



RF



ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LIX NO. 02

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

February 2018

The Prez Sez.....

by Tim N6GP



First of all, I wish to thank Dan Violette, K16X for filling in for me at our January meeting. Everyone said that he did a terrific job. I had a good, safe trip to Sonora for a family wedding, baptism and birthday party.

Winter Field Day was a success! Thanks go to Activities Director Ron W6WG for getting the site, and for his leadership in the event. Thanks also to everyone who showed up. We had a great turnout this year, enough to keep 3 stations going. We actually entered in the 4 transmitter category in order to have one VHF station chase multipliers. Winter Field Day is all about operating in the worst of weather and circumstances, and we had some of that. In the early morning on Sunday the Santa Ana Winds kicked up and broke one of our EZ-ups. At 11:30 PM some very powerful sprinklers turned on about 5 feet from one of our tents. Due to some

quick thinking, there was no damage to our rigs or equipment.

As reported here last month, there is a crisis on the governance and transparency of the ARRL. Thankfully, the lobbying by the "My ARRL Voice" group prior to the ARRL Board meeting did have an impact. First, the ARRL CEO Tom Gallagher NY2RF has resigned, and a search for a new CEO has begun. Secondly, the onerous proposals to amend the League's bylaws at the Board meeting were withdrawn or tabled. Both of these items are baby steps in the right direction, but there is a long way to go to turn things around. I think the era when ARRL members did not know or care about what goes on in Newington is over. From now on, it will take a lot of vigilance to make sure they stay on the straight and narrow path.

If you didn't hear, the Bouvet Island DXpedition made it to the island, but were unable to helicopter in due to wind and rough seas. One of the 2 engines on the ship failed, and the Captain declared the expedition to be over, and they started limping back to Chile on 1 engine. Just one day into their return trip, they changed course, and are now heading northeast to port in Cape Town, South Africa. We pray for a safe return trip for them. We need to give these brave men, including our own Arnie Shatz N6HC, our sincerest gratitude when they return. They gave it a good try, and safety is always first.

Tim Goeppinger N6GP
President

Next General Meeting

The February 2017 OCARC General Meeting program will be:

Joe Moell, KØOV

"Transmitter Hunting for the Whole Family!"

Joe, K0OV, will tell us about the fun of radio direction finding (RDF) and the many variations such as mobile T-hunting, radio-orienteeing, and foxoring, (Come find out what "foxoring" is all about.)

The next General Meeting will be on:

**Friday, February 16, 2018
@ 7:00 PM**

ENTER from the WEST SIDE entrance of the
Red Cross Building, Room 208
Take elevator to the 2nd Floor. See you
there!

In This Issue:

	Page
The Prez Sez	1
Club Information	2
WINTER FIELD DAY.....	3-5
OCARC Dues Are Due	6
Radioactivity	7
Heathkit of the Month	8-15
Visiting with Bodo DF8DX ...	16-18
Board Meeting Minutes	19-21
Upcoming Events	21
General Meeting Minutes	22-23
COAR RACES plans for B2V	24
Financials	24



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Submit articles:

editors@w6ze.org

Monthly Events:

General Meeting:

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

Club Breakfast (Board Mtg):

Normally First Saturday of month at 8am
Marie Callender's Restaurant
1821 North Grand Ave
Santa Ana, CA
(Between 17th & Santa Clara)

Club Nets (Listen for W6ZE):

28.375 ± MHz SSB
Wed- 7:30 PM - 8:30 PM
Bob AF6C, Net Control
Alt: Corey, KE6YHX, Net Control

146.55 MHz Simplex FM
Wed- 8:30 PM - 9:30 PM
Corey, KE6YHX, Net Control

7.086 ± MHz CW **OCWN**
Sun- 9:00 AM – 10 AM
Ann K6OIO, Net Control



Club Dues for 2018:

Regular Members renewals* - - - \$30
Family renewal/Join** - - - - - \$45
New Member Join Jan-Feb*** - - \$30
Replacement Badge**** - - - - - \$ 3

* Member renewals Jan-Dec.

** Two members or more, w/badge.

*** New members Jan-Mar, w/badge.

**** There is a \$1.50 charge if you'd like to have your badge mailed to you.

Winter Field Day 2018

by: Ron W6WG

This year's Winter Field Day was the third using the W6ZE club call. A recap of our participation in WFD 2016 and WFD 2017 will put this year's effort in perspective.

In 2016 the OCARC contingency was a total of four, three members, Doug K6PGH, Tim N6GP, myself W6FPS and one past member, Jim Brown KI6WJ, who just happen to be in Southern California and staying in the same campground at Prado Regional Park. Doug K6PGH brought his trailer next to which we put up his popup shelter. I erected my telescopic mast with a Hexbeam at 30'. A 40-meter dipole was also supported from the mast. Doug and I worked 15, 20 & 40 meters SSB with moderate success. Tim N6GP dropped by to work 2m, 6 m, 220 MHz and 400 MHz.

Remember back in 2016 we were in the middle of a drought. As luck would have it, it started to rain Saturday night with a forecast of heavier rain on Sunday morning. Being typical SoCal outdoorsmen, we packed it up when we felt the first raindrops. Our first WFD netted us 122 contacts, 9 multipliers and 2000 bonus points for a total of 3098 points. **(See the February 2016 edition of the "RF" for photos and more details.)**

Again in 2017, WFD found us at the Prado campground. Due to high winds Doug was delayed on his return from Quartzfest and didn't make WDF. The W6ZE team was now down to two, Tim N6GP and I W6FPS. The station setup was in a small tent and the antennas used were the same as the year before except for two addition antennas. I brought an 80m dipole and Tim his 160m dipole. Later Saturday night the two dipoles were hoisted up the mast with good results. The extremely high winds of Friday night died down and we enjoyed pleasant weather the remainder of

the weekend. Our second WFD netted us 124 contacts, 10 multipliers and 4500 bonus points for a total of 8,480 points. With the help of the 80m and 160m CW contacts and an additional 2500 bonus points we had a 174% increase in our score from the previous year. **(See the February 2017 edition of the "RF" for photos and more details.)**

For WFD 2018, Tim N6GP suggested we find a site closer to the center of Orange County so we could draw more members and increase the level of club participation. With that in mind I toured Orange County via Google Earth. I finally settled on a site in Huntington Beach about a half of a mile from my QTH. The site was a school that had been closed and later turned into the Ocean View School Districts office.



Some of the antennas and shelters.

After I was giving permission (my daughter-in-law works at the district office) to use the site I began in earnest to find participants. I put together an email list of those on the board and those who showed even the slightest interest in WFD. With a couple of postings in the RF and more than a few emails with "Equipment and Personal" spreadsheets the team was organized. Everything was done either by email or over the phone.

The Winter Field Day weekend weather was forecasted to be in the middle 70's on Saturday and the low 80's on Sunday, my kind of winter.



Really can have a conversation around the generator!

There are no outside power outlets at the site and since we were going to run on alternate power (bonus points) I picked up a Honda 3KW generator Friday afternoon which was very quiet and filled our needs. Saturday morning began early and by the 11:00 am start time we had three shelters up along with antennas for 160, 80, 40, 20, 15 and 6 meters. W6ZE had three positions operating shortly after 11:00. Two years before the bands were quiet and required endless CQing or time-consuming search and pouncing to produce contacts. To appreciate how WFD has become more popular in the last two years you should have been in the 20m tent from 11:00 am till the band closed that evening. It was non-stop QSOs just like that other FD they have in the summer. I could go on and on, but I'll give you the numbers and you can decide; 674 QSOs, 17 band/mode multipliers, 3 satellite contacts, 81 ARRL Sections, 56 state/provinces, 7 DX entities. Our operating class was 4Oscar, four operating positions and Outdoors (non-

insulated shelter). With our 6000 bonus points our total score was 33,336 points. That's a 293 % increase over 2017 and a 976% increase over 2016. We also out did 2016 and 2017 by having both rain (field sprinklers turning on at 11:30 Saturday night) and wind (two overturned shelters on a windy Sunday morning). I think we can call WFD 2018 a success on two fronts, first our score and second the comradery of the team.



