RF

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

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The Prez Sez.....

by Nicholas AF6CF

QST QST QST!
June is now here, and you know what this means… Field Day, Field Day and more Field Day. We are getting as ready as we can. This year the meeting date is exactly one week before Field Day, so this month we will have a special general meeting just before the actual event and will talk about the final preparations, details and schedule. Dino, Chip and Bob are going to give the final advice to the membership so we should all be ready for a successful event. As mentioned last month, we will use the Club's own Generator and now is the food donations turn.

Speaking of food, we are still looking for Food Committee helpers to ensure that a delicious meal is served to each person that shows up and helps at least a few hours on Friday.

This year we will have some signs up again so people will not get lost looking for our location. If you are a visitor and have a FCC license, this is the time to operate and have fun. On the other hand, if you have no license, there will be an on-site VE testing session so you can obtain or upgrade yours. There are a few positions open to help in different areas, so hurry up to volunteer. As usual, the final result of this effort will depend on the degree of everybody's participation, so let's make an effort to have as much FUN as possible in the process. After the event, we will evaluate our experiences and see how we did compared to last year and if can improve next time. As usual, I look forward to an eyeball contact with you all at the next General Meeting.

73 de AF6CF

Our Next Meeting

The next OCARC General Meeting will be held on Friday, June 20th 2014 at 7 PM. The program will be all about Field Day planning. Club FD co-chairs Nick AF6CF and Tim N6GP will present our club's final plans for 2014 Field Day. Chip K7JA will offer some entertaining tips on his favorite subject - Field Day!

The next general meeting will be on:

Friday, June 20th, 2014
@ 7:00 PM

As usual, we will be meeting in the east Red Cross Building, Room 208.
See you there!

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Submit Articles:
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Monthly Events:

General Meeting:
Third Friday of the month
at 7:00 PM
American Red Cross
600 Parkcenter Drive
(Near Tustin Ave. & 4th St.)
Santa Ana, CA

Club Breakfast:
Second Saturday of every
month at 8:00 AM
Jagerhaus Restaurant
2525 E. Ball Road
(Ball exit off 57-Freeway)
Anaheim, CA

Club Nets (Listen for **W6ZE**):
28.375 ± MHz SSB
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

7.086 ± MHz CW **OCWN**
Sun- 9:00 AM – 10 AM
Ann K6OIO, 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 and are prorated 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.

MARK YOUR CALENDAR NOW!!

2014 ARRL
Southwestern Division Convention
Dates: September 12 - 14, 2014

The ARRL SW Division Convention sponsored by SANDARC will be held at the Sheraton Four Points hotel located on Aero Drive near the Montgomery Field airport which is the same location of the 2010 convention.

Our convention will feature tech forums, vendor exhibits, on site radio station, grand banquet, flea market and many more activities. Check this site often to get the latest news regarding our ongoing convention events.

Vendors please check with Paul Rios at kc6qls@cox.net.

Check with Ann Rios, KC6TBG at kc6tbg@cox.net if wish to conduct a Tech Forum.

See www.sandarc.net/convention2014.php for more details

Field Day 2014
June 26, 27, 28 and 29

This is the big event of the year! We will be competing against 1500 clubs in USA and Canada. We have thrown down a challenge to the Albuquerque DX Association W5UR to see who can make more contacts!

24 hours of setup will begin Thursday June 26 at 5PM

Setup will resume at 9AM Friday June 27. A team is needed to load the towers onto the trailer at K6LDC's QTH. The day of hard work on Friday will be rewarded with a catered BBQ in the evening.

We need a good team also for tear down after 11AM Sunday, and for the return of the towers to K6LDC.

OCARC Field Day will again be at the Walter Knott Education Center in Buena Park, just west of Knott's Berry Farm.

A $5 donation per meal is requested to defray costs.
Meals are planned Friday dinner (set-up), Sat. lunch, Sat dinner, Sunday breakfast.
The club will provide iced bottled-water. Bring your own soda, iced tea, Gatoraid.

VE Testing is scheduled to be held at FD site on Saturday June 28th at 1PM.

Breaking news: Boy Scout Troop 788 will be joining us again this year on Saturday and Sunday. Youth GOTA operators!

Operating is easy, all you need to say is "<Callsign> 7 Alpha Orange".
Would you like to help setup or operate? Contact Tim N6GP at n6gp@w6ze.org or 714 730-0395.

Field Day co-chairmen are Nick AF6CF and Tim N6GP.

Field Day University Class #2 is 6PM June 20th

(Right before General Meeting)

Our second Field Day University Class meets one hour before our general meeting at the Red Cross. This course is targeted at the beginning level operator, who will be using the microphone (phone) on Field Day. We hope to train some new operators for either the GOTA station or the other Phone stations. This class was a secret weapon that helped propel us to 2nd place in the country last year.

Topics for the second class include:

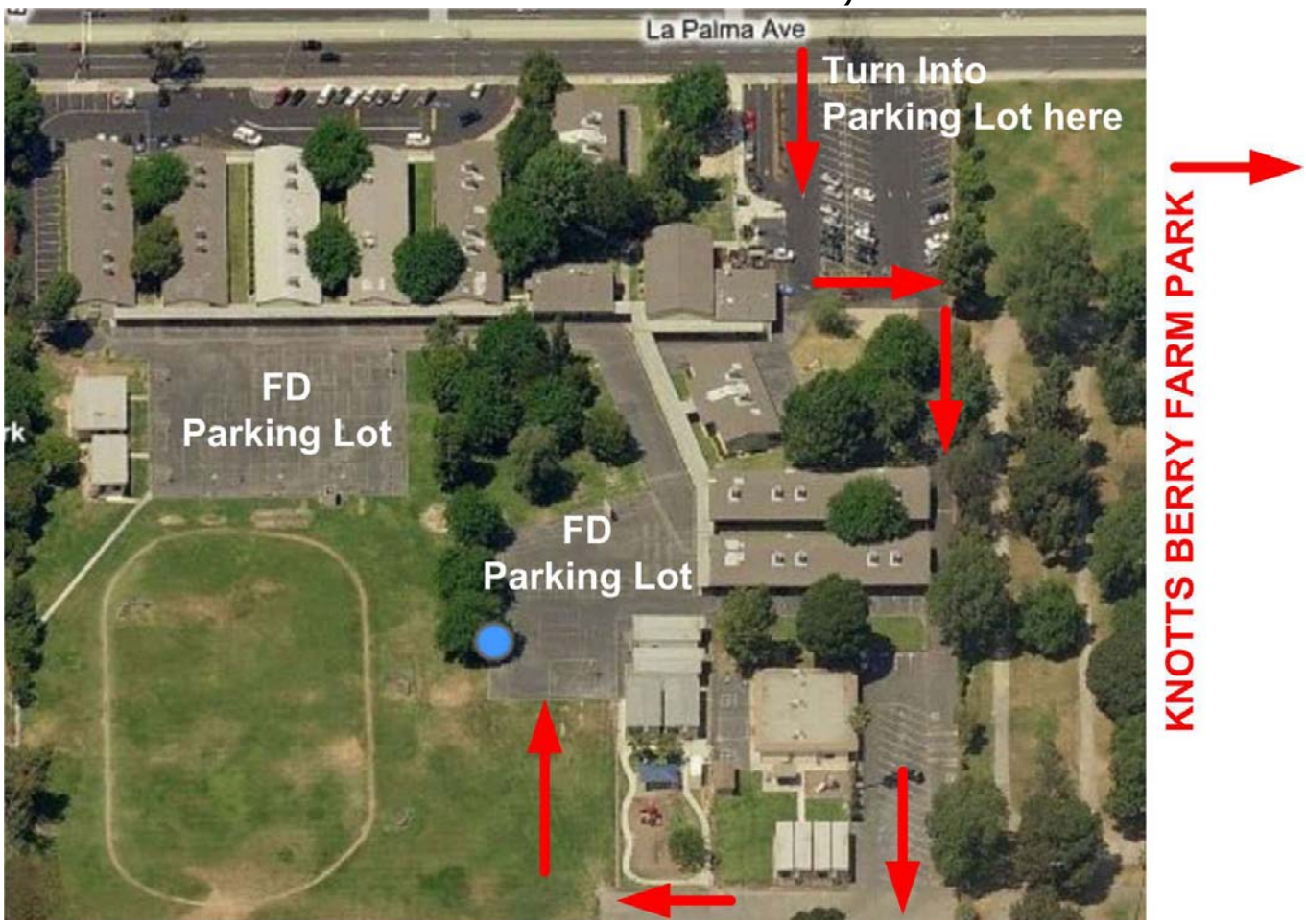
- How to hold your frequency
- What a pileup is, and how to deal with it
- Pace yourself, don't yell. Keep extra conversation to minimum.
- Use of Phonetics
- Use of the N3FJP Field Day software, with more hands- on practice
- Secret shortcut for using N3FJP software

