

# RF



## ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LV NO. 3

P.O. BOX 3454, TUSTIN, CA 92781-3454

March 2014

### The Prez Sez.....

by Nicholas AF6CF



Hello!  
March is here, and we have great news for all the Club members. This month's speaker will talk about building a tower trailer. This is a very interesting project, so make sure you show up at the General meeting.

Also, Field Day preparations are starting, with a couple of meetings planned to hear ideas and input from everyone. As last year, we will start a FD Donations Fund for rent and gas so it will (hopefully) attain its goal. We have open positions for Band captains. Many are still open, so hurry up to volunteer.

We will be working to secure a FD Site and just like last year my prediction is that we will have a great time, propagation or not. The two co-chairs will be doing work organizing the event, and scheduling training for us, the not-so-skilled operators.

As usual, we will be having a few members participating in Baker to Vegas this month and other radio related events to make our Club one of the most active in the region. We already reserved a place for the Holiday banquet on Friday December 12, 2014. Mark your calendars early! I look forward to an eyeball contact with you all at the next General Meeting.

**73 DE AF6CF**

### OCARC 2014 DUES are DUE !!!

Don't forget to pay your OCARC dues for 2014. Still only \$20 per year! You have through end of March 2014 to pay your dues without falling in arrears. Don't miss out on the events planned by our new Board. You can send a check made out to OCARC to the club PO Box (listed above) or pay at the club meetings.

+++++

### Next Meeting

The next [General Meeting](#) of the OCARC will be held on Friday, March 21<sup>st</sup>, 2014.

Our guest speaker is Wayne Overbeck – N6NB. His topic is on:

#### **“The Tower Trailer Project”**

Wayne N6NB has built ten tower trailers and towed them all over the US. Wayne will explain how he turned a utility trailer kit into a modern tower trailer with all the bells and whistles...

The next general meeting will be on:

**Friday, March 21<sup>th</sup>, 2014  
@ 7:00 PM**

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

In This Issue:	Page
The Prez Sez .....	1
Next meeting info .....	1
CLUB INFORMATION .....	2
San Diego Convention 2014 .....	3
Orange RACES plan for B2V Race .....	4
First ISS Digital TV Transmission... ..	5
FT5ZM Amsterdam Island DXpedition .....	6-7
Heathkit of the Month .....	8-14
FT5ZM – cont'd .....	15
Scout-O-Rama .....	16
February General Mtg Minutes .....	17
Free Sun Display to good home .....	18
March Board Mtg Minutes .....	19
WANTED - “Show And Tell” .....	20
Financial Report .....	21
Field Day 2014 Planning .....	22
WARA VE Testing Info .....	23
Order DATV-Express board now .....	24

**ORANGE COUNTY  
AMATEUR RADIO CLUB**  
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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. & 4<sup>th</sup> 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  
John WA6RND, 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](mailto:kc6qls@cox.net).

Check with Ann Rios, KC6TBG at [kc6tbg@cox.net](mailto:kc6tbg@cox.net) if wish to conduct a Tech Forum.

See [www.sandarc.net/convention2014.php](http://www.sandarc.net/convention2014.php) for more details



## City of Orange COAR RACES members prepare Communications Support for Orange PD Baker-2-Vegas Running Team

by Ken W6HHC

Each spring, law-enforcement running teams (from around the world) have entered in a competitive foot-relay-race through the desert. This race, known as "Baker-to-Vegas" (and aka B2V), is a 120 mile long race, that starts outside Baker (CA), runs through the desert to Shoshone, then runs through Pahrump, NV and finishes at the Hilton Hotel in Las Vegas. The B2V race is broken into 20 "legs" or stages. This year, more than 260 different law enforcement teams will participate.

The runners of the Orange Police Department have been supported for many years with communications by hams belonging to COAR (City of Orange Amateur Radio) RACES, the OCARC members, and Communications Volunteers from Cypress. This year, the B2V event is scheduled to begin on Saturday, March 22, with runners reaching the finish line on Sunday, March 23.



**Figure 1 – Several Planning Meetings were held to review comm details and assignments**

Eight members of the OCARC are assisting Orange PD during planning and during the actual B2V race.



**Figure 2 – Kathleen K6IBH discusses details for hams who provide comm in "Follow-Vehicle"**



**Figure 3 – Ken W6HHC explains details on the Communication Plan block diagram**



**Figure 4 – A workshop for testing equipment to be used in the Pahrump Comm Center was held in W6HHC backyard**

Even though **Fig05** looks just like a convertible, it is testing all the same radio equipment that will be used in the Follow-Vehicle van.



**Figure 05 – Equipment for the Follow-Vehicle is tested during a "dry run" exercise**

## First Digital-ATV transmissions from International Space Station

by Ken W6HHC

As Graham G3VZV explained to members of the British Amateur Television Club (BATC) Forum in May of 2013... *"Almost a decade ago someone came up with a madcap scheme for putting an ATV transmitter on the International Space Station to supplement the various amateur radio voice and data rigs that it carries. Then the reality of a link budget for ATV using FM on 2.4GHz was pointed out to him and the thought of having a lot of 3 metre dishes tracking the ISS as it goes across the sky at up to 1 degree per second hit him and he dropped the idea.*

*Since then we have had the advent of Digital-ATV and the link budget becomes possible - at least for 1 or 1.2metre dishes. Amazingly it has proven possible to get agreement to have such a transmitter delivered to the ISS and this is planned to take place within the next couple of months."*

The DATV project for ISS, known as HamTV, became a step closer to reality in August 2013 when the equipment was delivered on board the ISS via the Japanese HTV-4 cargo vessel. The OCARC August 2013 RF newsletter, explains that the main mission of HamTV is to perform contacts between the astronauts on the ISS and school students, not only by voice, but also by unidirectional video from the ISS to ground.

Commissioning of the HamTV equipment began on board ISS on March 07 2014. Then on March 08, the first video transmissions were received on earth. BATC has figured out how to tie the community of hams around the world together, using the BATC streaming server. The BATC video-server can provide live streaming video to hams anywhere...as well as storing videos for playback when you have time (same concept as YouTube). Piero IØKPT reported that the first ham DATV transmissions (using the OR4ISS call sign) as part of the commissioning process that were received by the Matera tracking station in Italy could be seen on BATC streaming server and also be seen on YouTube at <https://www.youtube.com/watch?v=qC2dVLOQpt8>

A second video clip is on YouTube from the Casale Monferrato tracking station in Italy at [https://www.youtube.com/watch?v=Xkodq\\_2TshI](https://www.youtube.com/watch?v=Xkodq_2TshI)



Video screen-capture of first DATV transmissions received in Italy from HamTV on board ISS

WOW....watch the video...I think this is super-cool for hams. These HamTV videos are an inspiring testimony to what hams can do when working together.