Hoist the main sheet, mates!

I would like to thank Bob AF6C, Clem W0MEC, Doug K6PGH, Bryan K6AJY, Greg W6ATB, Jim AF6N, Rodger AI6WV, Tim N6GP, Tom W6ETC, Jeff KK6TRC, and Vijay KM6IZO for coming out and getting it done. Also, we had two fine guest operators who gave use many, many contacts, Tom KA9FRH and Endaf N6UTC whose satellite contacts gave us 1500 bonus points!!! And a thank you again to Doug K6PGH (Go Eagles) for setting up "Doug's Bistro", great coffee!

FYI, Winter Field Day 2019 is on January 26 & 27, 2019, save the date and I'm making a list.

73, Ron W6WG

More Pictures from Winter Field Day



Working phone and working it fine!



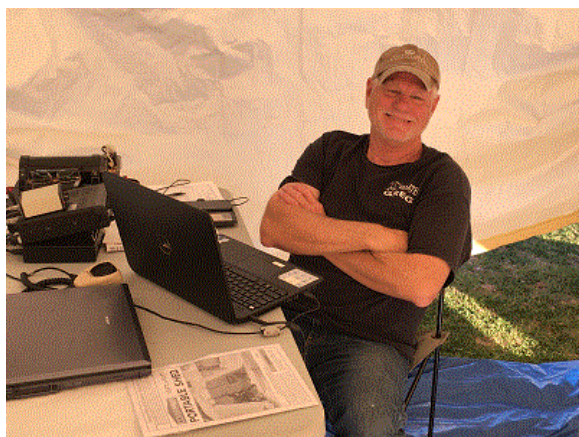
It's quite a nice day here in Huntington Beach!



I do believe we have the hang of it!



Gimme shelter!



I could work digital all day!



HAVE YOU PAID
YOUR 2018 DUES?
CLICK-HERE
DUES ARE DUE



To renew your OCARC Dues go to:
<http://www.w6ze.org/clubdues.html>

Radio Activity

February 2018

Upcoming Activities:

FEBRUARY

- ****North American Sprint / CW:** 0000 UTC through 0400 Sunday Feb. 4
- ***CQ WW WPX / RTTY** 0000 UTC Saturday Feb. 9 through 2359 UTC Sunday Feb. 10
- **Fists Winter Unlimited Sprint:** CW: 1700 UTC Sat. Feb 10 through 2100 UTC Sat. Feb 10
- ***ARRL International DX Contest:** CW: 0000 UTC Sat. Feb 17 through 2359 UTC Sunday Feb. 18
- ***CQ WW 160 Meter SSB:** 2200 UTC Friday Feb. 23 through 2200 UTC Sunday February 25
- **North American QSO Party/RTTY:** 1800 UTC Sat. Feb 24 through 0559 UTC Sunday Feb. 25
- *** Indicates club entries are accepted**
- **** Indicates team entries are accepted**
- **Note:** When submitting logs for ARRL Contests indicate your club affiliation as "Orange County ARC"

MARCH

- ***ARRL International DX Contest:** Phone: 0000 UTC Saturday March 3 through 2359 UTC Sunday March 4.
- ***CQ WW WPX / SSB:** 0000 UTC Saturday Feb. 24 through 2200 UTC Sunday January 25
- ****North American Sprint / RTTY:** 0000 UTC Sunday March 11 through 0400 UTC Sunday March 11

Continuing Activity:

- **ARRL International Grid Chase**
January 1, 2018 through December 2018

Repeating Activities:

- **Phone Fry** Every Tuesday night at 0230Z to 0300Z
- **SKCC** Weekend Sprintathon (Straight Key CW) on the first weekend of the month after the 6TH of the month. 1200 Sat. to 2359Z Sunday.
- **SKCC** Sprint (Straight Key CW) 0000Z to 0200Z on the 4th Tuesday night (USA) of the month.

Send an email to *Ron W6WG*, w6wg@w6ze.org to have your favorite activity or your recent Radio-Activity listed in next month's column.

Heathkit of the Month #82:
by Bob Eckweiler, AF6C

Heathkit

ELECTRONIC TEST EQUIPMENT

Heathkit FMO-1

FM TEST OSCILLATOR

Introduction:

When the switch-over to digital television occurred on June 12th 2009 a lot of Heathkit test equipment designed to service CRT televisions became obsolete. Included are various alignment generators, CRT rejuvenators, etc. They suddenly became of value only to collectors, owners of old TVs and those using one of the FCC mandated converter boxes with an old TV. However, the new large screen LCD TVs, that offer energy savings and higher resolution, quickly became popular and most of the older CRT TVs have found their way to the electronic recyclers.

Discussions about other uses for the obsolete Heathkit TV test instruments, without extensive modifications, were held on some of the Heathkit group sites without any useful ideas arising so far.

One piece of equipment that survived is the Heathkit FMO-1 FM Test Oscillator which is useful for aligning FM radios more than TVs.

The FMO-1 FM Test Oscillator:

The FMO-1 FM Test Oscillator (Figure 1) provides all the necessary audio, IF and RF signals needed to align a monaural FM tuner or radio that uses the almost universal 10.7 MHz IF frequency. This includes signals for alignment of discriminators, ratio detectors and other FM demodulators.

The FMO-1 was first offered in the fall of 1959. It appeared in the November issue of Electronics World and was marked "price to



Figure 1: Heathkit FMO-1 FM Test Oscillator

be announced" (See Figure 2). In the March 1960 Catalog supplement the price was listed at \$34.95. The FMO-1 continued production into 1967. It is offered in the 1967 catalog (810/67A), and still at the original \$34.95 price, but was not shown in the 1968 catalog. By that time most current FM tuners were stereo and Heathkit was offering the IG-112 FM Stereo Generator, which provides the features of the FMO-1 and the necessary signals to align the FM multiplex circuits in stereo FM tuners and radios as well.

Specifications for the FMO-1 are shown in Table I. Only the 10.0 and 10.7 oscillator signals are crystal controlled. All the other oscillator signals use inductors to determine frequency and do not have crystal accuracy.

Output Frequencies:

R.F. Alignment: 90 mc(Switch selected)
100 mc
107 mc
Modulation: 400-cycle (Incidental FM)

I.F. & Detector Alignment: 10.7 mc sweep
Sweep (Variable): 200 kc to > 1 mc
Markers: 10.7 mc (crystal)
100 kc submarkers
Modulation 400-cycle AM

Other: 10.0 mc (crystal)
100 kc
400-cycle audio

Tube Complement: 2 -6U8 dual section
(Triode / Pentode)

Power requirements: 105 - 125 VAC 60~ 12 watts

Size (inches): 7-3/8 H x 4-3/4 W x 4-3/8 D

Net Weight: 5 lbs.

Table I: Heathkit FMO-1 Specifications

However both crystal oscillators are designed to be rich in harmonics so they may be used to calibrate the RF alignment oscillators in-situ.

The FMO-1 Operation:

The FMO-1 FM Test Oscillator actually consists of three separate oscillator circuits and an output amplifier.

The first oscillator circuit has four functions that are switch selected by a large knob on the front panel. The first function is a 10.7 mc. sweep oscillator, and the other three functions are fixed VHF oscillators at frequencies of 90, 100 and 107 mc., these are frequencies near the lower end, middle and upper end of the 88 to 108 mc FM broadcast band.

The second oscillator circuit has two frequencies that are also switch selected. In certain switch positions the first function acts

as a 400 cycle audio oscillator that is used as a modulation signal for the RF oscillators when modulated RF is desired. The second function is as a 100 KC oscillator that is used as a marker with the sweep oscillator. When using the sweep oscillator the markers appear at 10.6 and 10.8 mc. (and, if the sweep width is set wide enough, also at 10.5 and 10.9 mc.)