Tim N6GP will again teach Class #2.

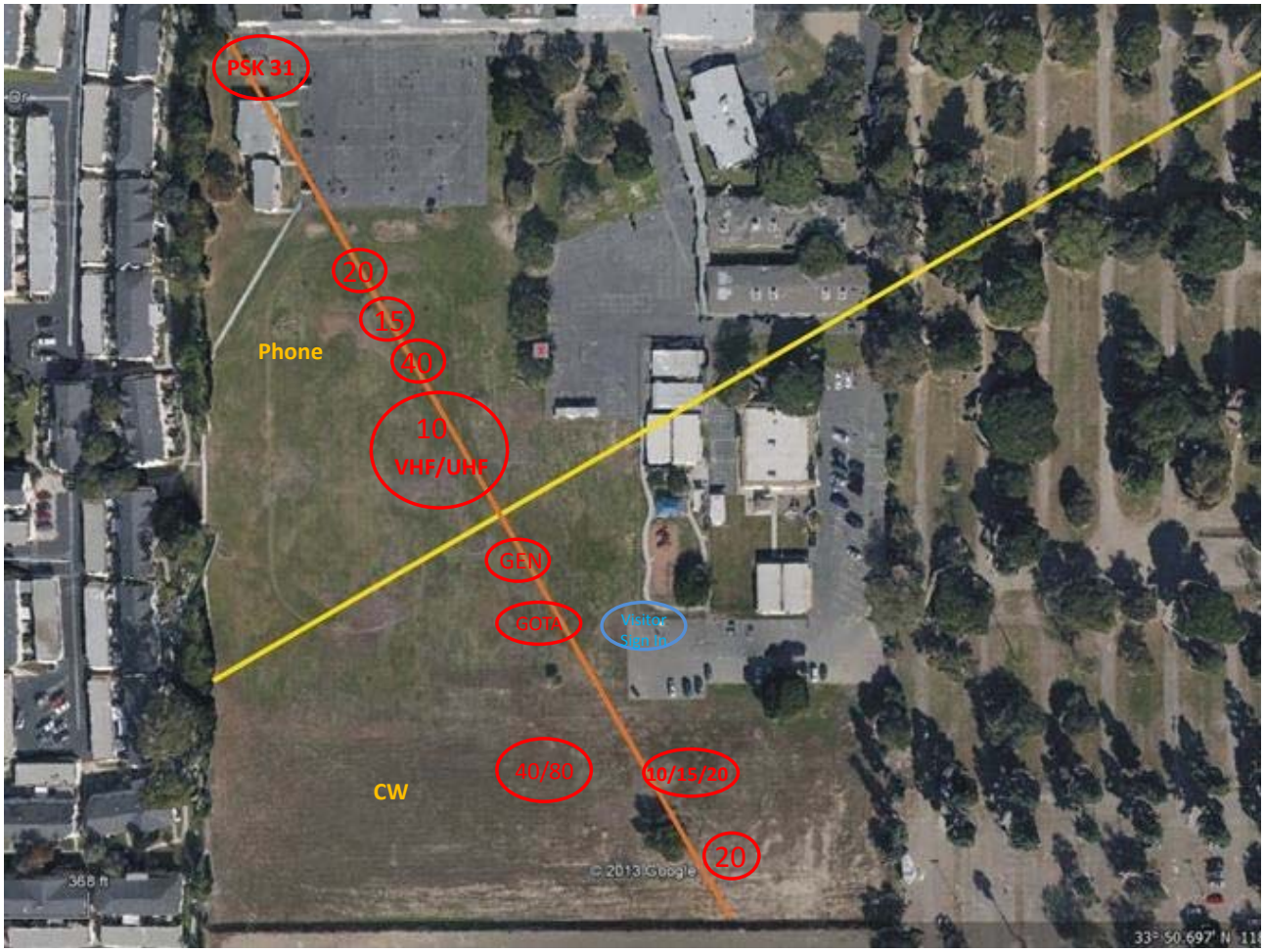
OCARC Field Day Location Map

Field Day will be again at last year's site (Walter Knott Education Center); however this year the access to the field may be slightly different than some past years. You may have to drive on a grassy area to reach the Field Day parking lot.
See aerial picture below for more details.

7300 La Palma Ave Buena Park, CA 90620



- **Head for Knott's Berry Farm**
- **Take the Beach Blvd (south) exit from the 91 or the 5 FWY**
- **Turn right (west) on La Palma Ave, along the north edge of Knott's Berry Farm Park.**
- **Continue driving on La Palma, past the Knott's Berry Park to 7300 La Palma Ave.**
- **The school will be on your left on the south side of La Palma. Use the first entrance on the East side of the school buildings.**

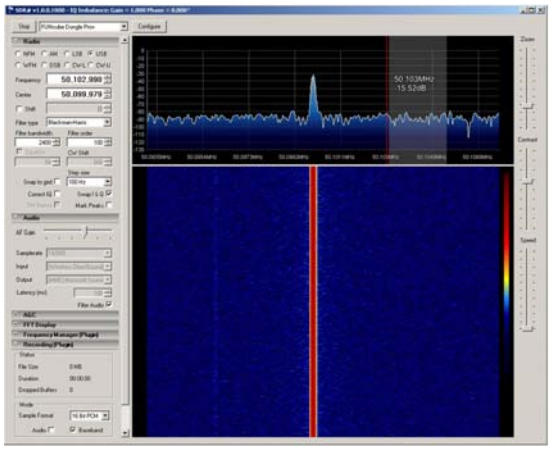


Locations of the Field Day OPs by Frequency Band.

Station	Captain(s)
80M CW, 75M Phone and 15M CW	Bob AA6PW
40M CW and 10M CW	Arnie N6HC
20M CW	Bob AA6PW
20M SSB	Ken W6HHC and Bob AF6C
40M Phone and 15M Phone	Dan KI6X and Cass W6SQC
10M SSB	Chip K7JA
GOTA	Tom W6ETC and Tim N6TMT
Digital	Greg W6ATB
VHF / UHF / Satellite (1 Free + 1)	Chip K7JA

You might be getting an email or phone call from the above captains who are recruiting teams for their stations. Even if you only have a couple of hours to operate, they would love to have you in their schedule.

