RF

VOL. LVII NO. 5 P.O. BOX 3454, TUSTIN, CA 92781-3454 MAY 2016

THE PREZ SEZ:

Hello! Like every year, May is the month where we start finalizing the plans for Field Day. We are proud and honored to announce that OC RACES will join us this year for this important training exercise. The FD Committee is feverishly working on all the details and antennas to have the group ready for another successful and safe operation. This year we plan to have more than one station running on solar/battery power, and we will have another FD operations training with Professor Tim N6GP. This month's meeting will be different from the regular one; we will have an update on Portable HF Stations and an "Expert Panel" to discuss different aspects of the Radio Hobby. The "Show & Tell" segment will be about VHF/UHF with Club members presenting their radio related exhibits. This activity will be of course followed by a general discussion about Field Day. Our preparations are well under way, with only a couple of meetings to go and with great ideas and input from everyone. This year again we will use the Club's own generator so we will concentrate on the food donations, since no FD is a success unless there is plenty to eat... We may have some band positions still open, so hurry up to volunteer. The co-chairs are busy doing their work organizing the event, so contact any Board member to volunteer. We will be very busy this year with all this and more activities. I look forward to an eyeball contact with you all at the next General Meeting.

73, de AF6CF

Visit our Webpage:
Scan this QR code with your smartphone or tablet.

http://www.w6ze.org

MAY 2016 MEETING

The May meeting will feature Nicholas - AF6CF talking on "HF Portable Operations Update". An Expert Panel Discussion on our Hobby, and a Show-&-Tell with the theme of VHF/UHF will follow. If you'd like to share with the club along this theme, feel free to bring it, and be prepared to say a few words about it. More meeting info can be found in the Prez Sez column.

See you FRIDAY,
MAY 20th 2016 @ 7:00 PM
Meeting location on pg. 2

In This Issue: ***Page***

The Next OCARC Breakfast & open club Board Meeting is on Sat. JUNE 4th 2016.

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

2016 Board of Directors:

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

Vice President:
Tom Cowart, W6ETC
(714) 454-0571
w6etc@w6ze.org

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

Treasurer:
Greg Bohning, W6ETC
(714) 767-7617
w6atb@w6ze.org

Membership:
Don Mech, N6XBP
(714) 206-6548
n6xbp@w6ze.org

Activities:
Tim Millard, N6TMT
(714) 744-8909
n6tmt@w6ze.org

Publicity:
Robbie Robinson, KB6CJZ
(714) 478-9713
kb6cjz@w6ze.org

Technical:
Clem Brzoznowski, WØMEC
(714) 927--4065
w0mec@w6ze.org

Directors At Large:
Tony Scalpi, N2VAJ
(408) 500--9628
n2vaj@w6ze.org

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

2016 Club Appointments:

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

Club Historian(s) ***(Updated)***
Bob Evans, WB6IXN *(Retiring)*
(714) 543-9111
wb6ixn@w6ze.org

Corey Miller KE6YHX *(Incoming)*
(714) 639-5475
ke6yhx@w6ze.org

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

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

ARRL Awards Appointees:
Arnie Shatz, N6HC
(714) 573-2965
n6hc@w6ze.org

John Schroeder, N6QQ
(West Orange Co.)
(562) 404-1112
n6qq@w6ze.org

OCCARO Delegate:
none
OCCARO is currently in limbo

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

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

Submit Articles:
editors@w6ze.org

Monthly Events:

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

Club Breakfast (Board Mtg.):
First Saturday of the
month at 8:00 AM at the
Marie Callender's Restaurant
1821 North Grand Ave
Santa Ana, CA
(Between 17th & Santa Clara)

Club Nets (Listen for W6ZE):
28.375 MHz SSB ± QRM
Wed - 7:30 PM - 8:30 PM
Bob AF6C, Net Control