Finally, find the current location of the International Space Station on <http://ISS.AstroViewer.net>



## THE 2014 FT5ZM AMSTERDAM ISLAND DXPEDITION – a most memorable experience by Arnie N6HC

On January 14, 2014 a team of 14 very experienced DXpeditioners departed Fremantle, Western Australia on the RV Braveheart for a nine day 1900 nautical mile passage to Amsterdam Island in the southern Indian Ocean. The team consisted of ten North Americans, one South American and three Europeans. The countries represented were the United States (New Jersey, Ohio, Georgia, Illinois, Minnesota, California), Canada, Martinique, Colombia, Norway, Russia and Tajikistan.

We planned to activate Amsterdam Island for the first time since 1998. The island ranked in the top five of most wanted entities for DXCC. Ralph Fedor, K0IR, had spent over two years organizing this trip to make it one of the most successful DXpeditions in recent *memory*. We planned to activate Amsterdam Island for the first time since 1998. The island ranked in the top five of most wanted entities for DXCC. Ralph Fedor, K0IR, had spent over two years organizing this trip to make it one of the most successful DXpeditions in recent memory.

The Northern Corridor Radio Group consisting of members from Perth and the surrounding areas proved to be an invaluable resource to the project. They provided transportation from the airport, hosted two BBQs and loaned us multiple aluminum tower sections for our Yagi antennas.



**Fig 1 – Ready and waiting in Australia.**



**Figure 2 – Arnie N6HC at post. Operators are standing by!**



**Fig 3 – Antonelli, little shack on the hill.**

The crew of five plus our ship Captain, Matt Jolly, worked tirelessly to ready the boat for our journey. It quickly became clear that our team was really twenty strong as the crew was completely committed to making our endeavor a successful one.

They did a lot of the heavy lifting and made sure that we were comfortable and safe for our passage. The Indian Ocean was not so thoughtful and made our journey somewhat uncomfortable for several days. We passed the time operating maritime mobile as VK6FZM, read books, did crossword and Sudoku puzzles, watched DVDs and clung tightly to our bunks during heavy seas. We came to know each other very well over those nine days.

We arrived at the island on January 23, 2014 and the following day began transferring our equipment to the island by Zodiac. The French inhabitants were extremely helpful with this task and efficiently allocated the offloaded equipment to the appropriate station sites using a fork-lift, tractor and trailer. We didn't know what to expect from the twenty resident islanders but our trepidation was quickly allayed. We saw nothing but smiles and a can-do attitude that made it clear that our team had grown again this time to forty strong. After a brief orientation, we split up into two radio teams and went to our respective work sites...either the lower Mataf site about 76 feet above sea level and a half mile from the Martin de Vivies base or the upper Antonelli site about 650 feet above sea level with a two mile hike from the base and uphill through very rough terrain. It took us a couple of days to assemble the antennas and stations, erect the antennas, establish generator power and network our computers.



Fig 4 - Mataf site with Braveheart anchored nearby

At both sites we used three element monoband Yagis on 10, 12, 15, 17 and 20 meters, single element vertical antennas for 30, 40 and 80 meters and an EY8MM "special" 160

Continued on Page 15...



**Heathkit® of the Month #54:**  
*by Bob Eckweiler, AF6C*



**AMATEUR RADIO EQUIPMENT**  
**The Heathkit® HM-102**  
**RF Wattmeter.**

**Introduction:**

Back in January 2012 (HOM #37) the line of Heathkit HF SWR bridges was covered. These devices are handy to monitor and adjust antennas for proper operation, but only give a relative indication of the power a transmitter or amplifier is outputting. The reason for this is the frequency sensitivity of the Monimatch-style pickup used to sample the forward and reflected RF energy. Since the sensitivity control has to be adjusted for each band (or even band segment) the meter cannot be accurately calibrated in RF power.

Some SWR meters, such as the Osker SWR-200, come with a sensitivity control with a 0-100 graduated dial and a separate calibration table so the sensitivity can be set and the power read on the meter. Since an expensive Bird wattmeter is specified at 5% accuracy it is reasonable to assume the Osker meter is probably 10% to 20% accurate at best; still this is not bad for the price.

By utilizing RF pickups featuring ferrite transformers, frequency dependence can be reduced to the point that the meter can read power at a



**Fig 1: Heathkit HM-102 HF RF Power Meter.**  
**The HM-2102 Meter for VHF is Similar.**

reasonable accuracy over a moderate span of frequencies. Such meters became readily available in the late sixties, and Heathkit produced the HM-102 “RF Power Meter” that replaced the HM-15 SWR meter in the very early seventies.

**Heathkit Line of RF Wattmeters:**

From 1970, until it closed its doors, Heathkit made a variety of both HF and VHF stand-alone wattmeters. They also featured RF wattmeters in their SB-634 amateur radio console. The later units featured a peak monitoring capability for reading PEP power and required power either from a battery or external power source. Table I lists the units and their features. Table II lists the prices over their years of pro-

Part #	Began	Ended	Frequency MHz	Power Watts	Notes
HM-102	1970	1981	HF: 1.8 - 30	200 / 2K / SWR	
HM-2102	1973	1981	VHF: 50 - 160	25 / 250 / SWR	
HM-2103	1973	1976	HF	200 / 1K	w/Dummy Load
HM-2140	1979	1983	HF: 1.8 - 30	200 / 2K Fwd. (Peak read)	Dual Meter: 50 / 500 / SWR Ref.
HM-2141	1979	1983	VHF: 50 - 175	30 / 300 Fwd. (Peak read)	Dual Meter: 10 / 100 / SWR Ref.
HM-9	1983	1991	HF <u>or</u> 6M <u>or</u> 2M	5 / 50 / SWR	Band chosen during assembly
HM-2140A	1984	1991	HF: 1.8 - 30	200 / 2K Fwd. (Peak read)	HM-2140 w/ new brown paint scheme

**TABLE I: Heathkit RF Wattmeters**



Part #	Price	Catalog	Price	Catalog	Price	Catalog	Price	Catalog
HM-102	\$29.95	Xmas 1973	\$34.95	Winter 1976	\$37.95	Spring 1977	\$49.95	Fall -1980
HM-2102	\$29.95	Xmas 1973	\$34.95	Winter 1976	\$37.95	Spring 1977	\$49.95	Xmas 1981
HM-2103	\$59.95	Winter 1973	\$59.95	Winter 1976	-	-	-	-
HM-2140	\$79.95	Fall 1980	\$89.95	Xmas 1981	\$94.95	Spr/Sum 1982	\$89.95	Winter 1983
HM-2141	\$79.95	Fall 1980	\$89.95	Xmas 1981	\$94.95	Spr/Sum 1982	\$94.95	Winter 1983
HM-9	\$49.95	Xmas 1983	\$39.95	Fall 1985	\$59.95	Xmas 1989	\$49.95	Winter 1991
HM-2140A	\$99.95	Fall 1985	\$129.95	Fall 1989	\$129.95	Winter 1990	\$99.95	Winter 1991
<b>TABLE II: Heathkit RF Wattmeter Pricing</b>								

duction from my factory catalog collection. Often a kit was reduced for a short period on special. At times the price would be listed like: *\$99.95 was \$129.95 in [the previous] catalog.*

### **Heathkit HM-102 (HF) RF Power Meter:**

The HM-102 is shown in Figure 1. It is a small self-powered unit measuring 5-1/4 W x 5-1/16 H x 6-1/2 D and weighing 2-1/2 pounds. The HM-102 paint scheme is the green and gray motif of the original SB amateur line as are the knobs and panel lettering, making it a match for use with any of the early SB transmitter receiver pairs or transceivers up to the SB-104.