OCARC
"Show and Tell" Night



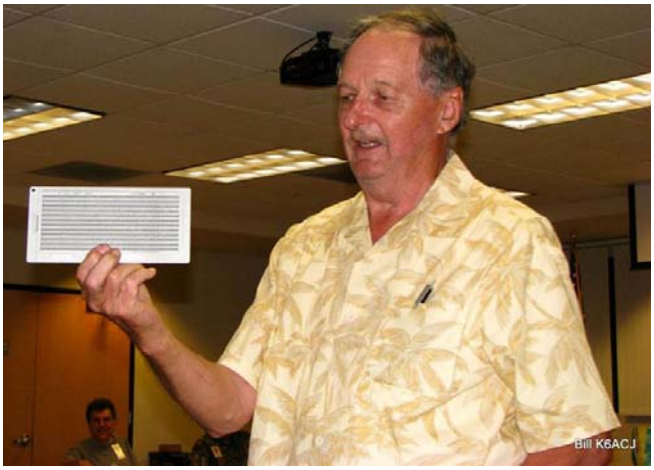
Peter NI6E demonstrated FunCube SDR Receiver spectrum and "waterfall" on 6 Meters
(photo by NI6E)

Peter NI6E controls frequency (150 KHz - 2.0 GHz) of FunCube receiver from notebook computer
(Photo by K6ACJ)

Tim N6TMT explains advantages of learning Morse Code using online CW ACADEMY
(photo by W6HHC)

George KK6KHE set up a video camera to record the "Show-and-Tell" presentations
(photo by K6ACJ)

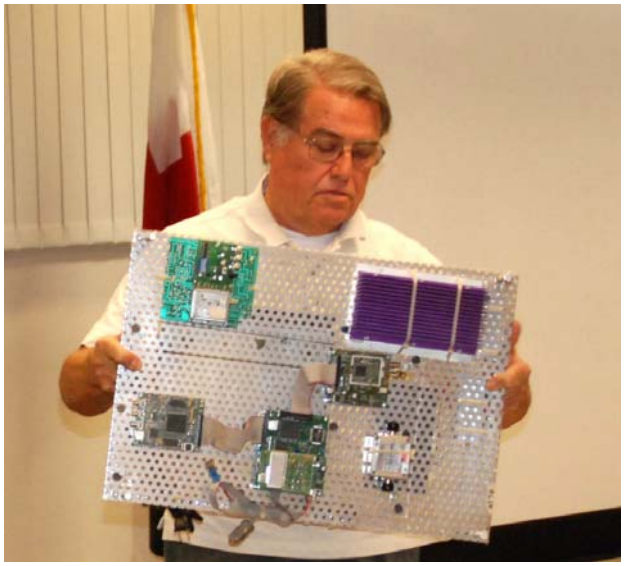
Clem WØMEC displays a 30-in disk drive platter from a 1970's CDC mainframe.
(photo by W6HHC)



Clem WØMEC shows a data-input punch-card alignment tool used for with the CDC mainframe.
(photo by K6ACJ)

Ken W6HHC demonstrated using an RKM MK802iv "micro-PC" to drive DATV-Express digitalATV PCBA
(photo by AF6C)

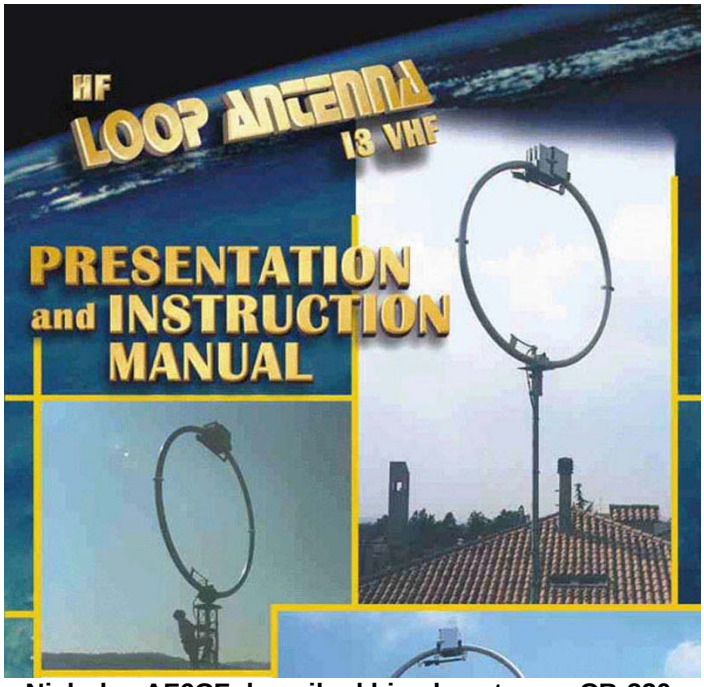
Dino KX6D points out the high-maintenace points of pulleys and cables on crank-up towers
(photo by W6HHC)



Robbie KB6CJZ showed his progress building a DigitalATV repeater station (1.2 GHz up / 3.4 GHz down)
(photo by W6HHC)

Here is a size comparison of W6HHC's quadcore-ARM MK802iv "micro-PC" to a card deck.
(photo by W6HHC)

Dino KX6D explains maintenance on brakes for the crank-up tower wench
(photo by K6ACJ)



Nicholas AF6CF described his plans to use CB-320 microcontroller to remotely tune loop antenna.
(book by I3VHF)

A Short Humor Story By Greg - W6ATB

I was undecided on the name for this story 'Getting Old' or 'Big Deal' you are the judge.

In 1962 I passed my Novice license, my call KN7VXM. I lived near Seattle Washington in a small town called Houghton. My ham gear was located in the house basement and I operated CW on 80/40 meters with my homebrew 6146 tube transmitter and SX-110 receiver.

Back in 1962 our home telephone was on a party line with three other houses in the neighbor. We only made long distant telephone calls on special occasions to my Grandparents in California. So when I made a CW contact outside the state of Washington, I would run up stairs to tell my parents who I had contacted and it was a big deal, in a positive way, for all of us.

Flash forward to 2014; in March I believe, I worked a Sweden OP on SSB on the 10-meter band with my Elecraft K3. It was an outstanding contact, good audio and S9+ signal. Shortly after the contact I told my wife about it. She had just completed a Skype call to her sister in Switzerland – her response 'big deal' in a condescending way.

The Sweden contact was a Big Deal for me. I'm Getting Old but I haven't lost my ham radio spirit!

Inner Peace… Author Unknown

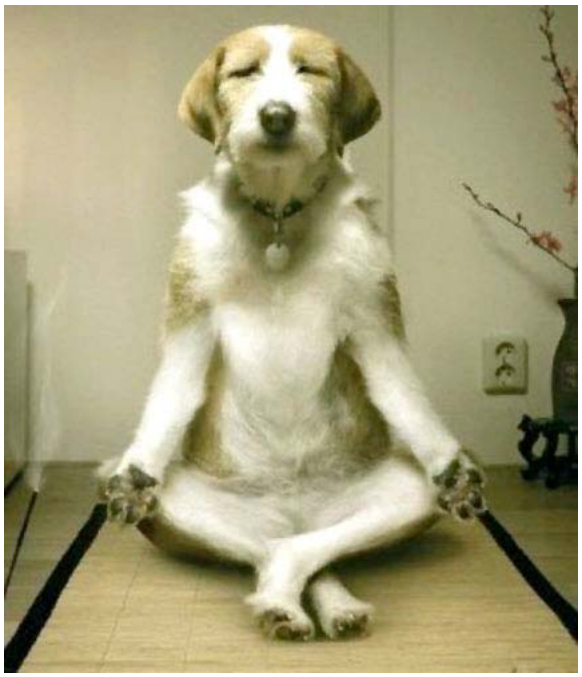
If you can start the day without caffeine,
If you can always be cheerful, ignoring aches and pains,
If you can resist complaining and boring people with your troubles,
If you can eat the same food every day and be grateful for it,
If you can understand when your loved ones are too busy to give you any time,
If you can take criticism and blame without resentment,
If you can conquer tension without medical help,
If you can relax without alcohol,
If you can sleep without the aid of drugs,

…

Then You Are Probably:

(answer)

The Family Dog!