The third oscillator circuit is a crystal controlled oscillator with two crystals that may be switch selected. These oscillators are designed to be rich in harmonics up through

Front panel controls are located in five rows:**Top row (Centered):**

1. (Large knob unnamed) 5-position rotary switch
OFF, 10.7 MC SWEEP, 90 MC 100 MC 107 MC

Second row (L to R):

1. **MODULATION** - 5-position rotary switch:
OFF, 400~ MOD, 400~ OUT, 100 KC MOD, 100KC OUT
LEVEL: - Potentiometer - no markings
Control - concentric with switch:
2. **MARKER OSCILLATOR** - 3-position rotary switch:
OFF, 10.0 MC, 10.7 MC
LEVEL: - Potentiometer - no other pot markings
Control - concentric with switch:

Third row (Centerd):

1. Neon pilot lamp - no markings

Fourth row: (L to R):

1. **SWEEP WIDTH** - Potentiometer w/switch
A.C. OFF (Full CCW) no other pot markings.
2. **RF - AF Output** - two pos. slide switch
3. **OUTPUT** - Potentiometer
MAX. (Full CW) no other pot markings.

Fifth row (Centered):

1. Amphenol Series 75 single button contact connector:
75-PC1M (chassis receptacle)
(Mates with 75-MC1F cable plug)
Output (unmarked)

Table II: FMO-1 Front Panel Controls

New Test Equipment



HEATHKIT FMO-1 Price to be announced

AN INSTRUMENT LONG-AWAITED BY SERVICE TECHNICIANS EVERYWHERE!

HEATHKIT FM TEST OSCILLATOR KIT (FMO-1)

Here in one compact, easy-to-use instrument are provided all the test signals and sweep frequencies required for fast, easy alignment and troubleshooting of RF, IF and detector sections of FM tuners and receivers. An instrument unique in the test equipment field ... being the only one of its type designed especially for FM service work.

SPECIFICATIONS—Output frequencies: for RF alignment, 90 mc (FM band low end), 100 mc (FM band middle range), 107 mc (FM band high end). **Modulation:** 400 cycle incidental FM. **IF and detector alignment:** 10.7 mc sweep. **Sweep width markers:** 100 kc to over 1 mc, variable, 10.7 mc (crystal), 100 kc sub-markers. **Modulation:** 400 cycle AM. **For other applications:** 10.0 mc (crystal) and harmonics, 100 kc, 400 cycle audio. **Controls:** main frequency selector, modulation switch/concentric level control, marker oscillator switch/concentric level control, sweep width—power switch, output control, AF:RF (source impedance) switch. **Power supply:** transformer, selenium rectifier. **Power requirements:** 105-125 V, 50/60 cycles, 12 watts. **Cabinet size:** 7½" H, x 4½" W, x 4½" D.

FIGURE 2: Heathkit FMO-1 Ad From November 1959 *Electronics World Magazine*

the FM broadcast band. The first crystal is at 10.7 mc. which is used as a precision marker for the center frequency of the sweep oscillator and is also used to calibrate the 107 mc oscillator. The second crystal is at 10.0 mc which provides a precision signal for calibration of the 90 and 100 mc. oscillators.

Calibration of the 10.7 mc. IF of a standard FM receiver by the FMO-1 requires use of the 10.7 mc. sweep oscillator and an oscilloscope (preferably one that has a line frequency sweep as most older Heathkit scopes do. This is because the sweep oscillator is driven at the line frequency). Depending on the detector circuit in the tuner or radio, the output the 10.7 sweep oscillator is injected into the last IF (ratio detector), or the IF stage before the limiter stage (discriminator detector). The scope is connected



Fig. 3: 10.7 MC IF alignment scope pattern.

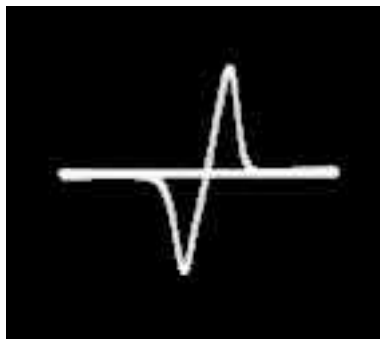


Fig. 4: FM Detector alignment waveform.

across the negative end of the load resistor (ratio detector), or grid resistor of limiter circuit (discriminator detector). The 10.7 mc. marker is added to the sweep oscillator and the IF transformer between the test oscillator and scope is adjusted for a symmetrical waveform of highest amplitude with the marker in the center of the peak

(Figure 3 shows a typical waveform). The 100 kc. markers can be turned on to produce pips at 10.6 and 10.8 mc. for further symmetry adjustment. The 10.7 mc. marker signal level must be increased to beat with the 100 kc. signal to get the pips and this adds some distortion to the waveform. The level needs to be adjusted to the point where the pips are barely visible to decrease this distortion.

The FMO-1 test oscillator is then moved one stage backwards

towards the antenna and the procedure is repeated. It is important to have the sweep and marker signals at as low a level as gives a good trace on the oscilloscope. This is continued until all the IF stages are aligned.

After aligning the IF, the detector stage is aligned. The 10.7 mc. sweep signal is applied to the first or preferably the second IF, which will give a cleaner trace. The scope is connected to the high end of the volume pot. The detector transformer primary is then adjusted for the largest length of the line crossing the baseline (see figure 4). Next, the 400 cps modulation is turned on which causes the baseline to "wiggle". The detector transformer secondary is then adjusted to minimize this wiggle. The 100 kc. markers can again be turned on. They should appear symmetrically on the 'S' shaped curve near the peaks.

Finally the RF section of the FM tuner or radio is calibrated. The scope is reconnected to the point used for IF alignment, and the FMO-1 output is connected to the antenna leads using a dummy antenna (a 150Ω resistor in series with each leg of the FMO-1 output cable). The FMO-1 oscillator is set to 107 mc. with 400 cps modulation, and the local oscillator trimmer on the unit being calibrated is adjusted until a clean sine wave appears on the scope. The RF amplifier trimmer is then adjusted for maximum level. The FMO-1 is then set to 90 mc. and the local oscillator slug is adjusted for a clean sine wave. The RF amplifier slug is then adjusted for maximum level. This procedure is repeated until no further adjustment is required to correct the frequency or increase the gain.

This simplified version of the alignment procedure gives a good overview. The Heathkit FMO-1 manual goes into a lot of added detail and should be consulted before attempting an alignment.

V1A 6U8 Triode:

10.7 MC Sweep Oscillator
Very High Frequency Oscillator (90, 100, 107 MC)

V1B 6U8 Pentode:

400 CPS Modulation Oscillator
100 KC Sub-marker Oscillator

V2A 6U8 Triode:

Cathode Follower Output Amplifier

V2B 6U8 Pentode:

Crystal Marker Oscillator (10.0 MC, 10.7 MC)

Table III: Heathkit FMO-1 Tube Functions

The FMO-1 FM Test Oscillator Circuitry:

FMO-1 consists of a series of oscillators. These are the Sweep Oscillator, the Very High Frequency (VHF) Oscillator, the 400 cps Modulation Oscillator, the 100 kc. Sub-Marker Oscillator, and Crystal Marker Oscillator. There is also a cathode follower output stage to provide a low and high impedance output signal (switch selected). This is all done with two 6U8 dual-section (triode and pentode) tubes. Table 3 shows the tube lineup and their functions. Two of the tube sections perform two oscillator functions, so not all signals are available at all times; however, the way they are arranged, there should be no reason to need to do so.