**Fig 2: HM-102 Rear View. The sensor chassis may be removed for remote operation**

The impedance sensor module, designed for 50Ω, can be removed from the back of the cabinet and located externally closer to the antenna feedline. An approximately six-foot, permanently wired, cable connects the sensor with the cabinet. Room is provided within the cabinet to stow the wire should you wish to leave the sensor module installed in the case.

The HM-102 has two power ranges that measure 200 watts and 2,000 watts full scale. It also measures SWR on a scale that goes from 1:1 to 3:1.

The front panel has two controls as well as a large, but unlit, meter. The left control is a three-position rotary switch marked **SWR, 2000, 200** that selects the SWR mode or one of two full-scale RF power levels. The second control is a potentiometer with a switch that is activated by pulling out on the knob. This control is marked **PULL TO SET - SWR SENSitivity**.

The rear panel (Figure 2) is part of the removable sensor module. It has two SO-239 UHF connectors marked **INPUT** and **OUTPUT** and a slide switch marked **CALibrate - NORMAl**. There are also two holes allowing access to two adjustments inside on the circuit board. These are marked with their schematic parts nomenclature **C-4** and **R-6**. A piece of insulated cardboard covers the holes between calibration periods. There is a space below the sensor module when it is installed in the cabinet. This space is for stowing the cable connecting the module with the cabinet circuitry.

**HM-102 Assembly:**

Assembly of the HM-102 is divided into four sections: Circuit board assembly; Remote chassis assembly, Cabinet assembly and Cabinet wiring. This encompasses nine pages in the manual.

Most of the RF components mount on the single printed circuit board (PCB). This is stuffed first with fixed resistors, capacitors and the three 1N295 diodes (germanium 40V 50 ma). Next the pre-wound toroid coil is mounted using an eyelet that fits through the toroid center hole and is soldered to the foil side of the PCB. Later the lead between the input and output coax connectors will pass through this eyelet and the center of the toroid. Finally three controls are soldered to the circuit board; they are the CAL - NORM slide switch **S1**, the **SWR NULL** variable capacitor **C4** and the **POWER CALIBRATE** trimpot **R6**. Once the board is completed the five-wire cable is attached to the board. A ferrite bead is placed on each lead before it is soldered to the board.

Remote chassis assembly involves mounting the SO-239 coax connectors and metal stand-offs to hold the circuit board, mounting the circuit board and some simple wiring between the two coax connectors on the remote chassis. The five-wire cable is then passed through a hole in

the remote chassis cover, a Heyco strain relief is attached and the cover is assembled to the remote chassis.

Cabinet assembly starts with the mounting of feet and a solder lug, followed by the front panel controls and meter. The other end of the five-wire cable from the remote sensor chassis assembly is attached to the cabinet using a cable clamp.

The cabinet wiring involves wiring up the five-wire cable, the controls and the meter. Three 0.001  $\mu$ f and one 0.005  $\mu$ f bypass capacitors are also installed, completing the total assembly.

**HM-102 Calibration:**

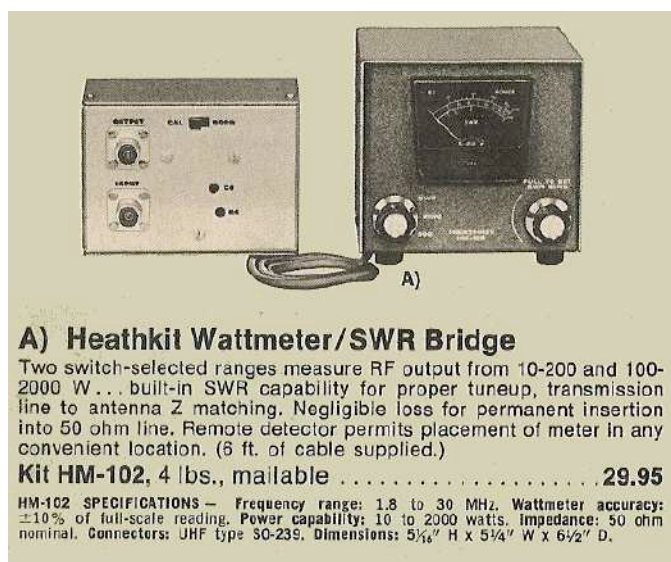
Calibration consists of first setting the mechanical zero adjust on the meter. Next RF is applied through the wattmeter to an accurate 50 $\Omega$  dummy load. The SWR NULL trimmer capacitor, C-4, is then adjusted with a non-metallic screwdriver for minimum reflected power on the meter, increasing SENSitivity and power as needed. A perfect null is the ideal outcome.

Next the power circuit is calibrated. The HM-102 includes some internal circuitry to produce a frequency dependent calibration standard valid on the 40 meter band. When the sensor switch is set in the CAL position, the wattmeter reads accurately. However this is only valid on 40-meters. If your radio transmits on 40 meters it is a simple matter to apply a reasonable power into the meter, note the setting with the switch in the CAL position, move the switch to the NORM position and adjust the power calibrate trimpot for the identical meter reading. This holds for all bands. Heathkit also offers another way to calibrate the meter if a 40-meter transmitter is not available. It requires an RF voltmeter or a VTVM with an RF probe.

**HM-102 Circuit Description:**

The HM-102 circuit is straight forward, but it may seem more complex due to the way the schematic (Figure 6) is drawn.

Components C7, C8, D1, R5 and C9 make up an RF voltmeter. These components look like



**Fig. 3: Christmas 1973 Catalog Ad for the Heathkit HM-102.**

they are connected to other components but those are all grounds. The output of this RF voltmeter goes to pin 1 of the CALibrate switch S1. On 40 meters this circuit produces about 7 volts DC when 100 watts is present on the wire passing through L1. The meter, which I assume to be 100  $\mu$ A full-scale, is scaled by R5 to read full scale with 9V at the cathode of D1 with the meter in the CAL position and 200 watts selected. Seven volts corresponds to 100 watts on the non-linear scale of the meter assuming 9 volts is full scale. This circuit is just used for a calibration source and plays no purpose during day-to-day operation of the power meter.