Working DX with JT65 Protocol

Are you a frustrated with DX pile ups or not having the latest radio gear and the best antenna system to go after DX – then JT-65 might be the solution for you.

If you are hearing odd musical sounds at 14.076 MHz USB and similar frequencies on other bands, you are hearing one of the fastest growing HF digital modes today – JT65 and JT9.

Unlike PSK31, you can't enjoy a conversation with JT65. The exchanges are almost entirely limited to call signs, signal reports and grid squares. Each transmission lasts slightly longer than 47 seconds and you have to take turns transmitting and receiving during even and odd minutes. It takes about 5 minutes to complete a contact.

So what is the JT65 attraction – Well, its popularity is that you can use it to make contacts over great distances with few watts and just about any antenna. When I started using JT65 in late 2012 and within a few months, I worked many Countries. Such as AUSTRALIA, BRAZIL, COSTA RICA, ITALY, SPAIN, JAPAN, RUSSIA (ASIATIC) and many more interesting places. Most of the places I listed were on 15 & 10 meters, using 25 watts output and a loaded vertical.

Currently, I am spending most of my JT65 airtime on 6 meters as it is the 6-meter open season. This Fall and Winter I plan to operate on 160 meters using an old 2MHz marine antenna with an addition of a loading coil for transmit and a 100-foot long wire for receive. I might try the diversity RX mode on my Elecraft K3, using both antennas.

I use the WSJT-X software for both JT65 and JT9 modes. There is also JT65-HF software that works well too. Here are the following links for both software versions:

http://www.physics.princeton.edu/pulsar/K1JT/ http://iz4czl.ucoz.com/index/0-28

To use WSJT-X or other JP65-HF software, your PC clock must be within 1 second of accuracy of “real” time. I use Dimension 4 software to set my internal PC clock to within milliseconds of "real" time. Go to: http://www.thinkman.com/dimension4/

The following is a very brief description of the WSJT-X software and JT65/JT9 protocols. The following information is taken for the WSJT-X Home Web Page and at ARRL.ORG under digital

1. Introduction

WSJT-X is a computer program designed to facilitate basic amateur radio communication using very weak signals. The first four letters in the program name stand for “Weak Signal communication by K1JT”, and the “-X” suffix indicates that *WSJT-X* started as an extended (and experimental) branch of program *WSJT*.

WSJT-X currently offers two protocols or “modes,” JT65 and JT9. Both are designed for making reliable, confirmed QSOs under extreme weak-signal conditions. They use nearly identical message structure and source encoding. JT65 was designed for EME (“moon-bounce”) on the VHF/UHF bands and has proved very effective for worldwide QRP communication on the HF bands, too. JT9 is optimized for the LF, MF, and HF bands. It is about 2 dB more sensitive than JT65 while using less than 10% of the bandwidth. Both modes use one-minute timed sequences of alternating transmission and reception, so a minimal QSO takes four to six minutes — two or three transmissions by each station, one sending in odd UTC minutes and the other even. On the HF bands, world-wide QSOs are possible with power levels of a few watts and compromise antennas.

Standard JT65 messages contain 72 bits of user information—typically two 28-bit call-signs,3 a 15-bit grid locator, and one bit to indicate the message type. A Reed Solomon (63,12) error-correcting code translates the 72 message bits into 63 six-bit “channel symbols.” Thus, every transmission includes 6 × 63 = 378 information-carrying bits. The user information is mathematically encoded so that it is spread throughout the entire sequence of 63 symbols. In JT65 a brief signal dropout of a few seconds will not affect recoverability of the entire message.

2. Computer Requirements

1 Computer running Windows (XP or later), Linux, or OS X

2 1.5 GHz or faster CPU and 100 MB of available memory

3 Monitor with at least 1024 x 780 resolution (more is better)

4 Computer-to-radio interface using a (virtual) serial port for T/R switching or CAT control or VOX, as is needed for your radio to computer setup

5 Audio input and output devices supported by the operating system, capable of 48 kHz sample rate

6 Audio or equivalent USB connections between transceiver and computer

7 A means for synchronizing the computer clock to UTC within ±1 second, see freeware software Dimension 4

BSA Scout-O-Rama Event

The Boy Scouts of America event was held at Irvine Regional Park on May 10.

From left to right in the picture above, Greg W6ATB, Thomas W6ETC, Tim N6GP and Tim N6TMT represented OCARC at the recent BSA gathering. Most of the scouts liked doing their name in Morse code on the code practice unit we had at the event. If a scout coded his name correctly, he got a jellybean.

Tim N6GP working his IC-7000 on 10 meter SSB

Heathkit of the Month #57:
by Bob Eckweiler, AF6C

Fig. 1: Heathkit AA-32 Stereo Amplifier

STEREO HI-FI EQUIPMENT
Heathkit AA-32
Tube-type Stereo Hi-Fi Amplifier

Introduction:
Over the years Heathkit has manufactured a large number of Hi-Fi kits including tuners, amplifiers, receivers (combined tuner and amplifier), speakers, tape decks and turntables. In 1964 they introduced a new line of lower-cost tube Hi-Fi equipment that they called the ***Designer-Styled*** series. This equipment came in a "mocha brown and beige with black accents" color scheme. Two kits were originally introduced, the AJ-13 FM/FM Stereo tuner and the AA-32 Stereo Amplifier. They appeared, marked as NEW, in the July 1964 Heathkit catalog 800/47. The kits originally sold for $49.95 and $39.95 respectively. Later in 1964, four more Hi-Fi kits were introduced with the same styling, the AJ-53 Hi-Fi AM Tuner, the AJ-63 FM Mono Tuner, the AA-13 14-watt Mono Amplifier and the AA-23 25-watt Mono Amplifier. The AA-13 was noted as "LAST CALL" in the Summer 1969 catalog. The remainder of this series evidently stopped production in the early 1970s. I could find no reference to them in any of my later catalogs. What makes this series of interest is **it is believed to be the last tube Hi-Fi/stereo equipment Heathkit produced.**

Table I shows the various kits in this family, their basic specs and prices. Unfortunately, while I have an AA-32 with its original manual, and a schematic of the AA-13, I have not been able to find much, other than the partial specifications given in the catalogs, on the other four kits.