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

7.086 ± MHz CW OCWN
Sun - 9:00 AM - 10:00 AM
Listen for Ann K6IOI, Net Cntl

VISIT OUR WEB SITE

http://www.w6ze.org

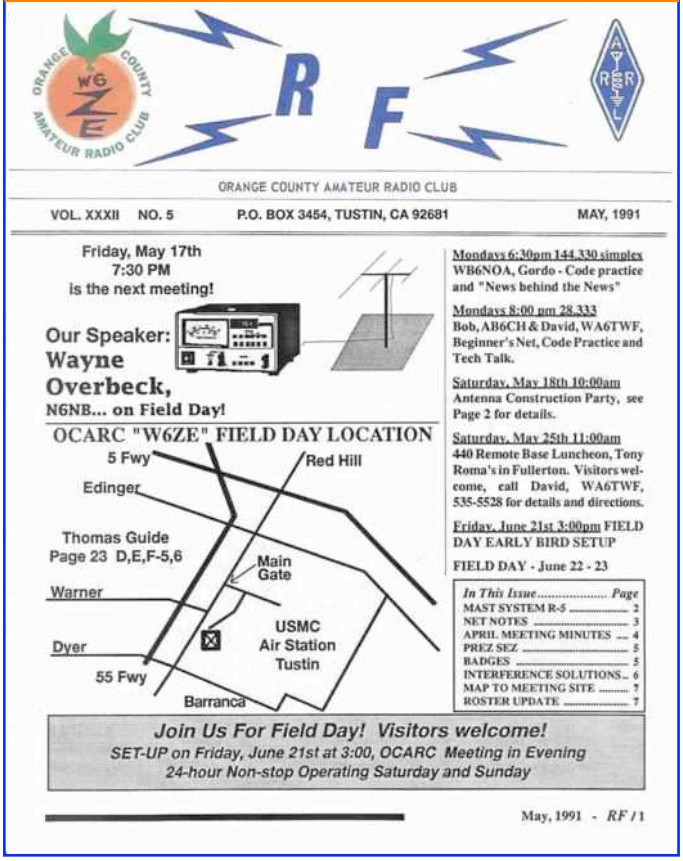
for up-to-the-minute club information, the latest membership rosters, special activities, back issues of ***RF***, links to ham-related sites, vendors and manufacturers, pictures of club events and much, much more.

Club Dues for 2016:

Regular/New Members[1] $30
Family renewal/Join[2] $45
New Member Join Jul-Dec[3] $15
Replacement Badge[4] $3

[1] New members Jan-Jun,w/badge.
[2] Two members or more, w/badge
[3] New members Jul-Dec, w/badge.
[4] There is a $1.50 charge if you'd like to have your badge mailed to you.

- 25 Years Ago in RF Newsletter - May 1991:



ORANGE COUNTY AMATEUR RADIO CLUB

VOL. XXXII NO. 5 P.O. BOX 3454, TUSTIN, CA 92681 MAY, 1991

Friday, May 17th
7:30 PM
is the next meeting!

Our Speaker:
Wayne
Overbeck,
N6NB... on Field Day!

Mondays 6:30pm 144.330 simplex
WB6NOA, Gordo - Code practice and "News behind the News"

Mondays 8:00 pm 28.333
Bob, AB6CH & David, WA6TWF, Beginner's Net, Code Practice and Tech Talk.

Saturday, May 18th 10:00am
Antenna Construction Party, see Page 2 for details.

Saturday, May 25th 11:00am
440 Remote Base Luncheon, Tony Roma's in Fullerton. Visitors welcome, call David, WA6TWF, 535-5528 for details and directions.

Friday, June 21st 3:00pm FIELD DAY EARLY BIRD SETUP

FIELD DAY - June 22 - 23

OCARC "W6ZE" FIELD DAY LOCATION

5 Fwy
Red Hill
Edinger
Thomas Guide
Page 23 D,E,F-5,6
Main Gate
Warner
USMC
Air Station
Tustin
Dyer
55 Fwy
Barranca

In This Issue..... Page
MAST SYSTEM R-5 2
NET NOTES 3
APRIL MEETING MINUTES 4
PREZ SEZ 5
BADGES 5
INTERFERENCE SOLUTIONS 6
MAP TO MEETING SITE 7
ROSTER UPDATE 7

Join Us For Field Day! Visitors welcome!
SET-UP on Friday, June 21st at 3:00, OCARC Meeting in Evening
24-hour Non-stop Operating Saturday and Sunday

May, 1991 - *RF* / 1

The front cover of the May 1991 issue included the radio/beam graphic that was commonly used in RF during that period. A map to our upcoming 1991 Field Day also adorned the page, as well as the announcement of our May guest speaker, Wayne Overbeck - N6NB. Wayne's presentation was to be on Field Day.

The May issue was eight pages long, standard for the period, occasionally one was ten pages long, but more often only six pages.

The editor for this issue was Nancy Bucher -N6XQR. Nancy first started editing RF in August of 1990 and continued through January of 1993. She was the first to use modern page-layout software and set a new standard for the editing of the newsletter; including real margins.

Articles in RF for May of 1991 included: ***A Mast System for the*** *[Cushcraft -ed.]* ***R5*** by Bob - KC6NTX and Tommie - KC6NTY Speik; and ***Resources for Solving Your Interference Problems*** by Joe Moell.

Bob - WB6IXN reported ***On the Nets*** as he still does today. In those days the HF SSB net was on15 meters (21.375) at 8 PM and the 2-meter FM net (146.55) was on at 8:30 PM. A 15 meter CW net was on Thursday at 8 PM. (All local times).