The SWR and power circuit consists of L1, C12, C4, C1, C13, R7, and R2. The additional components for detecting reflected power are D2, C2, R1 and C3. The additional components for detecting forward power are D3, C5, R4 and C6. L1 inductively picks up energy from the flowing RF. It is reasonably frequency independent; but the addition of R2 across the coil reduces the Q of L1 further making it frequency independent across the HF bands.

C12, C4 along with C1 and C13 provide a small voltage to the center tap of L1. This voltage corrects for capacitive anomalies in L1. It is in phase with one winding and out of phase with the other. With no SWR (reflected power) on the line, C4 can be adjusted to null out the voltage appearing on the left half of L1. Each side of L1 is rectified by a diode (D2 and D3) filtered by a capacitor (C2 and C5) and decoupled by an RC network (R1, C3 and R4, C6). The result is that forward power produces a relative voltage on terminal B and any reflected power produces a relative voltage on terminal C. These voltages are relatively frequency independent unlike those in the earlier SWR bridges.

Both of these voltages are fed to the SWR meter section, where they are selected by the pull out switch on the sensitivity pot, but the forward voltage is also fed through the POWER CALIBRATE trimpot (R6) on the circuit board to R8

which scales the voltage to read correctly on the meter when in the 200 watt position. In the 2000 watt position an additional resistor, R9 is placed between the meter and R8 further scaling the meter to respond to a full scale of 2000 watts.

The cabinet circuitry is rather straightforward. In the SWR position, when the SENSitivity control is pulled out the forward power is connected through the control to the meter and when the control is pushed in the reflected power is connected. In the 200 position the 200 watt output from the sensor (Pin F) is connected to the meter and in the 2000 position the 2000 watt output from the sensor (Pin G) is connected to the meter. C15 thru C18 bypass any stray RF to ground.

### HM-102 Operation:

Operation of the HM-102 is simple. It is connected in the transmission line where you want to measure RF power. This is usually in the feed line to your antenna or dummy load. Once installed the power can be read on the meter. In the 2000 position the meter is read on the top scale (2 KW FS) and in the 200 position the meter is read on the middle scale (200 W FS).

To measure SWR the switch is placed in the SWR position and with an RF carrier the SENSitivity control is pulled out and adjusted for a full-scale reading. The control is then carefully pushed in so as not to change the pot setting and the SWR is read on the bottom scale.

### Heathkit HM-2102 (VHF) RF Power Meter:

In 1973, a few years after Heathkit introduced the HM-102 it introduced the HM-2102, a VHF version. Physically it is identical in size and weight to the HF model. It differs in power capability, having full-scale ranges of 25 and 250 watts. These ranges are more practical to the average VHF operator than the higher ranges. The SWR capability remains, and, like the HM-102 it is designed for 50 $\Omega$  feedline. UHF connectors are used and the sensor module may also be placed remotely to the main cabinet.



The circuit of the HM-2102 VHF wattmeter is the same as the HM-102 HF unit with the obvious exception of the component values. The ferrite inductor, and the scaling resistors and capacitors have been selected for the higher frequency range and the lower power measuring levels. A few bypass capacitors, not needed at the VHF range, are also absent.

#### **Heathkit HM-2103 (HF) Dummy Load:**

The HM-2103 is a 1KW air-cooled dummy load with a built-in power meter. This is more a test bench instrument than an amateur accessory. The HM-2103 was short lived appearing in 1973 and vanishing in early 1976.

The circuit for the power meter part of the dummy load is identical to the HM-102 with the exception of the forward SWR output which is not needed. Neither is the reflected SWR output except when nulling the bridge. Thus it is connected to the meter in the **LAMP TEST** position of the function switch and used during the calibration procedure. The power circuit varies only in the scaling resistor used for 1 KW instead of 2 KW. The 200 watt scaling resistor remains the same.

The dummy load section uses a fixed 50Ω carbon resistor element rated for 175 watts continuous, 500 watts for 5 minutes and 1,000 watts for 2.5 minutes. A power dissipation rating curve is included in the manual for other

powers. An over-temperature sensor lights a lamp to warn of excessive dissipation. The lamp is powered by a standard 9-volt battery (NEDA 1604). A **LAMP TEST** position on the function switch allows testing the lamp and battery. The only function of the battery is to operate the lamp during an over-temperature condition.

#### **Heathkit HM-2140 & HM-2141 RF Wattmeters:**

In 1979 Heathkit improved its HF and VHF power meters adding peak reading capability. The result was the HM-2140 power meter for HF and the HM-2141 power meters for VHF. These meters are physically identical with each other measuring 7-1/8 W x 4-1/8 H x 6-1/8 D and weigh 4 pounds. Each has two separate meters on the front panel. One indicates forward RF power and the other reflected power. The meters also can measure average power.

When using the PEP feature a source of power is required; however the regular readings will function without power. Power may be provided by an internal 9-volt battery (NEDA 1604) or an external 9-volt DC source such as the recommended PS-2350 AC Adapter. Also, the GRA-43-1 adapter was mentioned in the early manuals. This AC adapter was part of the GR-43 Zenith-clone radio Heathkit sold. These meters remained on the market until 1983 when the HM-2141 VHF meter was dropped and the HM-2140 meter was replaced by the HM-2140A meter.

#### **Heathkit HM-2140A RF Wattmeter:**

With the color scheme change from the green and gray SB series of amateur gear to the brown color scheme of the later amateur gear, Heathkit updated the HM-2140 to the HM-2140A which for all practical purposes is the same device in new clothes. Some small circuit changes may have been made, but the schematics appear identical.

Perhaps a more in-depth article on the HM-2140, HM-2140A and HM-2141 meters are in order in a future HOM article.



**Figure 4 Heathkit HM-2141 Dual Meter VHF Wattmeter. The HM-2140 HF model is similar. The HM-2140A sports a brown motif to match the later Heathkit ham gear; otherwise it is unchanged.**

*Photo courtesy of Allen Wooten - WD4EUI*



**Fig. 5: Heathkit HM-9 QRP Wattmeter**  
 Be aware that the HM-9 could be wired for one of three bands: HF, 6-Mtrs or 2-Mtrs.  
*Photo courtesy of - KC8RP*

#### Heathkit HM-9 RF Power Meter:

In the early 1980s Heathkit was producing a series of QRP amateur transceivers, the HW-7, 7A, 8 and HW-9, which are still popular today. By the time Heathkit got to the HW-9 they decided to also manufacture a QRP RF power meter. Thus the HM-9 power meter came into existence.