The Heathkit AA-32 Stereo Amplifier:
The kit I have was originally built and used by our club member Ken - W6HHC. When he upgraded to a new stereo system he passed it, along with a defunct solid-state AJ-14 tuner, to me. The tuner is a story to be covered in a future article; let me just say that it was not defunct due to a problem originating with the kit

Amplifiers

Model	Type	Power	IHF Power	Intro. Date	New Price	Exit Date	Last Price	Notes
AA-13	Mono	14W	16W	Late '64	$29.95	1969	$24.95	120/240 volt operation
AA-23	Mono	25W	30W	Late '64	$42.95	1971	$42.95	Mic input, rear AC outlet
AA-32	Stereo	8W/ch	10W/ch	Jul. '64	$39.95	1971	$39.95	Featured kit

Tuners

Model	Type	Band	AFC	Intro. Date	New Price	Exit Date	Last Price	Notes
AJ-13	Stereo	FM	Yes	Jul. '64	$49.95	1971	$47.00	Front panel Phase control
AJ-53	Mono	AM	N/A	Late '64	$27.95	1971	$26.50	Dual Bandwidth
AJ-63	Mono	FM	Yes	Late '64	$39.95	1971	$37.50	AC-11B Stereo Mpxer compatible

Table I - Heathkit *Designer Styled* Tube Hi-Fi Kits

Power Output:	8 watts
IHF Power Output:	10 watts
Freq. Response:	±2 dB 20 to 40,000 cps ±1 dB 30 to 30,000 cps
Input Sensitivity:	Mag Phono: 6 mV Others: 250 mV
Input Impedance:	Mag Phono: 47KΩ Cer Phono: 2.2MΩ Others: 470KΩ
Channel Separation:	> 30 dB at 15,000 cps > 45 dB at 1,000 cps > 42 dB at 30 cps
Output Impedance:	4Ω, 8Ω and 16Ω
Harmonic Distortion: (at rated output)	> 2% at 15,000 cps. > 0.7% at 1,000 cps > 2% at 30 cps
Hum and Noise:	Mag Phono: < -46 dB Others: < -65 dB
Feedback:	18 dB
Damping Factor:	9
Mag Phono Equalization:	RIAA.
Power Requirements:	105 - 125 VAC 60 cps (85 watts at 120 volts)

Table II: AA-32 Amplifier Specifications

builder! The amplifier itself was in good working condition when I got it, as I remember.

The AA-32 is specified as a 16-watt amplifier. That means 8-watts per channel. Heathkit, like many manufacturers, rated their amplifier power in two different ways. The AA-32 is rated 8-watts per channel of continuous stereo power, or 10-watts per channel IHF (Institute of High Fidelity) dynamic power. This is a measure of the amplifier's capacity to deliver audio peak power - kind of an audiophile's PEP. The amplifier measures 13-1/2" W x 4-11/16" H x 9-1/4" D and weighs 13-1/4 lbs. net. Additional specifications are given in Table II.

The Kit uses seven tubes; all of them are dual section tubes. The tubes and their functions are given in Table III. The power supply uses silicon diodes. Both amplifier sections are identical and share a common power supply.

The front panel controls are simple with a rotary input **SELECTOR** switch, dual tandem pots for the **VOLUME** control, dual concentric pots for **BASS** and **TREBLE** controls, slide switches for **MONO - STEREO** and **ON - OFF** and a red neon pilot light. The BASS and TREBLE pots are each on a single shaft that adjust together; the VOLUME pots have separate concentric shafts with inner and outer knobs that are clutch-coupled so normally they turn together but can be adjusted separately if need be. The front panel control layout is given in Table IV.

The rear panel contains the power cord exit, a **HUM** adjustment pot, two speaker terminal strips, and two sets of four RCA input jacks. Their use and location are given in Table V.

#	Tube	Type	CH	Purpose
V1A	1/2 6EU7	Triode	Left	Mag Preamp
V1B	1/2 6EU7	Triode	Right	Mag Preamp
V2A	1/2 6EU7	Triode	Left	1st Preamp
V2B	1/2 6EU7	Triode	Right	1st Preamp
V3A	1/2 6EU7	Triode	Left	2nd Preamp
V3B	1/2 6EU7	Triode	Right	2nd Preamp
V4A	1/2 6GW8	Triode	Right	Tone Amp
V4B	1/2 6GW8	Pentode	Right	Power Amp A
V5A	1/2 6GW8	Triode	Right	Phase Splitter
V5B	1/2 6GW8	Pentode	Right	Power Amp B
V6A	1/2 6GW8	Triode	Left	Tone Amp
V6B	1/2 6GW8	Pentode	Left	Power Amp A
V7A	1/2 6GW8	Triode	Left	Phase Splitter
V7B	1/2 6GW8	Pentode	Left	Power Amp B

Qty 3: 6EU7 dual triode
Qty 4: 6GW8 (ECL86) triode / power pentode

Table III - Heathkit AA-32 Tube Line Up

From Left to Right:

SELECTOR Switch (4-pos. rotary)
- **MAG**netic **PHONO**
- **CER**amic **PHONO**
- **TUNER**
- **AUX**

VOLUME Dual concentric clutched pots
- **LEFT** (Outside knob)
- **RIGHT** (Inside knob)
- 11 marks over 330°

Mode Switch (Slide switch)
- **MONO** (Up)
- **STEREO** (Down)

Pilot Light (Red Neon)
- Above the two slide switches

Power Switch
- **ON** (Up)
- **OFF** (Down)

BASS Dual tandem potentiometers
- 11 marks over 330°

TREBLE Dual tandem potentiometer
- 11 marks over 330°

Table IV - AA-32 Front Panel Layout

From Left to Right (Rear view):

Power cord entry
- Heyco type strain relief

HUM pot
- Screwdriver adjustment

RIGHT SPEAKER 4-screw terminal strip
- **C**ommon
- **4Ω**
- **8Ω**
- **16Ω**

LEFT SPEAKER 4-screw terminal strip
- **C**ommon
- **4Ω**
- **8Ω**
- **16Ω**

The following input jacks are located left above right

LEFT Inputs (Quad RCA Jacks)
- **AUX**illiary
- **TUNER**
- **CER**amic **PHONO**
- **MAG**netic **PHONO**

RIGHT Inputs (Quad RCA Jacks)
- **AUX**illairy
- **TUNER**
- **CER**amic **PHONO**
- **MAG**netic **PHONO**

Table V - AA-32 Rear Apron Layout

AA-32 Setup & Operation:

Setting up and operating the AA-32 Stereo Amplifier is straightforward. First speakers are attached to the two speaker terminal strips on the rear of the unit; one strip is for the left speaker and the other is for the right speaker. Three impedances are available depending on the speakers chosen: 4, 8 or 16Ω. The hot (+) terminal of each speaker goes to its appropriate terminal and the neutral (-) lead goes to the C or common terminal. It is wise to use lugs on the ends of the speaker leads that go on the strip's screw terminals for reliability. Speaker impedance is usually given on the speaker or in its documentation, as are polarity markings. It is important to have the polarity right so the speakers are properly phased. Be sure the speakers are attached before turning on the amplifier. Operating without a load can damage the power tubes and possibly the output transformer. The speakers should be rated to handle the amplifier's rated power. Heathkit recommended their AS-18, AS-37 (both 8Ω 25W) or their mini AS-81 (8Ω 6W) as appropriate.

Three sources of input may then be attached as desired. A phono turntable (remember them for playing LP records?) may be attached to either the MAGnetic or CERamic inputs depending on which type of cartridge your turntable uses. (Variable reluctance cartridges use the magnetic input and crystal cartridges use the ceramic input). Your tuner connects to the TUNER inputs. If you have a second tuner, a tape deck or a CD player, it connects to the

Fig. 2: Heathkit AA-32 Stereo Amplifier - Rear View

AUX connectors. these connectors are all RCA type phono jacks. Once the AC line is connected your unit is ready for use.

Operation is simple. Turn the AA-32 on, along with the source you are going to listen to; let it all warm up (younger folk may not be familiar with that step!); then advance the volume to the desired listening level, taking in consideration whether you like or dislike your neighbors. Then adjust the BASS and TREBLE controls to your liking. A good place to start with these two controls is near the middle. Depending on the source, you may select MONO or STEREO. If your source is a tuner and the signal is a bit noisy the mono mode often will reduce the noise at the cost of losing the stereo affect.