In April the club moved its meeting from Mercury Savings and Loan to the Republic Federal Savings Bank near 17th and Tustin in Santa Ana. Ken - W6HHC , in his Prez-Sez article, said he was pleased with the new meeting place. He also announce the number of the winning ticket for the FT-470 handheld the club was giving away. The ticket # was 020144, but if, in 2016, you've found it, it's too late to claim the prize!

Under ***Free Ads for Members*****:** Bob - AF6C had an HQ-129X Hallicrafters receiver for sale along with an Ameco Six-N-Two VHF transmitter and an Applied Engineering GS-RAM™ board for the Apple IIGS™ computer (1.5 MB).

Secretary Bruce Creager - KC6DLA reported in the board minutes that the club treasury held just under $3,000. He also reported that at the last meeting Nancy N6XQR was Ms. RF, and Cindy - KC6OPI was lucky the winner. [M(r)(s). RF was a tradition to get members to greet each other. It started in the 70's; but efforts to keep it going in recent years have failed. -ed.]

The monthly club breakfast was being held at Denny's restaurant next door to the then new general meeting place.

Bob - AB6CH announced an Antenna Construction Party in Westminster - "**Most materials/all expertise** will be **provided**. **Low cost**. Call Bob..." It was a good learning event for new and old hams alike.

Want to read it? It's available on our website; select RF Newsletter in the left menu on our homepage, click on 1991 and then May. Enjoy.

de AF6C

Tom Weed - K6CCD

August 11, 1935 - April 11, 2016

Silent Key

Sadly, the club must report that longtime club member Tom Weed - K6CCD passed away unexpectedly on April 11th. Tom was an active member of the club participating in many events, like the open house gatherings and the annual Holiday party, accompanied by his charming wife Valerie. Tom was also very active on the 10 meter club net in the past.

Sometime last year Tom's health began to deteriorate and he stopped attending meetings. He was subsequently placed into a private nursing home. Tom seemed to be doing well there, but then died unexpectedly.

Longtime friend of Tom's, Fred K6RMX offered this short writeup on Tom for the newsletter:

Thomas William Weed K6CCD

August 11, 1935 – April 11, 2016

Tom was born in Oakland California. At the age of 3 the family moved to Hollywood and then Sherman Oaks.

I first met Tom Weed early in the 1950s when we were students at Van Nuys High School. We were both very interested in electronics and took every opportunity we could to learn more. We became licensed Amateur Radio operators pursuing our interest in electronics.

Time went on: I went to college, Tom joined the Navy, and we lost touch with each other.

Then, one day 50 years later, in 2004, Tom saw my name and phone number on a local ham radio club roster and gave me a call. He asked: "Is this the residence of Fred Fry who went to Van Nuys High School?" Well, that led to what was a wonderful 12 years of reconnecting with Tom. Ironically, we discovered that each of us had married and moved to Tustin! It was great. Our friendship picked up as though no time had passed!

When we first got those ham radio licenses as young teenagers, little did we realize then, that it would be ham radio that would link us together so that our friendship would indeed last a lifetime!

Tom leaves his loving wife Valerie, his sisters and his daughter. He has five grandchildren and two great grandchildren.

Fred Fry

K6RMX

Tom Weed, on the left, and his wife Valerie at the 2012 holiday party

Heathkit of the Month #72:
by Bob Eckweiler, AF6C

[AMATEUR RADIO - SWL
Heathkit HW-12 / HW-22 / HW-32
"*Single-Bander*" SSB Transceivers - PART II

Introduction:
in the February issue of ***RF*** the *"Single Bander"* HW-12 (75 meters LSB), HW-22 (40 meters LSB) and HW-32 (20 meters USB) were the topic. These sideband only transceivers were very popular in the mid sixties; many are still on the air today. In the February article the construction, control layout and frequency scheme were discussed at length. This month the circuit will be covered.

Since the schematics are too big to publish here, a copy of the HW-22 schematic has been uploaded to our website so you can follow everything a little closer:

http://www.w6ze.org/Heathkit/Sch/hw22.pdf.

Schematics of the other *"Single Bander"s* may be available on line too, but the HW-22 is representative of the other radios and should suffice. Snippets of the schematics of the other radios may be used as needed.

Figures 5 and 6 are block diagrams of the transmitter and receiver sections (Table and figure numbers will continue from last month. If one is shown in both articles, it will retain its original number.)

Tube Line-up:
Each of the *"Single Bander"* transceivers uses 14 tubes; with the exception of V14, they each perform the same function in each radio. Five of the tubes are dual-section, so the effective tube count is 19, and even 20 on the HW-22 and HW-32 if you consider the dual function for V14 tube.