To enhance sales of the HM-9, Heathkit designed it to be not just an HF QRP meter but also a VHF meter. In truth the kit contains the components to assemble the meter to cover either the HF band (1.8 - 30 MHz), the six-meter band (50 - 54 MHz) or the two-meter band (144 - 148 MHz). When completed the meter works only on the chosen frequency range. Full scales of 5 watts and 50 watts can be front panel selected as can the SWR mode.

The HM-9 uses the same basic circuit as the HM-102 and other power meters. The RF transformer, eight of the capacitors and four of the resistors are selected among different supplied values depending upon which range you choose the meter to be wired for.

#### **Conclusion:**

I've used the HM-102 and found it agrees with my Bird wattmeter within a few percent on the

bands I operate. The meter is most accurate when feeding a 50 ohm resistive load. Of course it matches the style of the SB-301/401 pair that was my main radio, built in the late sixties, and became a spare for my newer used TS-440SAT, bought from club member Kei Yamachika - W6NGO (SK). Recently an ICOM IC-7600 became my newest radio.

#### **Acknowledgements:**

Over the years of writing these articles, I've met some great fellow Heathkit aficionados who have helped me make these article possible. Four I'd really like to thank at this time are: **Allen Wooten WD4EUI** who contributed the HM-2141 photo and others previously ([http://wd4eui.com/Amateur\\_Radio.html](http://wd4eui.com/Amateur_Radio.html)). **Richard Pestinger - KC8RP** (<http://www.pestingers.net/heathkit.htm>) who provided the HM-9 photo. Former club member **Jim Tripp - WA6DIJ** who moved about the time that I joined and continues to send me great Heathkit tidbits (<http://www.antiqueradiomuseum.org/>). And finally, but very importantly, **Dave Somes - WB6TFC** who sent me a few pounds of Heathkit manuals that I have been going through and will be using to feature upcoming articles.

Also I'd like to acknowledge my good friend **Mark Bender - KD6NOT**, for passing along an HM-102 to me; with a manual no less! I had been meaning to do an article on it and its relatives for a while, but life kept stepping in the way with higher priorities - the reason the *Heathkit of the Month* has been missing on and off for the past half-a-year.

73, from AF6C

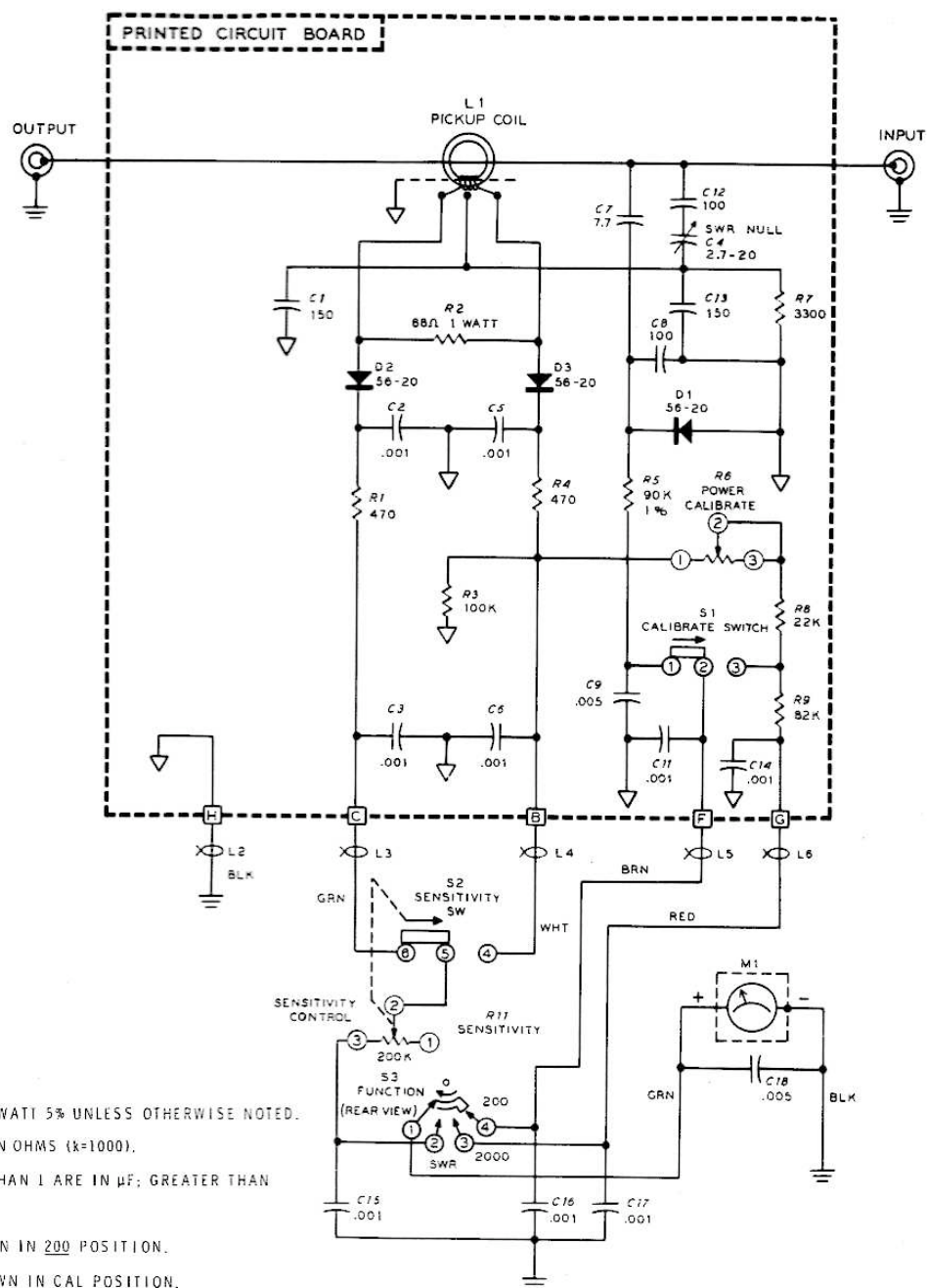


*This article is Copyright 2014 R. Eckweiler and The OCARC Inc.*

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

*Thanks - AF6C*

**Figure 6: Heathkit HM-102  
Schematic**



**NOTES:**

1. ALL RESISTORS ARE 1/2 WATT 5% UNLESS OTHERWISE NOTED. RESISTOR VALUES ARE IN OHMS (K=1000).
2. ALL CAPACITORS LESS THAN 1 ARE IN  $\mu$ F; GREATER THAN 1 ARE IN pF.
3. FUNCTION SWITCH SHOWN IN 200 POSITION.
4. CALIBRATE SWITCH SHOWN IN CAL POSITION.
5. SENSITIVITY SWITCH SHOWN PUSHED IN.
6. THIS SYMBOL INDICATES CIRCUIT BOARD COMMON.
7. THIS SYMBOL INDICATES CHASSIS GROUND.
8. THIS SYMBOL INDICATES AN EXTERNAL CONNECTION TO THE CIRCUIT BOARD.
9. THIS SYMBOL INDICATES A FERRITE BEAD.

