radio Club** around the edge of the circle. The information was printed on the orange colored badge in black.

Plastic Engraved Badge Cira 1973 | Badge Engraved by K6LJA Cira 1978

For reasons unknown, the club switched to a larger 2-1/2" round plastic badge in the sixties. The badge blanks were made of laminated plastic with an orange face and white underneath. The club name was silkscreened on the face of the badge in white and placed still around the edge. When a member ordered a badge it would be engraved with his name and call. The blanks, being round, were expensive and on more than one occasion the engraver, who held the blanks went out of business, leaving the club with a loss and causing a long delay for those awaiting their badge.

Ted Glick - K6LJA, silent key, had access to an engraving machine and made the badges for a few years in the seventies. His blanks were orange over black so the text was black. He also painstakingly engraved the club name on the face of the badge along the edge.

The current badge idea came from Larry Hoffman - K6LDC and Bob Eckweiler - AF6C. Larry had access to a laminating machine and knew where to get 7 mil thick pouches already slotted for a badge clip. The new badges measure 2-1/2 x 4-1/4.

Member Badge

No longer was the club having to rely on an engraver; now badges could be run off as needed and assembled in a reasonable amount of time. Bob - AF6C designed the layout of the badge using the club logo. Information of club nets etc. are given on the back of the badge. This information is now in it's eighth revision! Artwork was assembled into three files for 1-up, 2-up and 4-up printing on a single special 8-1/2 x 11 matte inkjet sheet of paper. Names and calls are added before printing and a special gavel is included on badges for past club presidents. After printing, the badges are rough cut, folded and trimmed. They are then laminated in a pouch, and are ready for distribution.

There are two styles of badges, member badges and board member badges. To get a free badge you only need to run and get elected for a position on the board. Board members receive free badges good for the year. **Since 2000 over 280 new style badges have been made!**

Board Member Badge

Please honor your badge. If your call changes, we'd be glad to make you a new badge at a discount. That discount is even higher if you upgraded to get your new call. Badges altered with masking tape are a no-no! Also board badges from previous years should no be worn; wear your regular badge instead.

Kenan - KR6J to Ride in the MS150

This fall, I am riding in the 28th annual Bike MS Bay to Bay Tour, a fundraiser for the National Multiple Sclerosis Society, and I truly need your help.

On October 16 & 17th, I will be one of 2,500 cyclists taking part in the 2010 Bike MS Tour. This year the goal is to raise $2.3 million and ride the 150 mile route along Southern California's coast to bring us closer to a world free of Multiple Sclerosis. I want to help the National MS Society reach that goal, but I can't do that without your help. The money raised from this event will fund continuing research to discover the cause and cure for MS. Equally important, it will help pay for a multitude of support services, critical to those whose lives has been touched by MS.

YOU CAN JOIN ME WITHOUT GETTING ON A BIKE...YOU CAN SPONSOR ME! Your support, no matter what the amount, will benefit the hundreds of thousands fighting the MS battle.

WILL YOU PLEASE CONSIDER HELPING? You can donate online by clicking the link below or mail your check (payable to NMSS) to:

National MS Society
Bike MS
5950 La Place Ct., #200
Carlsbad, CA 92008

Thank you for reading my personal appeal and responding with your support.

Very Sincerely,
Kenan Reilly, KR6J
Member OCARC

[**Editor's Note**: Be sure, if you send a check, to note on the check that you are "***sponsoring Kenan Reilly***".]

ARRL SWD Convention Sept. 17 - 19

The ARRL 2010 Southwestern Division convention is being held this coming weekend. Consider first coming to our general meeting on the 17th and then driving down to San Diego later in the evening or early the next morning to enjoy the festivities and see the latest in ham radio products.

For more information, and help finding last minute accommodations, check out the Convention's website at:

http://www.sandarc.net/Convention2010/

Colophon:

This issue of *RF* was published using *Pages 08* on an older Macintosh G4 dual-processor computer. *Pages 08* is part of the *iWork 08* suite produced by Apple Computer.

The primary fonts used are *Georgia* (serif) and *Helvetica* (san-serif) in 10, 11 and 12 point sizes.

Graphics and images were produced and edited using the drawing module in *AppleWorks* and by *GraphicConverter*.