Fig. 1 - HW-22 40-meter Transceiver

ID	Section - Tube # (Type)	Function
V1A	1/2 - 6EA8 (P)	Mic Amp
V1B	1/2 - 6EA8 (T)	Audio Follower
V2A	1/2 - 6EA8 (P)	Xmtr IF
V2B	1/2 - 6EA8 (T)	Relay Amp
V3	6AU6	Common IF Amp
V4	6AU6	Xmtr Hetro. Mixer
V5	1/2 - 6EA8 (P)	Xmtr RF Driver
V6	6GE5	RF Power Amp
V7	6GE5	RF Power Amp
V8A	1/2 - 6EA8 (P)	Rcvr RF Amp
V8B	1/2 - 6EA8 (T)	Xmtr Het. Mixer
V9	6AU6 (P)	Rcvr IF Amp
V10	6AU6 (P)	VOX Amp
V11A	1/2 - 12AT7 (T1)	Product Detector
V11B	1/2 - 12AT7 (T2)	Carrier Oscillator
V12A	1/2 - 6EB8 (P)	Rcvr Audio Out
V12B	1/2 - 6EB8 (T)	Rcvr Audio Amp
V13	6AU6 (P)	VFO
V14[1]	6BE6 (H)	VFO Follower
V14[2]	6BE6 (H)	VFO Het Osc/Mix

[1] HW-12 75-meter transceiver only
[2] HW-22 40-meter & HW-32 20-meter transceivers
Tube Type: (P) = Pentode, (H) = Heptode, T = Triode

TABLE IV – "Single Bander" Tube Line-up

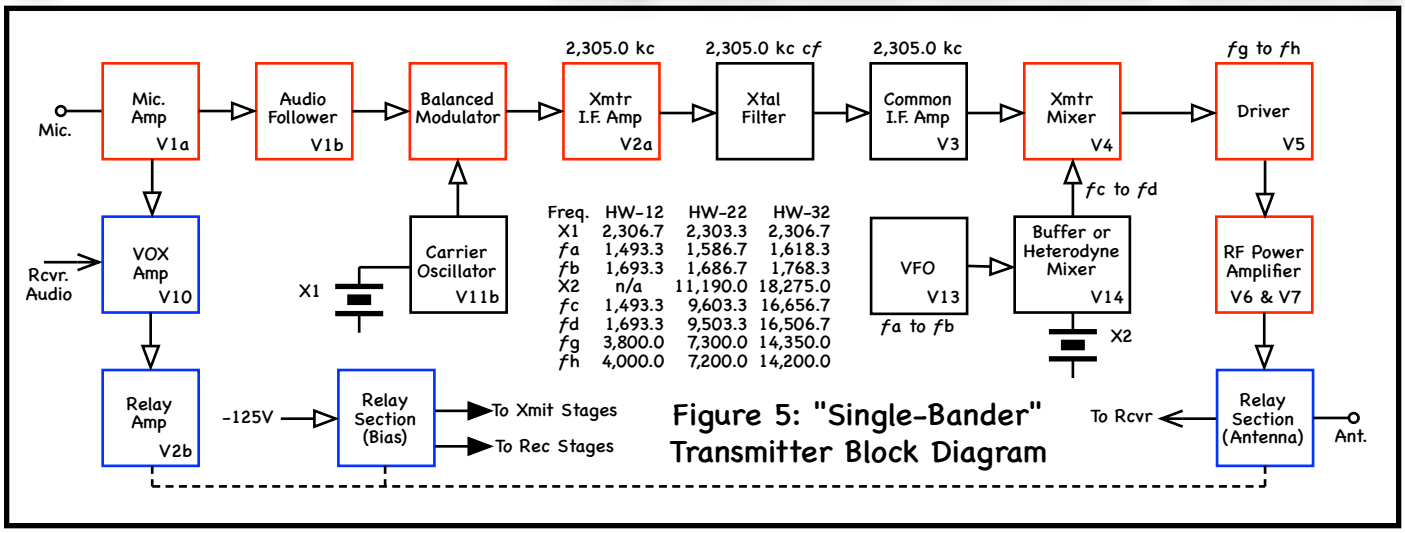


Figure 5: "Single-Bander" Transmitter Block Diagram

Circuit Description:
The circuit may be broken up into four sections - the oscillators, the transmitter, the receiver and the transmit/receive control and switching.

The Oscillators:
All three radios have a similar crystal controlled carrier oscillator and VFO oscillator. The HW-22 and HW-23 also have a crystal controlled heterodyne oscillator to raise the frequency of the VFO without compromising stability. All three oscillators use series-resonant crystal mode oscillators.

Carrier Oscillator (V11B):
The crystal controlled carrier oscillator uses 1/2 of a 12AT7 in a Colpitts oscillator circuit. It operates either on a frequency of 2,303.3 or 2,306.7 kc. Each frequency is 1.70 kc from the 2,305.0 kc IF frequency. The lower crystal frequency will initially create an USB signal after passing through the crystal filter; likewise, the higher crystal frequency will create an LSB signal. Feedback is supplied by the series capacitors and the signal is taken from the cathode. This oscillator provides the carrier signal to the balanced modulator on transmit, and carrier injection signal to the product detector on receive.