**SCHEMATIC OF THE  
HEATHKIT®**

**RF POWER METER  
MODEL HM-102**



Continued from Page 7

meter top loaded vertical only at the Antonelli site. The Yagis were rotated manually by the "Armstrong" method. The transceivers were Elecraft K3s driving either OM Power OM-2000 or Elecraft KPA-500 amplifiers. Several of the transceivers had auxiliary Elecraft pa-nadapters. The interfaces were by W3YY, the band pass filters were individual ICE models in the shack and 4O3A high power models at the tower base. We used N1MM logging software and the MMTTY engine for radio teletype. There were three 6000 watt generators at each site and the Braveheart crew maintained the generators throughout the operation.

Corporate sponsorship was generous and without their support this operation would have been impossible. FT5ZM hit the airwaves on January 26, 2014 to humongous pile-ups. Those pile-ups never abated. When we closed the operation on February 12, 2014 the pile-ups were still humongous. In spite of meticulous planning, several obstacles were encountered. The terrain between Antonelli and Mataf made networking of both sites problematic. Some of the computer power supplies were RF noisy, making it difficult to operate on some bands. After one week of operation, we found that our 40 and 80 meter operation from Mataf was interfering with the geomagnetic monitoring that the resident scientists were carrying out; we had to shut down 40 and 80 meter operation from Mataf. During the day, we were serenaded by the island seals and their calves who clamored for their next meal. There were thousands of seals that called Amsterdam Island their home. At night they came out of the ocean to nestle in the thick clumps of grass which were interspersed with large lava rocks. They had no fear of humans and, if approached, could become very aggressive. Our French host required us to agree not to travel at dark from our operating shacks. It was dangerous at Mataf because we might find a family of seals in the brush around our towers; seal bites can be very nasty. It was dangerous at Antonelli because the two mile hike to base was over uneven and perilous terrain. The only way to abide with this constraint was to have 12 or 24 hour shifts. There were three bunk beds at each site so it was possible to catch a quick nap if one was necessary. Small "kitchens" were set up at each site so a meal could be enjoyed if anyone needed a snack or drink.

We were treated royally at Martin de Vivies base. We were housed in a dormitory with two to a room. We had flush toilets, warm showers and comfortable bunk beds. We had use of the local laundry facilities and internet, although our connection rate was painfully slow and we had to use French keyboards! The biggest surprise was the gourmet food that we enjoyed. Breakfast was from 6:30 AM to 9:00 AM and was continental with a choice of fruit, fruit juices, hot chocolate, coffee or tea, cold cereal and warm baguettes with butter, margarine or jam. Lunch and dinner were a different matter altogether. We were treated to fresh fish, lobster, sausage, beef or chicken, salads, vegetables, rice, French fries (frites), pasta and delicious sauces to dress up the already yummy feast. Dessert consisted of various choices of cheeses, cakes and pastries and even ice cream sundaes with chocolate and whipped cream toppings. With each meal there was a choice of beverage which included French wine. No one suffered malnutrition on Amsterdam Island! There was also a small bar which served soft drinks, beer, wine and various liquors. No one suffered from thirst on Amsterdam Island, either! It was not unusual for the team to give Francis, the chef, a round of applause in appreciation of his delicious creations. Our radio team was integrated into the French team at the Skua restaurant. We each performed at least once as "petit Marie" helping "grande Marie" clean the restaurant floor once daily and set and bus the tables for lunch and dinner.

The eight K3 transceivers hummed for seventeen days churning out 170,000 QSOs. The breakdown by continent was 50% Europe, 25% North America, 22% Asia, and 3% Africa/South America and Oceania. The statistics by mode were 95,000 CW, 63,000 SSB and 12,000 RTTY. Our most productive bands were 10 meters (30,834), followed closely by 15 meters (28,237) and 20 meters (27,816). We worked DXCC on every band except 80 meters (96) and 160 meters (85). There were over 36,000 unique calls in the log.

Unfortunately, we had to cease operation one day earlier than scheduled due to an approaching unfavorable weather front causing rough surf. Heavy seas would make it impossible to load the RV Braveheart. With a heavy hearts, we departed the island and waved goodbye to our friends at the pier. The nine day transit back to Fremantle blessed us with six days of calm weather and only three more days of tossing and rolling.

We were all glad to finally place our feet on solid ground on February 22. With our sea legs still under us and the ground "moving," we were graciously treated to another BBQ by the Northern Corridor Radio Group at their club station. The following evening our radio team started leaving the continent down under.

We will fondly remember the generosity of our Australian hosts, the graciousness of our French hosts and the comradeship of the Braveheart crew. We gratefully thank our support team who helped at every step of the DXpedition. Lastly, we will never forget our radio team mates and what we accomplished together on this DXpedition. We hope you made it into the log and that you enjoyed our adventure as much as we did.

DXpedition web site: <http://www.amsterdamDX.org>

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## OCARC Demonstrating Amateur Radio Booth at the Scout-O-Rama May 10



Mark your calendars for **Saturday, May 10, 2013** from **9 a.m. – 4 p.m.** at Oak Canyon Regional Park (5305 Santiago Canyon Drive, Silverado). Scout-O-Rama is the annual trade show of Scouting in Orange County that is attended by over 25,000 people. Thanks to generous donations by 2 of our members, our club will be given the opportunity to showcase Amateur Radio to Scouts and their families. We think this is a good demographic.

**VOLUNTEERS ARE NEEDED** to staff the booth. It is likely we will be charged \$10 admission per family, plus \$5 parking. Please contact Tim Goeppinger N6GP at [N6GP@w6ze.org](mailto:N6GP@w6ze.org) if you would like to help.

## OCARC

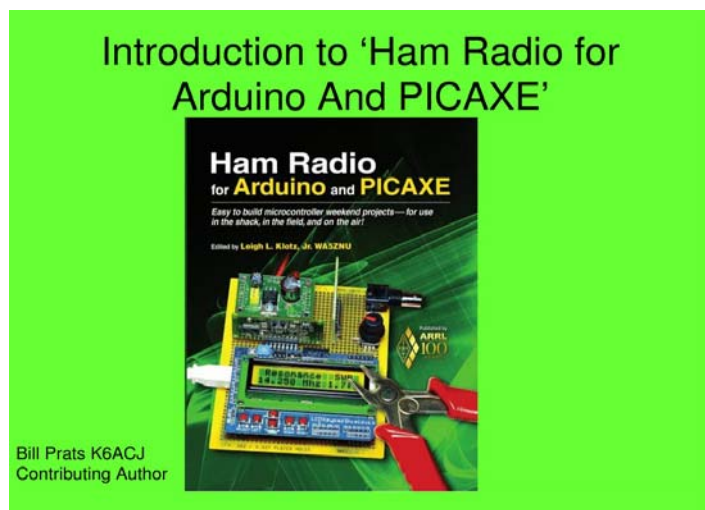
## GENERAL MEETING MINUTES

2014-02-21

The OCARC General Meeting was held at the Red Cross Complex on February 21<sup>st</sup> 2014. The meeting was called to order at 7:02 pm, 3:02 UTC. There were 38 people, including 6 visitors, in attendance. As we usually do, we started the meeting with the U.S. Pledge of Allegiance. Next we went around the table introducing ourselves. There was a quick announcement from Sam Goda – W6JRA about his retirement from Ham Radio and his plans to sell various equipment over the weekend.