Feedback and Damping Factor:

You may have noticed in the specifications Feedback: 18 dB and Damping Factor: 9. Let's take a quick look at what these mean. To delve deeply requires many pages. You may search on the web for more detail.

Feedback refers to negative feedback. By sending some of the amplified energy back to the input of a stage, or series of stages, the gain is reduced but the linearity is improved. Good linearity means the amplified signal represents a truer image of the original. Two types of feedback are used in the Heathkit AA-32.

The first is cathode feedback applied to an individual stage. By not bypassing (or partially bypassing) the cathode with a large capacitor, the cathode voltage varies with the amplified signal, changing the grid to cathode voltage and creating negative feedback. This is used on the stages of V1A, V2A, V3A and V7A. (Note: since the left and right amplifiers are identical, we will only refer to the left channel in this article, except where otherwise necessary.)

Another way to provide feedback is over multiple stages. The stages of V7A, and V6A drive the Class B output stage composed of V6B and V7B. A signal taken from the 16Ω tap of the output transformer is fed back to the cathode three stages back through a parallel combination of C37 and R59. This improves the overall linearity of these stages at the cost of gain. In the case of the AA-32, this gain reduction is 18 dB, yet it leaves plenty of audio power to drive the speakers to full rated output.

Damping Factor is another important aspect of a Hi-Fi amplifier. When a speaker voice coil is moved by a signal it doesn't just come to a stop, it oscillates like most other mechanical things. This oscillation induces a signal that is fed back to the amplifier (The speaker is a magnet moving in a coil). The amplifier's damping factor is its capability to quickly dampen the speaker coil's self oscillations. The damping factor is given as the ratio between the load impedance (typically 8Ω) and the amplifier's source impedance. New transistor amplifiers can have a very low source impedance and a very high damping factor. Tube amplifiers with their higher plate impedances have lower damping factors. Other things like speaker lead resistance also play a factor.

Heathkit AA-32 Circuit Description:

The AA-32 circuitry (Figure 4) is straight forward. Each amplifier channel has three stages of triode pre-amplification, followed by a class A triode power amplifier, a triode phase splitter and a class B push-pull power amplifier. Before we look at the preamplifier and power amplifier stages, lets look at the power supply.

Power Supply:
The power supply is transformer based. The primary is only operable on 105 - 120 VAC and is fused at 1-amp (slow-blow). A simple slide switch in the primary provides on-off function, and a small neon bulb in series with a 100KΩ resistor provides pilot light function. The 120V secondary drives a full-wave voltage doubler that uses silicon diodes and 30 µF capacitors. A four-section can-capacitor provides voltages to the various circuits: 290 volts to each output stage, 250 volts @ 6 ma to the first power amplifiers and the phase splitters, 230 volts @ 4 ma to the second and third preamplifiers and 200V @ 2 ma to the magnetic phono preamplifiers.

A second winding on the transformer provides 6.3 volts to the tube filaments. Neither side of the filament chain is directly grounded. All the filament (and AC power) leads are twisted together to reduce AC pickup that results in hum. The filament chain is also attached to a 2KΩ pot (R104) that has its center arm grounded. Any hum picked up from the AC chain should be able to be nulled by adjustment of this pot.

Preamp & Amplifier Stages:
The initial preamplifier V1A is only used for the magnetic phono input. It is a simple amplifier that is followed by the RIAA de-emphasis network. Records recorded in the RIAA (Recording Industry Ass'n of America) standard are pre-emphasized by raising the level of the higher frequencies to improve the ability to record them on records. This network removes the emphasis. If you are interested, more information may be found on the Internet.

The function switch selects either the pre-amplified magnetic phono input, the ceramic phono input, the tuner input or the auxiliary input and feeds it to the second preamplifier. Preamplifier stages two and three (V2A and V3A) further amplify the audio signal. The volume control is located between these stages. When in monaural mode, the tops of the two volume controls are connected by the MONO STEREO slide switch. These stages amplify the signal to a level where it can be fed into the tone control network. this network is built in a sealed P.E.C. (Packaged Electronic Circuit), perhaps an early integrated circuit. Since the tone network is a common circuit in audio amplifiers, this PE.C. has found its way into a lot of amplifiers. It, in conjunction with a bass and treble potentiometers, allows the bass pot to adjust the audio from +14 dB to -18 dB at 30 cps and the treble audio from +15 dB to -17 dB at 15 kcs (kHz).

The first power amplifier V7A is the first stage in the multi-stage feedback loop. It amplifies the signal to a level that can drive the phase splitter.

The phase splitter V6A is a triode circuit. It is both a cathode follower and a unitary gain amplifier. Signals capacitively coupled from the tube's plate and cathode are basically identical except they are out of phase by 180°. They are fed to the grids of the two tubes of the class B push pull power amplifier, V6B and V7B. There is no cathode feedback in this circuit - the cathode bias resistor is bypassed by large electrolytic capacitor C43. The push-pull stage is where the real power is developed. Negative feedback is provided by the multi-stage feedback discussed previously.

The Heathkit AJ13 Stereo FM Tuner:
Heathkit released the AJ-13 Stereo FM Tuner along with the AA-32. This release made the cover of the July 1964 catalog (Figure 3). This tube tuner has a built-in multiplexer to allow stereo reception. It also has AFC (automatic frequency control). The AJ-13 incorporates 7 tubes, including three dual-function tubes and a triple function tube. An indicator lights when a stereo FM signal is being received. The lighted tuning dial covers below 88 to 108 mc. A separate 0 - 100 logging scale is also present.

The Heathkit AJ-63 Monaural FM Tuner:
Shortly after the AJ-13 tuner was released Heathkit released a monaural version of the same tuner. Except for the model number on the front panel and no stereo indicator, it looks identical to the AJ-13. Surprisingly, the left

Figure 3: Heathkit's New AJ-13 FM Stereo Tuner on the Cover of the July 1964 Catalog

control is a volume control instead of the power and mode switch. The AJ-63 uses 5 tubes and has a connector on the back so it can be used with the AC-11B Stereo Multiplex Converter (See HOM #45). While the AJ-43 sells for $10 less than the AJ-13 the AC-11B costs $24.95. The 'B' signifies a tan cabinet which matches the AJ-63; ('A' is black).

The Heathkit AJ-53 Hi-Fi AM Tuner:
Along with the AJ-63, Heathkit also introduced an AM Tuner designated the AJ-53. It looks identical to the AJ-63 except for the AM scale. This 4-tube tuner features an RF stage and a voltage doubling detector. A slide switch on the front selects either of two bandwidths; for normal listening 7 kc and for Hi-Fi listening 16 kc. Since broadcast signals on the AM band are spaced at 10 kc, a whistle filter is incorporated to remove any 10 kc beat note that might reach the detector.

The Heathkit AA-13 Monaural Amplifier:
While stereo was all the rage in the mid-sixties, some audiophiles still preferred monaural, others preferred to use two separate amplifiers for stereo. The AA-13 is a 14 watt (16 watt IHF) monaural amplifier Heathkit came out with shortly after the AA-32 and in the same style. The AA-13 looks similar to the AA-32 except the two slide switches (MONO-STEREO and ON-OFF) of the AA-32 are missing; so is the dual concentric volume control with concentric knobs, replaced by a single pot and knob. The power switch appears to have been moved to the treble pot. The selector switch switches three inputs; the AUX position is missing. This amplifier uses six tubes including a EZ81/6CA4 rectifier tube; no silicon diode rectifiers! The output uses a pair of EL84/6BQ5 tubes in push-pull. Other tubes are a 6EU7 dual triode for magnetic phono preamp and first preamp, a 6AU6 second preamp, a 6AN8 1st power amp and phase splitter.