Simplified schematics of each circuit is presented as part of their discussion. These schematics are from the Heathkit manual with added notations. Note that none of the extensive switching is shown. The schematics represent the circuit as it is when selected. The full schematic may be found at:

<http://www.w6ze.org/Heathkit/Sch/FMO-1-Sch.jpg>

The 10.7 MC Sweep Oscillator (V1A):

A triode Hartley circuit is used for the sweep oscillator (see fig. 5A). Part of the capacitance for the resonant circuit is the diode.

The effective capacitance of a diode that is back-biased depends on the applied voltage. This voltage is derived from the filament supply and causes the oscillator frequency to change at a 60 cycle rate around the 10.7 mc. center frequency. During the negative half of the 60 cycle the voltage is coupled to the grid through C13 turning off the oscillator and effectively flat-lining the return trace. The level of the applied AC voltage determines the width of the sweep frequency and is adjustable by the **SWEEP WIDTH** control. R2 provides a DC return path for the diode bias voltage.

Very High Frequency (VHF) Oscillator (V1A): The VHF oscillator uses the same tube section as the sweep oscillator, V1A. When one of the three VHF frequencies (90, 100, 107 mc.) are selected, V1A operates as a Colpitts oscillator with either L2, L3 or L4 switched in depending on the desired frequency (see Fig. 5B).

This oscillator may be modulated if desired. The modulation signal is coupled to the plate of the tube. The resulting audio voltage causes the oscillator to vary slightly in frequency resulting in incidental FM modulation. Modulation at either 400 cps or 100 kc may be selected.

Many of the components of the sweep oscillator are also used in the VHF oscillator circuit. These include: R12, C2, C16, C17, and C35.

400 CPS Modulation Oscillator (V1B):

An electron coupled Hartley oscillator produces a nominal 400-cycle audio signal used to modulate the sweep and HF oscillators (see Fig. 5C). This oscillator uses the pentode section of V1 (the suppressor grid is not shown). A center tapped audio choke, which along with C22, form an LC circuit that determines the frequency. Feedback to sustain

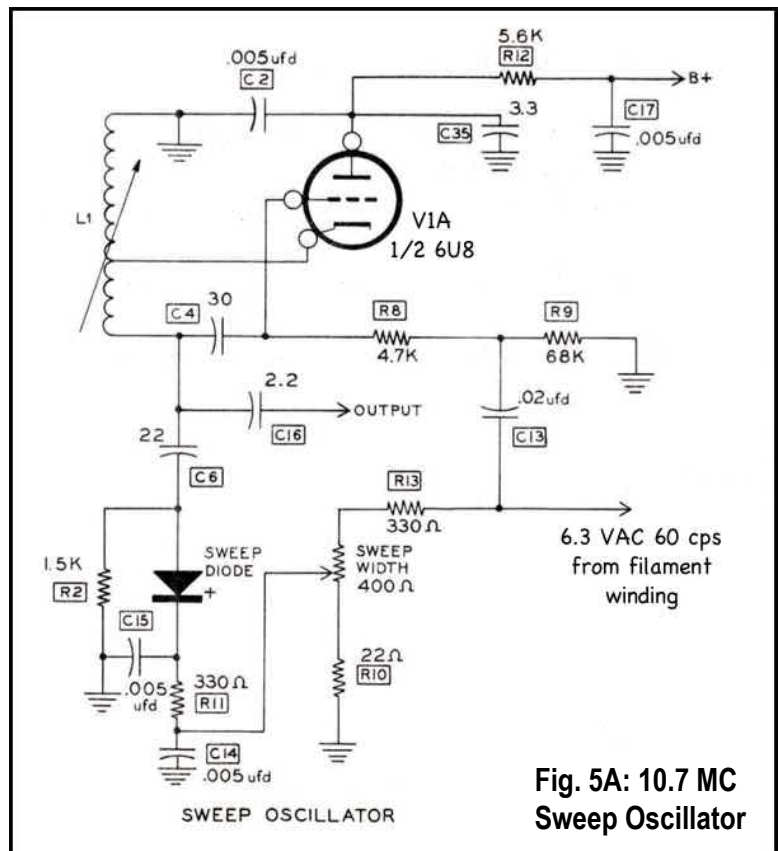


Fig. 5A: 10.7 MC Sweep Oscillator

oscillation is from the screen grid, and the signal is taken from the plate; this “electron coupling” helps isolate the plate load from the oscillator, improving stability.

The 400 cps signal is available as an output as well as a modulation source, and can be used for troubleshooting the audio circuits of the device under test.

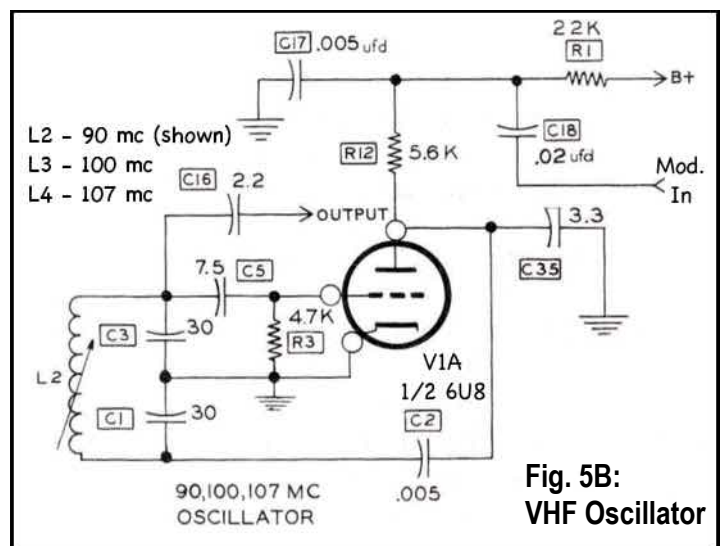


Fig. 5B: VHF Oscillator

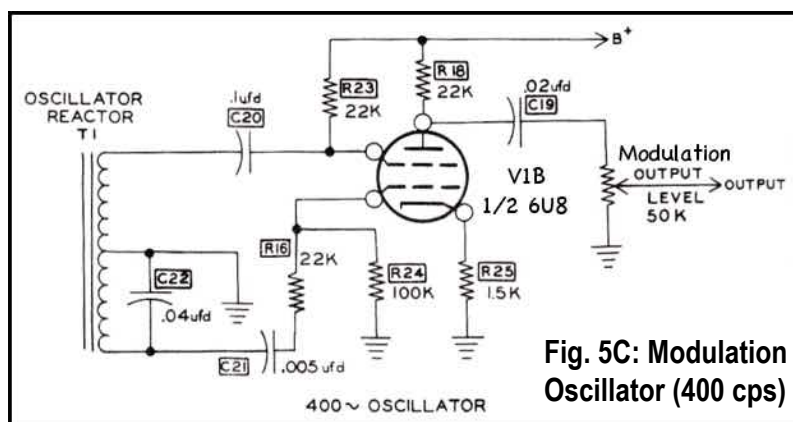


Fig. 5C: Modulation Oscillator (400 cps)

100 KC Sub-Marker Oscillator (V1B):

This oscillator utilizes the same pentode section of V1B as the 400 cps modulation oscillator. It too is an electron coupled Hartley oscillator, but uses L7 and C29 as the tank circuit to form a 100 kc oscillator in a circuit very similar to the previous oscillator (see Fig. 5D). Common components include: C19, R23 through R25, and the MODULATION LEVEL potentiometer. Since harmonic content is desirable for this oscillator, R16 is excluded, generating clipping and harmonics.