VFO Oscillator (V13):
A 6AU6 pentode is used to generate the VFO signal. This is also a Colpitts circuit. Since the frequency range and frequency span of the VFO is different for each of the *"Single-Bander"* radios, the capacitor values, including the variable capacitor are not identical across the line. The lower and upper range of the VFO is given in Figures 5 or 6 as *f*a and *f*b.

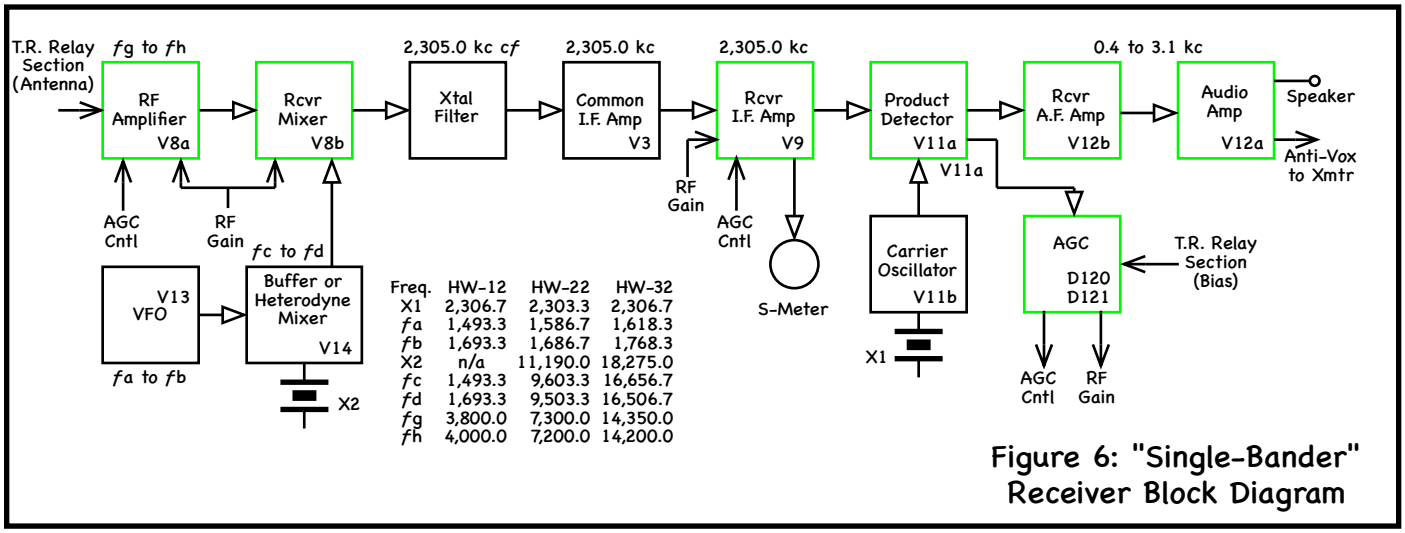


Figure 6: "Single-Bander" Receiver Block Diagram

The same coil is used in each (L5 in the HW-12 and L6 in the HW-22 and HW-32), and is temperature compensated by C130, a negative temperature coefficient capacitor. The remaining frequency determining capacitors are of the NPO type. Using a low frequency around 1,600 kc for the VFO adds to the stability, as does mounting the coil and variable capacitor on the rigid chassis instead of the circuit board.

VFO Buffer (V14) [HW-12 only]:

Since the HW-12 uses the VFO frequency as the transmitter and receiver mixer frequency directly, it does not need to be heterodyned to a higher frequency. However, to keep load changes from pulling the VFO off frequency, V14 acts as an isolation buffer in the form of a cathode follower. Evidently Heathkit wanted to use the same tube lineup for all the *"Single-Bander"s,* so a 6BE6 pentagrid tube that is used as a heterodyne oscillator and mixer in the higher frequency radios, is used as a triode cathode follower in the HW-12. The schematic of this circuit, along with the VFO oscillator, is shown in figure 7. Note that there is no connection to the plate (pin-5) of the tube; instead, the first screen grid acts as the plate. The signal from the VFO is coupled to the 1st control grid (pin-1). Since the two screen grids (pin-6) are connected internally, the second control grid (pin-7) is tied to the first one externally. In effect this creates a triode. The buffered signal appears at the cathode (pin-2) where it is fed to the receiver mixer and, after filtering (not shown in figure 7), to the transmitter mixer. Capacitor C134 is large enough to bypass any harmonics to ground while passing the fundamental frequency to the buffer.