Mathematical equations were produced using *Equation Editor* by Design Science, Inc.

Depending upon the program you are using to view this document, links (index and external) should take you to the linked page or to the linked site on the Internet through your browser.

de Bob, AF6C

Cooking at 2.4 GHz*

by Bob, Af6C

* Typical frequency of a Microwave oven.

Ham Pizza Sandwich

Ingredients:

1 English muffin
1 slice packaged Canadian Bacon (such as Hormel)
1 slice mozzarella cheese (about 3/16 thick)
2 tbsp. Prego Italian sauce (Traditional style)

Description:

Here is a tasty sandwich for the pizza lover. It can either be prepared to eat immediately or to eat later at the office, assuming you have access to a microwave oven to warm the sandwich. You can brown bag it to work, but be sure to put the sandwich in the refrigerator until lunch time. The sandwich has the flavor of a pizza with a ham topping.

This sandwich is reasonably filling and has a lot less calories than sharing a pizza. (Can you ever stop after one slice?)

If you'd like, experiment with the sandwich trying different meats or even a slice of vegetable in place of the Canadian bacon. Eggplant, a tomato slice, salami, are all possibilities; try combinations too.

Best of all, the sandwich can be made in just a few minutes.

Directions:

Split the English muffin and toast the two sections very lightly. (Toast it more if you'd like a more crispy crust. I usually don't).

On the bottom part of the muffin place a slice of mozzarella cheese about 3" x 3" by 3/16". Multiple small slices may be used as they will melt together when heated.

Place the Canadian bacon (or other chosen topping) on top of the cheese.

Add Prego over the topping and cheese. And then cover with the top of the English muffin.

Heat the sandwich in a microwave oven on high for 30 - 40 seconds or until hot and the cheese is well melted. If you plan to take it to work and eat later, heat for 15 - 20 seconds or until the cheese is soft and able to help hold the sandwich bread together. When you reheat the sandwich at lunch time heat for 20 - 30 seconds or until cheese is well melted. Let cool a minute or two before eating.

If you are making the sandwich for work, wrap it in waxed paper, or better one of those waxed paper bags (if you can find them) that you can reheat in. Be sure to add some napkins; this is finger food!

Watch out when you bite into the sandwich. It can be HOT!

Campbell Burke

WV6V

Silent Key

OCARC lost a valuable club member when Cam Burke - WV6V died unexpectedly on August 24 at Kaiser Permanente Hospital. Cam received his first radio license in 1984 and had been thoroughly involved with many aspects of ham radio, especially SSTV and Amateur TV. Like many hams, Cam's ham radio activity slowed down because of work, family and other outside activities. Then, a few years ago he took an early retirement from AT&T because of health problems. His retirement gave Cam a chance to dive back into ham radio with a lot more spare time. He immediately got his new call, WV6V, and joined the OCARC.

Cam and his wife Susan - WU6U also joined the Orange Police Department Volunteer Program as a COAR RACES member in June, 2009 and he was a recent graduate of the OPD Citizen Academy Class.

His volunteerism started in 1982 as a Volunteer Firefighter for the County of Orange until 1989. He had been a Church Deacon for the Covenant Presbyterian Church. After retirement, he offered his skills as a ham license instructor for others to obtain their amateur radio licenses. He started up the Covenant ARC (K6COV) at his church with a focus on emergency preparedness.

OCARC members may best remember Cam for bringing so many new hams from his recent Covenant ARC ham classes to the OCARC 2010 Field Day. His plan was to introduce these new hams to "The Joy of Field Day". He did... and it worked... and many of these new hams could be found giving a try at the W6ZE VHF/UHF station. At FD, Cam also set up a satellite station for W6ZE and valiantly tried to get a QSO via the Eyesat satellite with his small hand-held. Cam's help was instrumental along with his fellow COAR members and some OCARC members to make the support for the OPD 2009 and 2010 Baker to Vegas Relay races so successful.

Campbell Burke - WV6V was a great asset to ham radio and to the OCARC, and he will sorely be missed.

The **ORANGE COUNTY AMATEUR RADIO CLUB, INC.**
P.O. BOX 3454
TUSTIN, CA 92781-3454

First Class Mail

Time Dated Material.

Please Expedite!

http://www.w6ze.org