Crystal Marker Oscillator (V2B):

The pentode section of the second tube (V2B) is dedicated to the crystal marker oscillator (see Fig. 5E). An electron-coupled Pierce oscillator operates with either a 10.0 or 10.7 mc., switch-selected, crystal. The tube bias is set so the crystal will produce harmonics, as

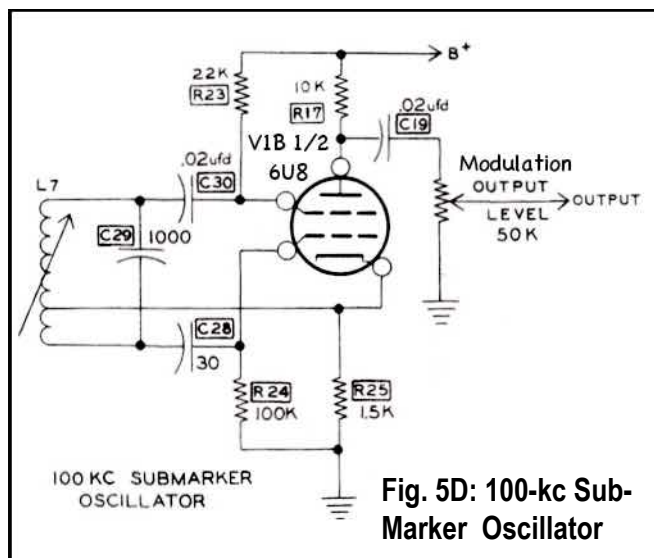


Fig. 5D: 100-kc Sub-Marker Oscillator

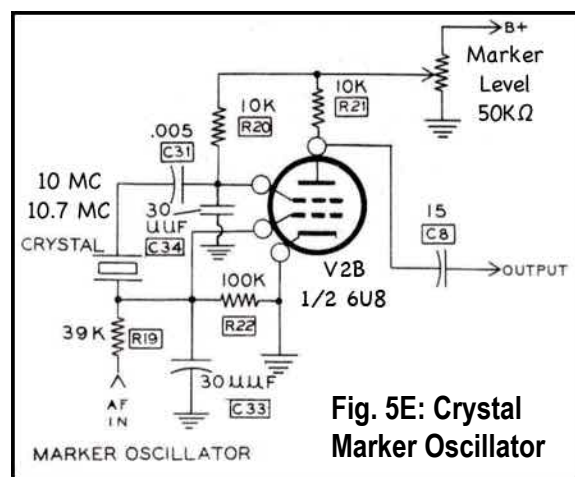


Fig. 5E: Crystal Marker Oscillator

this oscillator is also used to calibrate the 90, 100 and 107 mc. VHF oscillator frequencies.

The crystal marker oscillator can be modulated by either the 400 cps or 100 kc. modulation signal.

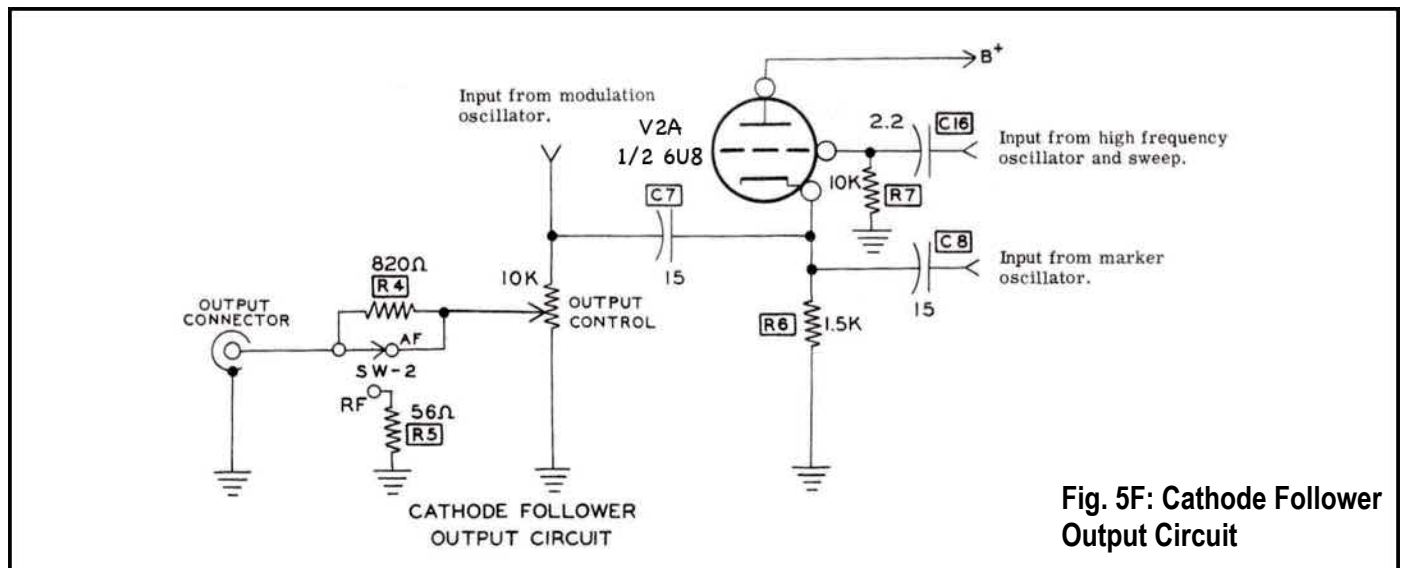
Output Circuit (V2A):

The output circuit (see Fig. 5F) is a cathode follower using the triode section of a 6U8 vacuum tube (V2A). Its input signal is either the VHF oscillator or the sweep oscillator. When using the sweep oscillator with the marker oscillator the latter signal is fed into the cathode of the follower. This prevents mixing of the two signals producing sum and difference frequencies. Instead the marker frequency appears as a pip on top of the sweep frequency marking where that frequency is located on the oscilloscope trace. When the 400 CPS modulation is output it is fed directly to the OUTPUT control, bypassing the cathode follower.

The RF - AF slide switch changes the output impedance of the FMO-1. In the RF position the output is a nominal 50 ohms. In the AF position the output is high impedance.

Power Supply:

The power supply (see Fig. 5G) uses a conventional transformer based half wave circuit. Plate B+ voltage rectification is by a low



current sealed selenium rectifier. The supply provides a nominal 107 volts DC from a simple PI RC filter. An NE-2 neon bulb, driven by the B+ and current limited by R15, is used as a pilot light.

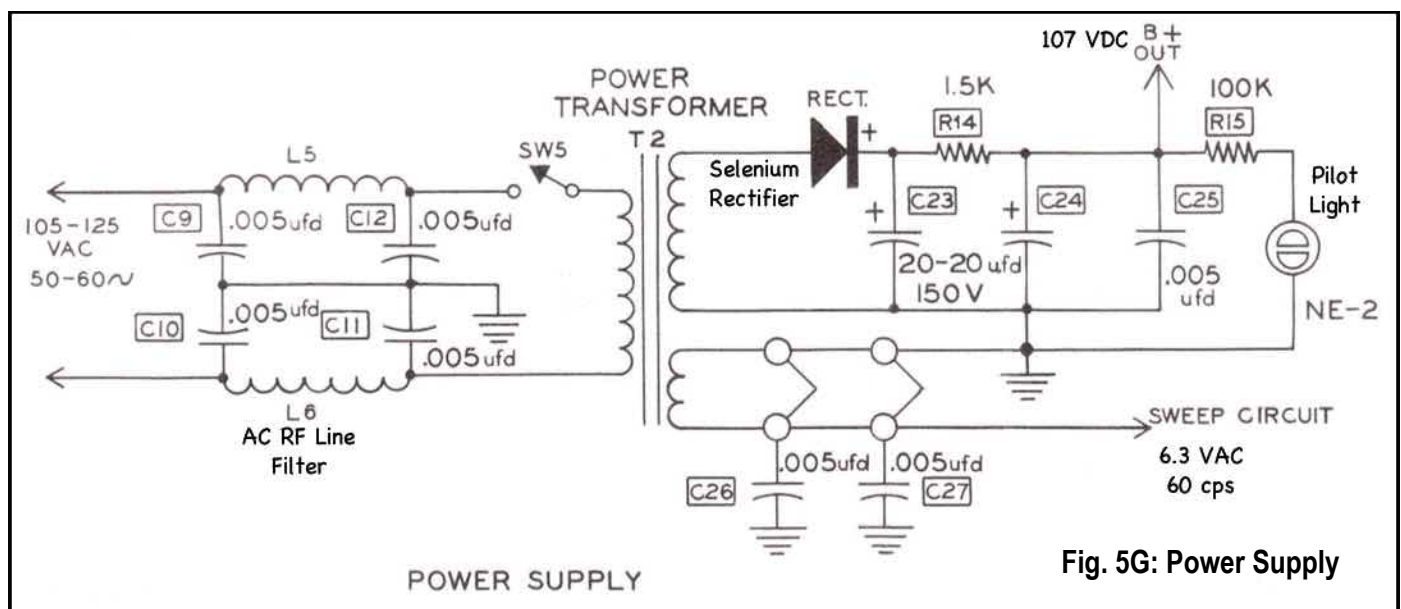
The transformer also supplies filament power to the two 6U8 tubes. The AC filament voltage is also used as the sweeping voltage and blanking signal or the 10.7 mc. sweep oscillator.