## PROGRAM

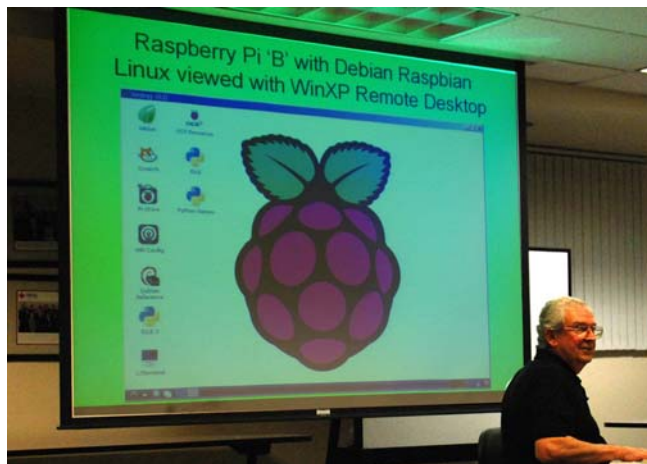
Our main speaker for the evening was Bill Prats – K6ACJ. Bill is a longtime ham and also wrote several chapters in the ARRL book "Ham Radio for Arduino and Picaxe". Bill is also involved in robotics and the Maker Faire movement. Bill's presentation was on using the Arduino, Picaxe and Raspberry Pi for Ham Radio projects.



**Fig 1 – Bill K6ACJ presented a number of ham projects possible with microprocessors**

Two of Bill's projects are featured in the HRAP book. One is a solar tracker that moves a solar panel so that it is aimed optimally throughout the day and the other is a CW beacon for a DXpedition in the Amazon. He explained that both are fairly simple weekend projects that utilize the simplest of the three devices – the Picaxe.

A Picaxe unit can range in price from \$2-8, while the Arduino ranges from \$25-30 and the Pi from \$35-40. Of course whatever additional functions and components are added to the project will add to the cost.



**Fig 2 – Bill talked about the new more powerful Raspberry-Pi board for ham projects.**

Bill took a little time to tell us about some of the other organizations he is involved with, such as: Robotics Society of Southern California at

<http://rssc.org/>

Urban Workshop – such as the one in Irvine -

<http://www.meetup.com/Urban-Workshop-The-ultimate-DIY-and-Makers-workshop/>

Orange County Mini Maker Faire -

<http://ocminimakerfaire.wordpress.com/>

One of the other interesting uses that Bill featured is a Picaxe remote controlled antenna tuner attached to a Mag Loop Antenna. It was amazing to see what could be done with a small programmable cpu unit attached to a few components. Bill said that what can be done is really up to your imagination.

## Business:

After a short break the meeting was reconvened. A quorum of officers was present as follows:

Nicholas – AF6CF, Tim – N6GP, Ken – W6HHC, Tim – KJ6NGF, Doug – W6FKX, Robbie – KB6CJZ, Paul – W6GMU, Bob – AF6C.

**President - Report** – Attended the OCCARO February meeting. OCCARO discussed disbanding since the major function of organizing the "Ham Radio booth at Orange County Fair" has not been happening the last few years due to the Fair Board's emphasis on for-profit booths.



OCCARO resolved to continue to meet once a year each February with the options of more meetings to be called if the fair booth or another project is decided upon. Their board also decided to stop collecting dues from the member clubs at this time since they have excess money in the account compared to expenses. Separately, Nicholas was surprised to find out that while several of our club members are on the OCCARO board, we did not have anyone formally representing our club at their meetings. Also, while other clubs had paid dues for the last 2 years, our club's payment of dues (\$20 per year) went uncollected.

**President – Report** - Nicholas also informed us that he visited the Quartzfest in Arizona but found it not to his liking and quickly left after one day.

**Vice President – Report** – Next month we will hear from Wayne Overbeck on Tower Trailers and at our April meeting we will have Dennis Kidder – W6DQ.

**Treasurer** – Stated that we started out the year with about \$5,000 in our bank account. Also, mentioned that we received back our Christmas dinner deposit from Jagerhaus where we have had the party the last 8 years. This year's dinner will instead be located at Marie Callender's in Anaheim Hills on December 12.

**Activities** – Paul is taking final orders for club coffee cups that evening.

#### **Announcements:**

2014 ARRL Southwestern Division Convention is Sept 12-14 in San Diego.  
<http://www.sandarc.net/Convention2014/index.html>

Meeting adjourned at 9:00pm, 5:00 UTC.

Respectfully submitted by:

Tim Millard, KJ6NGF, Secretary 2014.



### **FOR FREE TO A GOOD HOME !**

I have a Sun Sony Trinitron Flat-Screen 19" CRT Monitor looking for a good home.

This monitor was built by Sony for a high quality Sun Systems Work Station \$\$

Sun Part # X7135A

Sony Part # CPD-4410

I got this monitor from Dan - N6PEQ, and used it with an old Mac IIsi, which I no longer use. It has worked flawlessly and has a very good image. I'm trying to clean up so it has to go.

Call or email me for pickup.

Bob, AF6C

## OCARC BOARD MEETING MINUTES

### 2014-03-08

#### **OCARC Board Meeting Minutes for: March 8, 2014**

The OCARC Board meeting was held at the World Famous JägerHaus Restaurant, 2525 East Ball Road, Anaheim, and called to order by President Nicholas Haban AF6CF on Saturday, March 8, 2014 at 8:15 am. All directors present except Paul – W6GMU. Club members Tom – KJ6UFJ and Steve – N1AB were also in attendance.

#### **DIRECTOR REPORTS**

**Pres** – no formal report.

**Treas** –Ken - W6HHC for first two months of year deposits were about \$1000 ahead of outflows. Ken will not be at the next general meeting so Greg – W6ATB will fill in that evening.

**Secr** – Tim - KJ6NGF presented three renewal payments and an HRO invoice to our Treasurer.

**Member**- Doug – W6FKX will be unable to attend the next two General meetings due to school field trips. Someone needs to monitor the 2 meter frequency during the meeting to let any late parties in the door.