Heterodyne Oscillator & Mixer (V14) [HW-22 & HW-32]:

In the two higher frequency radios, the VFO is raised in frequency by mixing it with the signal from a crystal oscillator. This the raises VFO frequency without introducing additional drift of any significance. V14, a pentagrid, tube (five grids), also called a heptode (seven electrodes), is a tube designed specifically as a single tube

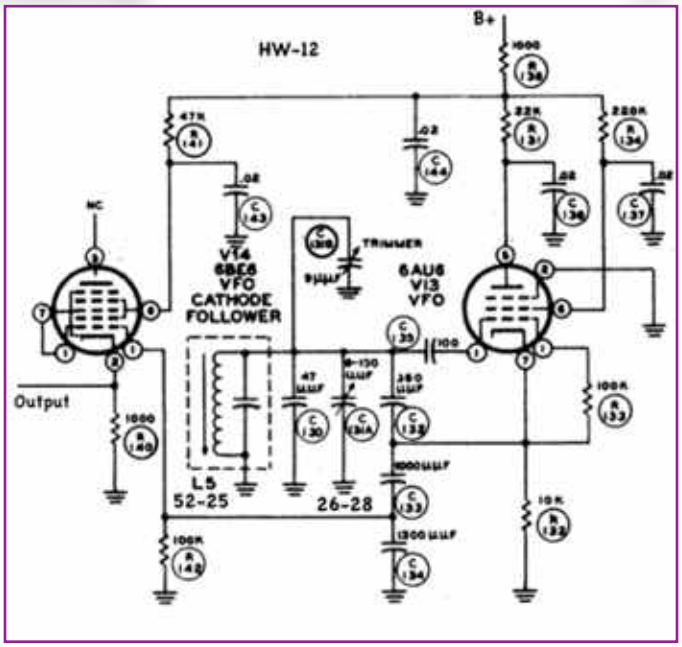


Figure 7: HW-12 (75-Meter) VFO with Buffer

that functions as an oscillator and mixer. The first grid is a control grid for the oscillator; in this case another crystal Colpitts oscillator. The second grid acts as a plate for the oscillator section; it is connected to the screen source. Since this grid is so porous, some electrons pass right through to the second section. the third grid is also a control grid. The VFO signal is coupled to it. The fourth grid, which is internally connected to the second grid, is a screen grid for the upper section, and the fifth grid is a suppressor grid to absorb any electrons bouncing off the plate. With the tube biased to a point where it is no longer linear, mixing occurs and the two frequencies, plus their sum and difference appear at the plate. L5 is broadly tuned to the difference frequency band. The heterodyne crystals are at 11,190.0 (HW-22) and 18,275.0 kc (HW-32), resulting in output frequencies between fc and fd (Fig. 5 or 6) as the VFO is tuned.

The TRANSMITTER:

Microphone Amplifier (V1A):

Audio from a high impedance microphone is amplified by V1A, the pentode section of a 6EA8. C11 removes any RF entering from the mic connection. This is a simple pentode amplifier using grid-leak biasing. Its output is fed

to the MIC GAIN control. The low end of the control is AC coupled to ground so the next stage can be biased off during transmit.

AF Cathode Follower (V1B):
The triode section of the 6EA8 is a cathode follower buffer. It presents a low output impedance audio signal to the balanced modulator through C18.

Balanced Modulator (CR1 - CR4):
Mic audio from V1B is mixed with the carrier oscillator signal in the balance modulator (Figure 8). The RF carrier signal is fed across R8 to the junction of two legs of the bridge consisting of C1 & R3 and C2 & R4. When these legs are identical, the bridge is balanced and none of the carrier signal appears across transformer.- T1's primary. The CARRIER-NULL control adjusts the bridge balance, correcting for component tolerances. When audio is applied from V1B to the diode ring, it unbalances the bridge at an audio rate, causing the upper and lower sideband signals to appear across the transformer primary. In order to provide a carrier for tune-up, the TUNE LEVEL places a DC voltage across the diode ring when the FUNCTION switch is in the TUNE position, resulting in an unbalancing of the bridge, allowing a steady carrier to appear across T1.

Transmitter IF Amplifier (V2A):
V2A, the pentode section of a 6EA8, amplifies the two sideband signals from the secondary of T1 and applies them to the crystal filter. It also matches the impedance the filter needs to see for optimal performance.

Crystal Filter (Y2 - Y5):
The crystal filter passes only the desired sideband for the particular model, which is determined by the carrier oscillator crystal and whether sideband inversion occurs later in the transmitter mixer. Y2 through Y5 are matched pairs of crystals at 2,303.5 and 2,505.1 kc., which, along with L1, provide a filter response as shown in figures 8. With a carrier crystal of 2,303.3 kc (red) the filter passes only the USB signal within an audio range of 400 to 3,100 cps at the 6 dB points (shown green to yellow), which corresponds to 2,303.7 to 2,306.4 kc. Similarly, with a carrier crystal of 2,306.7 kc (purple) the filter passes only the LSB signal within an audio range of 400 to 3,100 cps, which corresponds to 2,306.4 to 2,303.7 kc. This signal is then coupled to V3, the common IF stage.