A dual PI LC filter, inline with the AC power where it enters the FMO-1, helps prevent RF

from entering or leaving the FMO-1 via the power lines.

SUMMARY:

This unit was purchased used some years back. At that time it was used to align an FM-4 Heathkit tuner. Since then it has occasionally been used as an accurate 10.7 mc. signal source around the shack. Recently it was noted that the switching, which is quite extensive throughout the unit, was noisy. This FMO-1 now sits quietly awaiting a good cleaning, recapping and calibration. New capacitors to replace those that are over 50



years old in the house, but due to low priority, the spare time to get to the job has not been found.

While good for broadband FM alignment, the sweep capability of the FMO-1 has not been tried for alignment of a narrowband FM communications device.

Other News:

Chuck Penson - WA7ZZE reports his latest book, *Heathkit Hifi and Stereo Products* has encountered a few publishing delays, but should be out in the next few months. I hope to write a review when it becomes available. Stay tuned.

At last October's OCARC radio auction I picked up a Heathkit V-6 VTVM. Upon opening it up I found serious corrosion where the battery had obviously leaked. I totally disassembled the kit, and finding the front panel and meter in good shape decided to do a complete rebuild. I was able to clean the damaged chassis parts and nickel-coat the damage. Right now I am awaiting the arrival of some parts before I start re-assembling the VTVM. Sadly I didn't take photos of the original damage, but I still plan to do an article on the restoration of the V-6. Here's a shot of the chassis, as I started reassembly.



Heathkit V-6
Restoration Project

OUTPUT SIGNALS

<u>Frequency</u>	<u>How Obtained</u>	<u>Use</u>
400 cps audio	Direct switching	Testing audio circuits, Modulation signal ³
100 kc.	Direct switching	Calibrating instruments, modulation signal, marker ³
10.0 mc. (Xtal)	Direct switching	Calibrating instruments ^{1,2,3}
10.7 mc. (Xtal)	Direct switching	Calibrating instruments ^{1,2,3} , center IF frequency, marker
10.7 mc. sweep	Direct switching	IF sweep alignment
90 mc.	Direct switching	Front-end alignment
96.3	10.7 mc. harmonic	Front-end alignment
100 mc.	Direct switching	Front-end alignment
107 mc.	Direct switching	Front-end alignment

The following may be modulated by 400 cps or 100 kc.:

- 10.0 mc. (AM)
- 10.7 mc. (AM)
- 90 mc. (AM plus incidental FM)
- 100 mc. (AM plus incidental FM)
- 107 mc. (AM plus incidental FM)

Notes:

1. Either crystal oscillator frequency may be used simultaneously with any other available frequency (the 400 cps and 100 kc. are modulating signals, rather than being mixed).
2. The output from the crystal (marker) oscillator may be mixed with the output from the VHF oscillator at the same time one of the two is being modulated with the 400 cps or 100 kc. signal.
3. The small red knobs control the output amplitude of the modulation and marker oscillators independently. The main **OUTPUT** control adjusts the level of all signals appearing at the output connector simultaneously.

Table IV: Summary of Output Signals & Modulation Capability
(Information for this Table came directly from page 45 of the Heathkit FMO-1 manual.)

Till next month...

de AF6C



An Enjoyable Visit With Bodo Fritsche, DF8DX / 5N7Q / KT3Q by Tim Goeppinger, N6GP

My first QSO with Bodo was back in 2009 during his first trip to Nigeria when he was 5N00CH. He lives and works in Switzerland, and was sent to Nigeria to work on a big project. I worked him on 4 different bands from 80 to 20 meters. His signal was always BOOMING! Several years later I made a contact with him when he was activating an IOTA in 2013 right here in Southern Calif – Anacapa Island, the same one that I had been to in the previous 2 years before.

Sometime last year I saw in the DX spots that Bodo had returned to Nigeria, and had been on the air again. I noticed he was on Facebook with the fictitious name of “Bodo Hamradio” and I friended him. Just before Christmas he posted the following on his wall:



Figure 1 Bodo announced his visit to Southern Calif.

I texted back and forth with Bodo, and we decided that Friday December 29 was a good day for his visit, since we normally have a group of a dozen hams at the Orange Café at that time. I was shocked that he was going to drive all the way up from Vista just for our lunch. I got RSVP's from the Orange Café group, invited the

OCARC Board, plus several DXers in our club, and enlisted the help of Arnie N6HC to invite some local DXers. We moved the venue to Rodrigo's Grill (former Don Jose) in Tustin to accommodate a group of 20. Bodo agreed to do a brief program on his experiences in Nigeria. Thanks to Chip K7JA and Arnie, we had a projector and a screen.



Figure 2 Our lunch with Bodo at Rodrigo's

I met Bodo at the restaurant a bit early, and it was a pleasure to meet him. We had a good turnout, and we had our own little DX Convention, right here in Tustin. Bodo's knowledge of the English language is impressive, and was surprised that he likes Mexican food (He visited Tijuana a week later, and ate there).

Rodrigo's did a great job with the food and service, and by providing a back room for us

to use. Some people had to leave to get back to work, but most of us were able to stay for Bodo's interesting presentation.



Figure 3 Bodo (right) giving PowerPoint presentation

Bodo is an RF Engineer who works for Ampegon AG (Formerly Thomson Broadcast), and was sent to Nigeria in 2009 to set up a 250 KW transmitter with a rotatable curtain antenna for the Voice of Nigeria (VON) shortwave broadcast.

With nothing to do out at this remote worksite, he got his license there, and set up a Spiderbeam and worked the world as 5N00CH. He also found a dish antenna and did some Earth Moon Earth EME contacts with Europeans back home.



Figure 4 His trailer and Spiderbeam

The first phase of his project was an array of 70 foot towers that formed a fixed curtain. When the Voice Of Nigeria was off the air, he used this curtain to put a huge signal into Europe, with huge pileups.

Our jaws dropped when he described the scope of the rotatable curtain antenna, with 32 dipoles, each weighing 2 tons! It stands 80m tall, and weighs 280 tons. It takes a 20 KW motor to rotate it! This antenna delivers 20 dBi and is broadband from 6 to 20 Mhz.



Figure 5 Bodo with one of the 2 ton dipoles

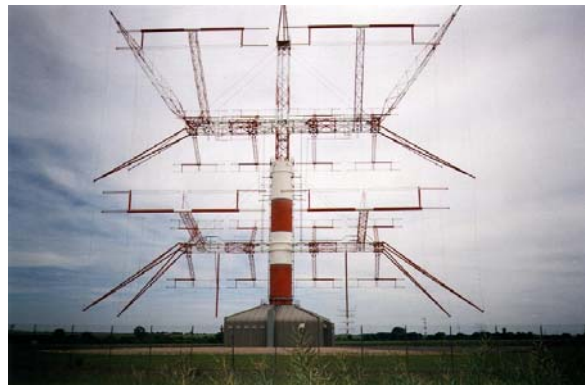


Figure 6 Rotatable curtain antenna

Bodo operates when VON is QRT. The signals he receives in the pileups totally overload his transceiver! Also, he says that this massive antenna cannot be used for receive when there is a thunderstorm nearby. You get blasted by QRN, plus the antenna connector is actually hot with voltage.