The Heathkit AA-23 Monaural Amplifier:
The final product of the Designer Styled series is a more powerful monaural amplifier designated the AA-23. This amplifier is rated at 25 watts (30 watts IHF). The front of the AA-32 looks identical to the AA-13; you have to read the nomenclature to tell which model it is. The AA-32 also has a few differences including a microphone input (1/4 in. Phone jack on the rear panel), an un-switched AC outlet (two prong style, also on the rear panel). The tube lineup is a pair of dual triode 6EU7s in the pre-amplifier stages, a 12AU7 dual triode phase splitter, a pair of 7591 pentodes in the push-pull power amplifier and a 5AR4 rectifier.

Comments:
After cleaning up my AA-32 amplifier I used it with an AJ-14 solid state FM tuner and a Sony cassette tape deck for many years. Shortly before I retired I found an AA-14 solid-state amplifier that matches the AJ-14 tuner, and it replace the AA-32 that is now sitting below the shelf.

On a side note, this amplifier was being built in October of 1965. Ken, W6HHC made some corrections to the schematic which he dated and initialed!

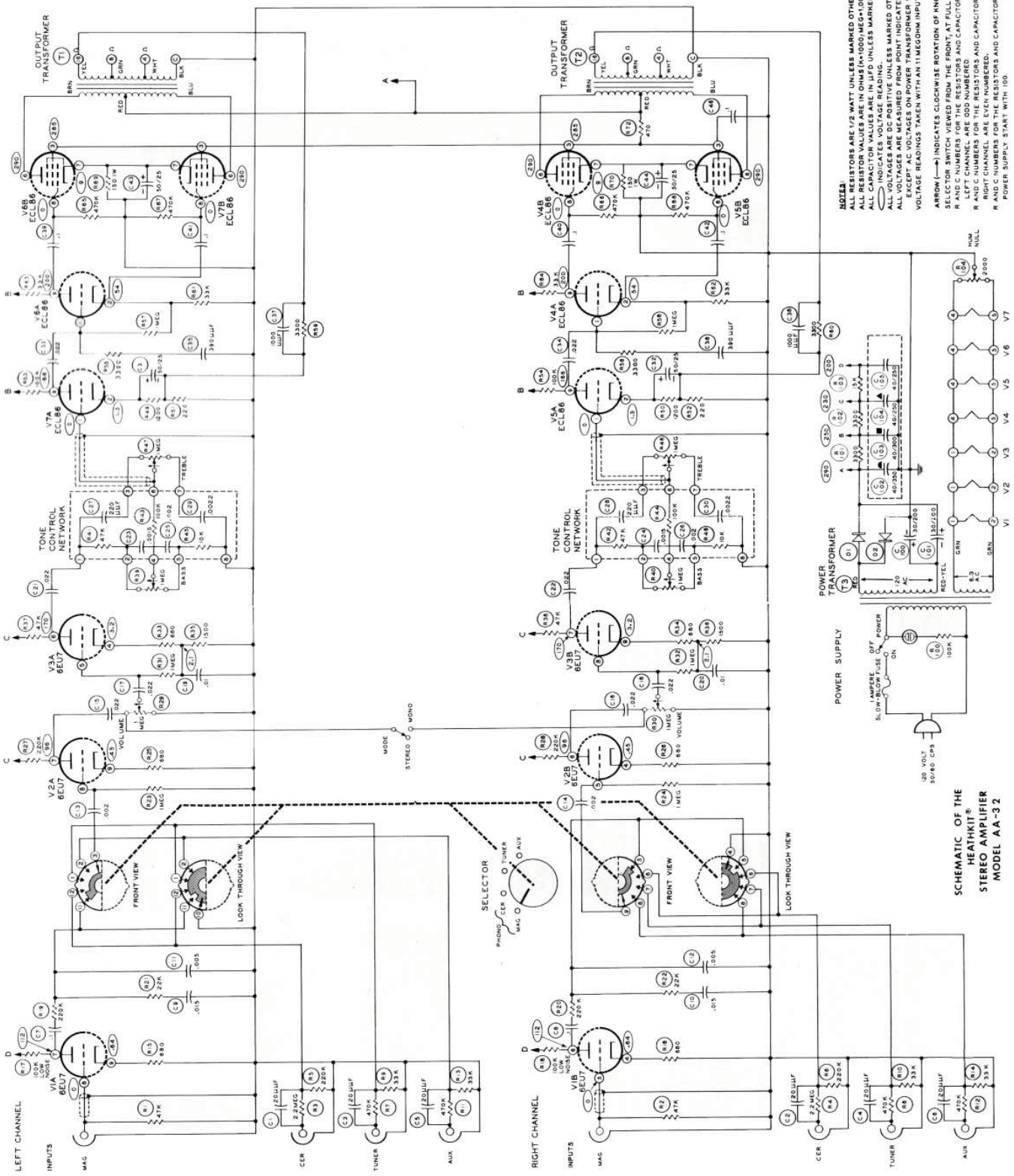
Next month I'll include a review of Chuck Pearson - WA7ZZE's excellent new book ***Heathkit Test Equipment Products***. It is definitely worth owning for Heathkit aficionados.

73, from AF6C

Remember, if you are getting rid of any old Heathkit Manuals or Catalogs, please pass them along to me for my research.

Thanks - AF6C

The Heathkit AA-13 Monaural Amplifier Schematic



OCARC General Meeting Minutes for 2014-May-16

The OCARC General Meeting was held at the Red Cross Complex on May 16th 2014. The meeting was called to order at 7:15 pm, 2:15 UTC.
Our speakers for the evening were various members of the club with short presentations.

Peter Ni6E– Demonstration of Funcube dongle pro + software defined receiver. Peter demonstrated a capture of the RF data being received and processed through the device. He was then able to tune from signal to signal showing what transmission were taking place at that time data was captured.

Clem W0MEC – collection of old disk and hard drives from early days of computing. Clem told us about the early days of disk storage. How oxidation would take place on the disk and power tools would be used to remove the buildup.

Ken W6HHC – DATV express project hook up using a Quadcore MK802iv ARM device to serve as the processor. This device has proven to be a more effect processor than earlier attempts at using the Raspberry Pi. The MK802iv can be purchased for around $80.

Tim N6TMT – CW Academy – Tim spoke about his experience learning CW through the CWOPS.org training program. Classes take place online utilizing a video sharing service with a small group of students and an experienced cw operator. Additionally a website provides access to practice sessions. http://www.cwops.org/cwacademy.html

Dino KX6D – tower maintenance. Dino filled us with his wisdom from many years of antenna tower work. This was a thorough demonstration of the parts and equipment needed to keep a tower in tiptop shape.

Robbie KB6CJZ– his construction of a DATV digital repeater that will allow transmission over a larger area. Robbie has prepared a working repeater unit that will soon be up and operating for use by the local Digital Amateur TV community.

Nicholas AF6CF – told about attempts to use a CB-320 micro controller to tune a Loop Antenna. The high Q – with resonance point being very narrow would seem to provide a good place for using a microcontroller device for a loop antenna tuner.

After a short break the meeting reconvened covering club business. A quorum of Board members were present with only Doug – W6FKX and Tom – K6ETC absent.

Motion approved to spend $1300 on FD. A large portion of expense is devoted towards food; with FD attendees offsetting the remaining balance of food cost by donating $5 per each meal they eat.

Meeting Adjourned.