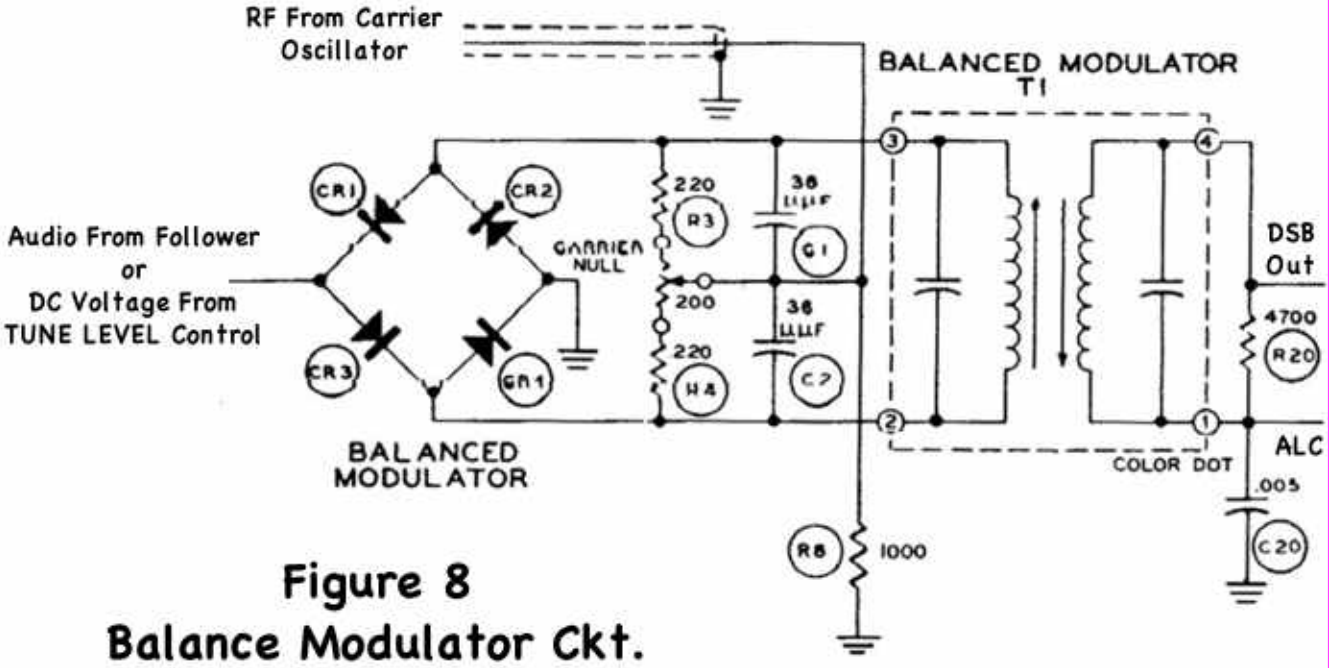


Figure 8
Balance Modulator Ckt.

The Common IF (V3 - During Transmit):
The common IF uses V3, a 6AU6 pentode, It is driven directly from the crystal filter, with R30 providing the proper load for the filter. Output is through a double tuned IF transformer, T2. This stage and the filter are used for receiving also.

Transmitter Mixer (V4):
In the transmitter mixer, another 6AU6 pentode, the transmitter IF signal and the heterodyned (or buffered in the case of the HW-12) VFO signal from V14 are mixed. Only one of the mixer products is allowed to pass the double tuned driver grid transformer L2. The heterodyne signal is coupled to the secondary of T2, along with the transmitter IF, and both are fed to the control grid of V4. On the HW-12 the sum of the two signals is passed and no sideband inversion occurs. But, on the HW-22 and HW-32 the difference between the two signals is passed. Since the sideband signal is subtracted from the higher frequency oscillator signal, sideband inversion does occur. To correct for this, the carrier oscillator crystal is selected to initially produce the other sideband.

Driver (V5):
The driver tube is a 12BY7 power pentode. It operates as a linear, tuned grid, tuned plate power amplifier. It is broadly tuned to operate over the desired band segment and no front panel tuning adjustment is provided. A small part of the RF energy from the final amplifier stage (discussed next) is fed back through a capacitive voltage divider consisting of capacitors C63, C64 and C55 to the B+ side of the plate coil L2. This voltage provides fixed neutralization for the final amplifiers.