Bodo returned to Nigeria last November for a week to oversee repairs, and to do some training of the VON staff. He had fun operating as 5N7Q on the big antenna again.



Figure 4 Adapter from the huge feedline to PL-259 for ham use

The Spirit of Amateur Radio is alive and well. No other hobby spreads “international goodwill” like ours does. Bodo is the embodiment of this goodwill, and it was a thrill for all of us to meet such an amazing individual. It will be interesting to see where in the world he ends up next.

**FREE to Good Home!
1950's Military VHF/UHF
Transmitter T-217A/GR**

Tim N6GP has a friend who is cleaning out his garage and is getting rid of a 1950's era VHF/UHF transmitter, military model number T-217A/GR. It is included in this training manual.

http://www.bunkerofdoom.com/lit/mil_uhf_01/uhf_mil_equ.pdf



If you haul it away, it is yours. Located in North Tustin. Please contact Tim N6GP at 714-730-0395 or n6gp (at) w6ze.org

OCARC BOARD MEETING MINUTES 2018-02-03

The February OCARC Board meeting was held at the Marie Callender's Restaurant at 1821 N. Grand Ave in Santa Ana on February 3, 2018. Meeting called to Order at 8:10 am.

Roll Call:

President: Tim N6GP, Present	Vice President: Dan KI6X, Present
Secretary: Jim AF6N, Present	Membership: Bob AF6C, Absent
Technical: Kenan KR6J, Absent	Treasurer: Ken W6HHC, Present
Activities: Ron W6WG, Present	Publicity: Tim, N6TMT, Present
Directors at Large: Corey KE6YHX, Present	Clem W0MEC, Present

DIRECTOR REPORTS:

Vice President – Dan KI6X – No current report. See below.

Secretary – Jim AF6N - No current report. See below.

Membership – Bob AF6C – Reported that the club has 46 current 2018 paid members. That seems to be running ahead of past years. It was noted that use of Paypal for dues has accounted for earlier renewals this year.

Treasurers Report – Ken W6HHC presented copies of the current Cash Flow report. January was a quiet month with most of the inflow having resulted from member's dues. Currently club holdings continue to be split but are being moved from Orange County Credit Union to Wells Fargo Bank.

Activities – Ron W6WG reported on possible 2018 club outings. SOTA and/or IOTA operations are under consideration. Use of an Orange County peak for SOTA or possibly a trip to one of the Catalina Island peaks which could qualify for both SOTA and IOTA. Catalina could require courtesy coordination with the CARA group.

Publicity – Tim N6TMT reported the Boy Scouts have confirmed receipt of the \$30 check and have promised to cash it soon. That will allow for the close out of the Orange County Credit Union account.

He also reported that acknowledgement of the IC-7300 rebate has been received although the rebate will be paid out later.

The Boy Scouts are planning an event during which Morse code will be taught and practiced. Tim N6GP volunteered to participate.

Technical – Kenan KR6J – Ill and absent, no current report.

Director at Large – Clem W0MEC visited HRO and reported that nine OCARC tri-fold brochures are on hand. While there, he also spoke with Janet and learned that Chip K7JA has received and will be testing a magnetic loop antenna for MFJ.

A discussion followed centered on the safety and weather problems being reported from the Bouvet DXpedition. Although they have made anchor off the Bouvet coast, extreme weather and rough seas have made use of the two helicopters impossible and has tossed equipment about on the boat. As of this morning the team has been unable to make landfall. (DXpedition was aborted later 2/3/2018)

Director at Large – Corey KE6YHX reported and presented a study of his research into the proposed Lifetime Achievement Award. He also reported that QST issues can no longer be checked out of the Santa Ana Library.

OLD BUSINESS:

Newsletter Editors: February – Tim N6TMT, March – Tom W6ETC, April – Jim AF6N, May - Tim N6GP

Entertainment: Dan KI6X reported the following presentation schedule:

February – Joe Moell K0OV will present on "Hidden Transmitter Hunting"

March – DX Engineering will present on "The K3LR Multi-Multi Station" via SKYPE. DX Engineering has promised to send a set of instructions approximately 3 weeks prior to the scheduled presentation.

April – Cliff Guice KG6MIG will present the topic "NVIS"

May – Marty Woll N6VI will present on "Troubleshooting for the Non-engineer".

June – TBA – Possible Chip K7JA or Carl WU6D for Field Day presentation.

August – Wayne KH6WZ, a frequent CQ writer, a possible “Maker Fairs” presentation.

Ken W6HHC suggested a presentation combining representatives from both RACES and ARES.

Club Historian: Corey KE6YHX reported that although the mailing list of 1959 showed 232 entries only 55 were dues paying members.

The W6ZE.org has been downloaded to M-disc and is now stored in the OCARC archives.

Membership: Bob AF6C reported that the OCARC business cards are in transit.

Bob found that Got Print was more convenient to work with and more economical for QSL's than VistaPrint but that VistaPrint had been used for business cards.

Winter Field Day - Ron W6WG reported on a great Winter Field Day event last weekend. The Huntington Beach site was excellent. We had plenty of room and quiet radio conditions. Thirteen members came out to help and visit. The bands were extremely active. Our 4 station entry managed 674 contacts, 17 multipliers, 9 bands, phone, cw, digital, and satellite modes of operation. The clubs score calculated to some 33,336 points including 6000 bonus points as compared to previous years at roughly 8,500. All in all, it was a great contest for OCARC.

Even the weather and site conditions reminded us that this was a “Winter” Field Day as a wind storm blew two tents over and the midnight lawn sprinklers created a torrent in and around the tents and equipment.

It was noted that the 40-meter bandpass filters and associated short cables have not been located. Thereby a possible problem for the next Field Day.

Wells Fargo Conversion – Ken W6HHC reported on the conversion from Orange County Credit Union to Wells Fargo. The account activation at Wells Fargo has been a challenge including nine trips to the office by Ken. Following the board meeting, Ken, Tim N6GP, and Jim AF6N will go again to Wells Fargo to provide signatures for the bank's and Secretary of State's paperwork. Dan KI6X will go in to sign at a later date. Currently, Both Ken and Tim are authorized to sign checks from either account. Approximately \$3,600 is now in the Well Fargo account. The rest remains at the credit union

and will be transferred pending clearance of the outstanding \$30 Boy Scout check.

85TH Anniversary Celebration: The September General Meeting has been suggested for a reunion at which former members could be invited to attend. Jim AF6N reported on a survey of suppliers and costs for commemorative mugs. Four suppliers have been identified that can print our multi-colored Logo. They will be contacted again to verify costs and ordering details. The goal of the mug offering is to provide members a quality mug and not to realize a profit for the club.

Ron W6WG who has been handling details of the Winter Field Day will investigate the cost of OCARC polo shirts with I Initial and other vendors.

Among other suggestions for acknowledging the anniversary, was establishment of a commemorative event station and certificate during September. The discussion was tabled for future consideration.

Lifetime Achievement Award: Tim N6GP requested nominations for recipients of the proposed Lifetime Achievement Awards that are tentatively scheduled for the September Anniversary meeting. The award would not be granted annually as is the Good of the Club Award but, would be granted to recognize a legacy of exceptional long-term service. Several names suggested were Roy Maxson W6DEY, Ted Glick K6LJA, and Kei Yamachika W6NGO. The committee, Corey KE6YHX, Ken W6HHC, and Bob AF6C, is open to additional suggestions.