Respectfully submitted by:
Tim Millard, KJ6NGF, Secretary 2014.

Bill's Hint or Kink Column

Hello to all, I volunteered to write a monthly Do It Yourself column about various ham radio hardware and software projects. Projects will range from simple around the Radio Shack projects, stealth antennas, and projects that might save time and money or more complex projects to spawn ideas or educate.

A bit about my background, licensed in 1957 as KN6ACJ, I built my first transmitter from tubes and boxes followed by countless construction projects for HF, VHF and UHF with a concentration on fixed HF, mobile and my favorite, sitting in the grass operating portable with a favorite QRP rig and wire antenna. After a fabulous 43 year career in the computer industry I have at last more time for our wonderful hobby and have completed extensive and complicated projects in Software Defined Radio, HF amplifiers, PICAXE/Adruino/Raspberry Pi micros and HF Magnetic Loop Antennas. Dumpster Diving for parts is part of DIY which adds to the fun. Aside from various ham radio club affiliations I belong to a Robotics club where I find many fresh ideas.

It's been my aim to teach others from what I have learned so I would like to make this column for everyone and will look to your contributions. Don't be afraid as I can do the writing so feel free to contact me to discuss your favorite tricks, tips and projects and I'll put it in writing. In the past I've made items that seemed trivial only to see someone write up the same idea as an article in a ARRL publication. This column will give you the chance to describe your Hint or Kink, or project in this column.

73 till next month,
Bill Prats k6acj@biztek.com http://www.biztek.com/k6acj

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Contact V.E. George T. Jacob Jr. N6VNI

Phone Numbers: Home Phone 562 691 7898 Cell Phone 562 544 7373
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Sponsoring Club: N6ME Western Amateur Radio Association, "WARA"
Test site location:
La Habra Community Center.
101 W. La Habra Blvd.
La Habra, Ca. 90631
Pre-Registration is requested and preferred. Walk-ins are welcome.

2014 TESTING SESSIONS

Thursday, Jun 19th 2014 6p.m.
Saturday Jun 28th 2014 1p.m.
(Special session to be held at the Field Day site)
Thursday, Jul 17th 2014 6p.m.
Thursday, Aug 21st 20146p.m.
Thursday, Sep 18th 2014 6p.m.
Thursday, Oct 16th 2014 6p.m.
Thursday, Nov 20th 2014 6p.m.

On VE Exam Day Bring the Following Items

1. A legal photo ID (driver's license, passport) or two other forms of non-photo ID; e.g., birth certificate, social security card, library card, utility bill or other business correspondence with name of the examinee as it appears on the Form 605 and current mailing address.
2. Your Social Security Number (SSN) or FCC-issued Federal Registration Number (FRN).
3. If applicable, the original and a photocopy of your current Amateur Radio license and any Certificates of Successful Completion of Examination (CSCE) you may have from previous exam session. (Photocopies will not be returned.)
4. Two number two pencils with erasers, and a pen.
5. A calculator with memory erased and formulas cleared (no iPhones, iPads, etc.).
6. Test Fee: $15.00 (cash or check).

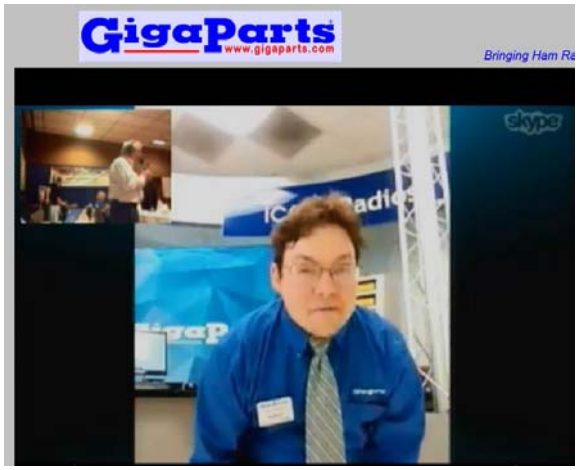
If you fail an element and wish to retake it, we are required to charge an additional test fee. If you pass an element, we typically offer and encourage you to take the next element. We do not charge an additional test fee for this and it gives you the opportunity to see what the next exam element is like!

Some Photos
from
Dayton Hamvention 2014
by Ken W6HHC

W5KUB provided streaming video from Dayton and here interviews Astronaut Doug Wheelock

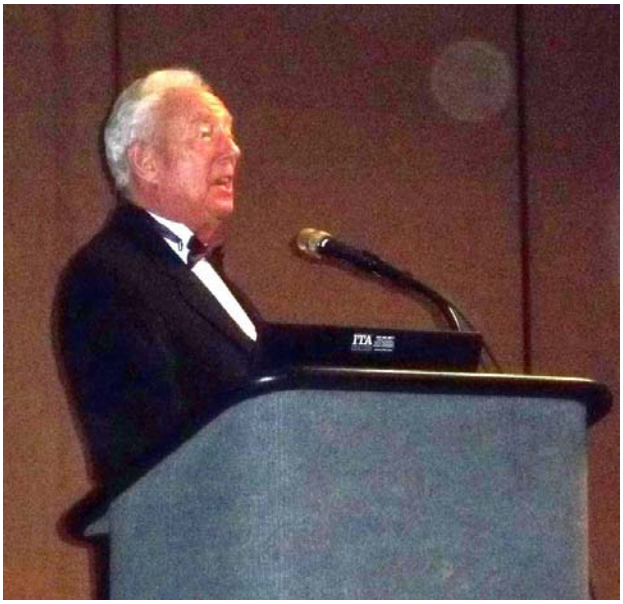
A truly "iconic" photo showing the size of crowds at this year's Dayton gathering
(courtesy of Joe KØNEB via YouTube)

"The Blues Kids" Janet KL7MF and Chip K7JA are on way to ICOM dinner with "Blues Bros" theme.
(courtesy of Chip K7JA)



W5KUB (upper left) raffling off a Yaesu FTdx12000 high-end rig donation by GigaParts at Dayton
(courtesy of W5KUB.com)

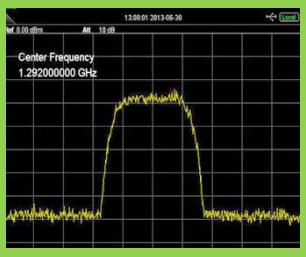
OCARC members Arnie-N6HC and Wayne-W6IRD enjoyed seeing new equipment being shown.
(courtesy of Arnie N6HC)



Gordon West WB6NOA gave a presentation at the ATVers Forum at Dayton
(courtesy of Art WB8RMC)

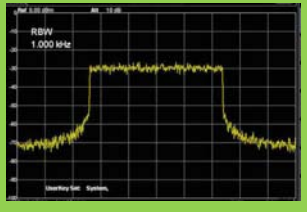
Digital Amateur TeleVision Exciter/Transmitter

now available from



DATV-Express

- A more affordable DATV exciter can now be ordered
- Fully assembled and tested PCBA
- DVB-S protocol for DATV (using QPSK modulation)
- Can operate all ham bands from 70 MHz-to-2450 MHz
- RF output level up to 10 dBm (min) all bands (DVB-S)
- Software Defined Radio (SDR) architecture allows many variations of IQ modulations
- “Software-Defined” allows new features to be added over the next few years, without changing the hardware board
- As extra bonus, the team has been able to get the board to transmit DVB-T 2K mode, however we cannot guarantee the performance of that protocol. Caveat Emptor!
- Requires PC running Ubuntu linux (see User Guide)
- Price is US$300 + shipping – order using PayPal



For more details and ordering
www.DATV-Express.com

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