**Publicity** – Robbie – KB6CJZ club flyer copies are at HRO. It was suggested that flyers could also be taken to Ford Electronics.

VP and also the Director at Large – have been enjoying the conditions on 10 meter.

**No other Directors reports presented.**

#### **Old Business:**

- 1.) **Newsletter Editors:** Apr AF6C; May W6GMU; June W6ATB; Doug W6FKX.
- 2.) **General Meeting Entertainment,** Mar - Wayne Overbeck – N6NB on tower trailers, Apr – Dennis Kidder – W6DQ.
- 3.) **Field Day 2014**– Document has been drafted based on interview with Bob – AA6PW. Copies of the draft were sent to Nicholas – AF6CF and Tim – N6GP.
- 4.) **Field Day Site, etc.** –site at Walter Knott School is being secured with school district placing the event on their Board calendar for approval.
- 5.) **OCARC Coffee Mug orders** – no status update since Paul – W6GMU is not at meeting.
- 6.) **2014 Christmas Banquet discussion** –December 12, 2014 at Marie Callender's in Anaheim. Cost per person will be less than \$30.
- 7.) **OCARC at the Scout O Rama** – Tim – N6GP requested that a check for \$250 be provided to pay the booth cost. These funds were provided as previously agreed based on donations from Dan – N6PEQ and Nicholas – AF6CF covering the full amount. It was agreed that Tim would order copies of the ARRL Scouting brochure for distribution at the event. Also, Tim will acquire a stamping pad to add our club info onto the brochures.
- 8.) **Property Donation to OCARC** – as discussed at last Board meeting the ability of the club to own and operate a remote station in Anza, California is not in the realm of our present ability to pay for.
- 9.) **Email Policy** – Bob AF6C presented a written version of our club policy regarding the establishment and usage of a "club website" email for forwarding emails, normally setup as callsign@w6ze.org. Board approved adopting policy as drafted. Bob will post policy on website.

- 10.) Appointment of new Director at Large** – the president recommended Tom – KJ6UFJ for this position, he accepted and the board approved by vote.

### New Business

- 1.) Show and Tell meeting** – Nicholas – AF6CF suggested that we consider having a meeting with a number of short topics where members could present a brief 10 minute talk on a ham radio project they are working on. May meeting is likely to be scheduled for this event.
- 2.) ARRL Special Services club status** – Bob – AF6C will handle renewing our status.
- 3.) Letter to ARRL** – at January General meeting a motion was passed to contact ARRL headquarters regarding ARRL pursuing a cost/benefit analysis that can be used for Congressional lobbying and publicity showing the many financial benefits that the US receives from its granting of frequency privileges to Amateurs. Since that time ARRL has passed their own motion regarding the whole matter so there is no reason for our club to write a letter as voted on in our meeting, however, the board did decide to send a letter to ARRL headquarters congratulating them on their action. Tim – N6GP sent a draft letter to board members this last week. Based on comments received he is making changes and will submit an update soon.

### Good of the Club

Tim – KJ6NGF asked for suggestions for helping a ham who is now in a retirement home sell off old gear. Several suggestions were made and will be forwarded to the individual who is currently in possession of the equipment to see what they would like to do.

Adjourned at 9:24 am

Respectfully submitted by:

Tim Millard KJ6NGF, Secretary 2014.



### 10 Minute “Show And Tell” Presentations Wanted for May 16 Meeting

Our meeting on May 16 will be an interesting talk of 6 or 7 mini-talks by our own members. Do you have an electronic project or antenna that you would like to show off? Do you have something that you are excited about that you would like to share with us in 10 minutes or less? If you do, please contact our VP Tim Goeppinger at [N6GP@w6ze.org](mailto:N6GP@w6ze.org) or at 714-730-0395



**OCARC Cash Flow - Year To Date**

1/1/2014 through 2/28/2014

2/28/2014

Page 1

Category	1/1/2014- 2/28/2014
<b>INFLOWS</b>	
ARRL Membership Income	39.00
Badge Income	9.00
Coffee Mug Sales	60.00
Donations - FD	5.00
Donations - FD Food	1.00
Donations - Scoutarama	250.00
Dues, Family	150.00
Dues, Membership	620.00
Opportunity Drawing -Monthly	228.00
Radio Sales Receipt	100.00
Reservation Deposit Refund	200.00
<b>TOTAL INFLOWS</b>	<b>1,662.00</b>
<b>OUTFLOWS</b>	
ARRL Membership Expense	37.00
Brochure Printing Expense	105.84
Opportunity Drawing - Monthly	407.14
<b>TOTAL OUTFLOWS</b>	<b>549.98</b>
<b>OVERALL TOTAL</b>	<b>1,112.02</b>



# Field Day 2014

**Save the Date - June 28 and 29<sup>th</sup>**

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

**Thanks to the efforts of George N6VNI, the  
OCARC Field Day will again be at the Walter  
Knott Education Center in Buena Park.**

**Our next planning meeting will follow the  
General Meeting at the Red Cross on March  
21<sup>st</sup>.**

**Co-chairmen are Nick AF6CF and Tim N6GP**



# Western Amateur Radio Association

## NOW OFFERING AMATEUR RADIO VE TESTING SESSIONS

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

Phone Numbers: Home Phone 562 691 7898 Cell Phone 562 544 7373

Email: [jac2247@gmail.com](mailto:jac2247@gmail.com) Or [N6VNI@arrl.net](mailto:N6VNI@arrl.net)

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, Mar 20<sup>th</sup> 2014 6p.m.

Thursday, Aug 21<sup>st</sup> 2014 6p.m.

Thursday, Apr 17<sup>th</sup> 2014 6p.m.

Thursday, Sep 18<sup>th</sup> 2014 6p.m.

Thursday, May 15<sup>th</sup> 2014 6p.m.

Thursday, Oct 16<sup>th</sup> 2014 6p.m.

Thursday, Jun 19<sup>th</sup> 2014 6p.m.

Thursday, Nov 20<sup>th</sup> 2014 6p.m.

Thursday, Jul 17<sup>th</sup> 2014 6p.m.

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### 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!

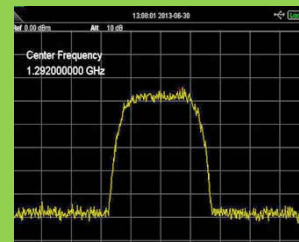




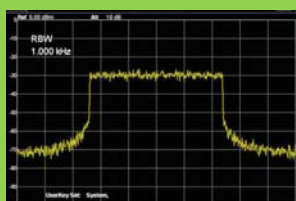
## Digital Amateur TeleVision Exciter/Transmitter

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](http://www.DATV-Express.com)

register on the web site  
 to be able to see  
 the PURCHASE page