June Field Day: June Field Day was discussed. The Buena Park site is again planned for this year's FD. However, Tim N6GP reported that the Buena Park Swat Team is now using it for training purposes. Coordination with them may be required. The Oceanview site will be considered as a backup. The 2018 event is expected to be limited to a similar number of stations as the 2017 event. A kickoff meeting will be scheduled for March. Operating rules for GOTA will be investigated for possible change.

Ron W6WG, who successfully chaired the Winter Field Day, was nominated to chair the 2018 regular Field Day. Ron will consider based upon his other commitments.

Mimi's \$5 coupons: The dilemma of how to use the Mimi's Café \$5 coupons was solved. Tim N6GP negotiated a trade of the supply with Mimi's resulting in five \$10 gift cards that will be used to provide dinners to out of town meeting speakers.

NEW BUSINESS:

Raffle Details: It was decided to continue the General Meeting raffle by selling tickets for \$1 each or 6 tickets for \$5. A target budget of \$50 per meeting was agreed upon.

Board Meeting Site: Tim N6GP noted that the Santa Ana Marie Calendar's building is up for sale. He suggested that the board consider other local restaurants as a backup should this site be closed. Several possibilities were discussed.

GOOD OF THE CLUB:

Bob AF6C reported contribution of equipment from an SK ham including: 1 RME 7350 receiver, 1 Globe Scout transmitter, 1 Hallicrafters SX28 receiver.

Tim N6GP reported equipment contribution from a friend of: 1@ T217 transmitter covering 225-400 Mhz.

The meeting adjourned at 9:53.

*Submitted by Jim Schultz, AF6N
OCARC Secretary*



UPCOMING EVENTS

FEBRUARY 16, 2018 MEETING

Joe Moell, KØOV

“Transmitter Hunting for the Whole Family!”

MARCH 23, MEETING

NOTE: Moved to 4th Friday due to Baker to Vegas

Tim Duffy, K3LR, from DX Engineering will present via Skype. The topic will be an introduction to the amazing K3LR contest station.

April 22, 2018 MEETING –

Cliff Guice KG6MIF will present on the topic of “Near Vertical Incidence Skywave (NVIS)”

May 18, 2018 MEETING

Marty Woll – N6VI,
“Troubleshooting for the Non-Techie Ham”

For the most current Upcoming event information go to:

<http://www.w6ze.org/Events.htm>

OCARC GENERAL MEETING MINUTES 2018-01-19

The OCARC General meeting was held at the Red Cross Complex in Santa Ana on January 19, 2018.

Club Officers: There was a quorum. All officers were present except for Tim N6GP, Kenan KR6J, and Corey KE6YHX.

Attendance: We had 21 members and seven guests sign the attendance log. It is important that everyone signs in. Today's guest may become tomorrow's member.

Meeting Started at 7:05 pm. Dan KI6X welcomed all in attendance. He explained that he was filling in for Tim N6GP who was attending a family wedding.

The meeting began with the pledge of allegiance and introductions from all attendees.

Program:

Dan KI6X introduced this month's speakers. Joe Moell, K0OV and April Moell, WA6OPS.

Joe K0OV is very active in amateur radio direction finding activities. He authors a web column titled "Homing In" located at homingin.com. Joe reported on the upcoming USA ARDF Championships that will be held on June 13-17, 2018 near Truckee, CA.

He also invited attendees to participate in the next Southern California ARDF Meet at Santa Fe Regional Park Sunday January 28, 2018. Joe stressed that the meets are excellent family events. Bring the kids!

Details for both events are available on his website.

April WA6OPS is the founder of HDSCS, Hospital Disaster Support Communication System. She holds a Master's Degree in Human Resources Management with more than twenty years of experience in care of patients with physical disabilities.

While managing two departments at St. Jude Medical Center in Fullerton, she was also the Stroke Program Coordinator and the rehabilitation unit's representative to the hospital's disaster committee.

April has been active in Amateur Radio since being first licensed in 1976. While at St. Jude, she founded the Rehab Radio and North Pole Network programs, which use Amateur Radio communications as a therapy tool with patients recovering from stroke, head injury, and spinal cord injury. A phone outage local to St. Jude's led to her interest and formation of HDSCS as a vital support to currently all 32 of the county hospitals.

She explained that the HDSCS organization's objective is strictly to provide patient care through standby communication service to the hospitals. That communication service is limited only by the hospital's need and may occur between hospitals and outside agencies or internally between hospital departments.

April explained that HDSCS is a totally voluntary organization with no financial support or budget. Equipment is that which is available from the volunteer ham's go-box. She talked of the importance for training and equipment preparation early on and prior to the call for operation. She emphasized that VHF/UHF voice communication is the mode of choice and that the equipment used should not be "state of the art" or technically exotic. Far preferable is equipment that is in common use by most hams. And, the goal is to have ham radio in service within 30 minutes of the request for help.

April described several of the major emergencies at which the organization has served including the Laguna Fire, the Placentia Train Collision, etc. She then opened the meeting to questions from members.

Intermission was taken at 8:35.

Business Meeting commenced at 9:00**Announcements:**

Current announcements were delivered by Dan KI6X and Clem W0MEC.

Show and Tell:

- Ron W6WG offered an informative Power Point presentation on the upcoming Winter Field Day. Slides included the site, the proposed layout of stations, and a schedule of stations and participants. All member and guests were urged to participate.

Ask the Elmer:

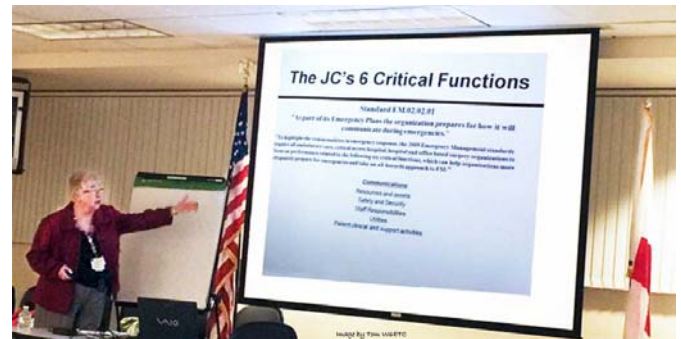
- None offered.

GOOD of the CLUB:

- Tom W6ETC offered useful information for anyone interested in EMCOM and/or Incident Command training.
- April WA6OPS reminded of health and medical needs at St. Joes including the current shortage of blood supply.
- Jim AF6N reminded members of the 85th Anniversary of OCARC coming up in September 2018 and asked for additional commemorative ideas.
- Dan KI6X read the upcoming schedule of presenters including on Feb. 16 – Cliff Guice KG6MIG presenting the topic of “Near Vertical Incidence Skywave (NVIS)” **Now re-scheduled for April meeting.**

Meeting Adjourned at 9:17 pm

Submitted by Jim Schultz AF6N
OCARC Secretary



April WA6OPS covers some of the finer points of HDSCS.

OCARC Cash Flow - Year To Date

1/1/2018 through 2/2/2018

Category	1/1/2018- 2/2/2018
INFLOWS	
Dues, Family (PayPal)	43.39
Dues, Membership	450.00
Dues, Membership (PayPal)	201.81
Refreshments Income	23.83
TOTAL INFLOWS	719.03
OUTFLOWS	
Refreshments Expense	9.87
Supplies	24.33
TOTAL OUTFLOWS	34.20
OVERALL TOTAL	684.83

COAR RACES plans Communication Support for the Orange Police 2018 B2V 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 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 and OCARC members. This year, the B2V event is scheduled to begin on Saturday, March 17, with runners reaching the finish line on Sun, Mar 18.



Many members of COAR RACES and other communications volunteers take a group photo during one of the Orange PD Baker-2-Vegas Communications planning meetings. There are nine OCARC members assisting COAR during B2V this year.