Final Amplifier (V6 & V7):
A pair of 6GE5 "Compactron" beam-power tubes, originally designed for TV horizontal sweep deflection amplifiers, provide 200 watts of input power. The tubes are effectively in parallel with their plate, control grid and cathode connected together, and their screen grids fed by separate resistors. RF is capacitively coupled from L2 to the grids. The pi-network output

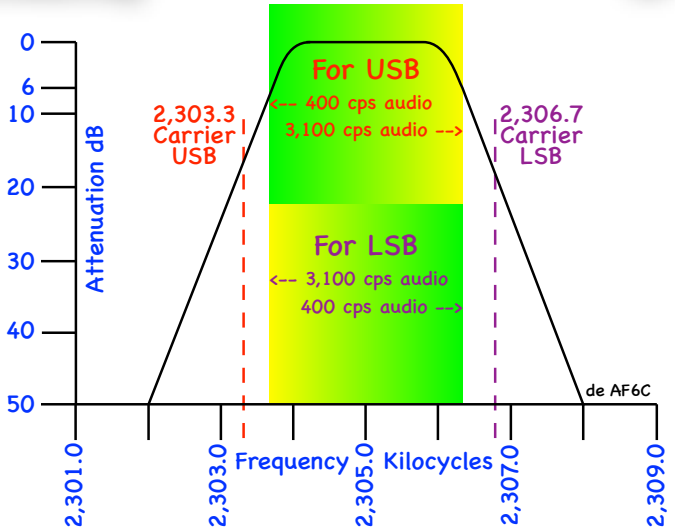


Figure 9: Filter Frequency Response (See Text)

circuit is simple since there is no band switching; L4 provides the tuning inductance. The only adjustment is the FINAL TUNE capacitor; loading is fixed by C77 for use with a 50Ω load. Low value capacitors C61 and C71, along with the circuit board trace, provide VHF oscillation suppression.

Final bias is provided through a voltage divider chain from the -130-volt power connection. The FINAL BIAS control allows setting the resting plate current to the proper value.

ALC (D70):
To help prevent the transmitter from becoming non-linear ALC (Automatic Level Control) is provided. Should the amplifier be over driven, the grid will start to draw current. This causes fluctuation in the grid voltage at the audio rate. This AC voltage is coupled through C75 and rectified by D70. The resulting negative DC voltage increases the bias on V2A (the Xmtr IF) V4 (the Xmtr mixer) and V5 (the driver), reducing their gain and bringing the final amplifier back into linearity.

The RECEIVER:

RF Amplifier (V8A):
When in receive mode, the antenna, and the signal from the optional 100 kc crystal calibra-

tor, if installed and turned on, are fed to the a coupling link on L3, the driver plate tuning coil. The driver plate tuning coil is also coupled to the grid of the RF amplifier V8A, the pentode section of a 6EA8. In a similar fashion the plate of the RF amplifier shares the double tuned driver grid coil L2. This eliminates the need for two additional coils and simplifies alignment.

Receiver Mixer (V8B):
V8B, the triode section of a 6EA8, acts as a simple mixer. The signal from the RF amplifier is fed to the grid; and the heterodyne signal from V14 is fed across the cathode resistor; this signal is 2,305.0 kc above or below the desired receive frequency, depending on the model. The plate signal is coupled to the common IF stage where only the output of the mixer at the 2,305.0 kc IF frequency is allowed to pass.

The Common IF (V3 - During Receive):
The common IF is used for both transmit and receive. It consists of the crystal filter, followed by an IF amplifier using a 6AU6 pentode and a double-tuned coupling transformer T2. The crystal filter is centered around the 2,305.0 kc IF frequency, and was discussed under the transmitter section. The filter is just wide enough to pass an SSB signal. On receive, T2 acts only as a single tuned circuit and the IF signal is capacitively coupled from the plate of V3 to the receiver IF stage, V9.

The Receiver IF (V9)
The receiver IF is the second stage of IF amplification using a 6AU6 pentode. This is a typical IF stage and the amplified IF signal is fed through a double-tuned IF transformer to the grid of V11A, the product detector

The Product Detector (V11A)
The product detector is another mixer; it uses a triode section of a 12AT7, V11A. It recovers the audio from the IF signal fed to the grid by beating it against the carrier oscillator signal which is coupled across the cathode resistor R112. If the IF signal is the correct sideband and tuned properly, the difference between these two signals is a reproduction of the transmitted audio. The unwanted higher frequency mixer components are bypassed to ground through C111 and C112.

The Receiver 1st Audio (V12B)
The first audio stage is a common class A triode audio amplifier. It amplifies the audio and passes it to the audio power amplifier. This stage also provides an AVC (automatic volume control) voltage to the AVC circuit (discussed later).

The Receiver AF Output Amp (V12A)
The audio from the previous stage is amplified in a class A power stage, and transferred via the audio output transformer, T4, to an external 8Ω speaker. The cathode circuit is a bit unusual; R120 develops bias for the tube while C120 rolls off the low frequencies below 160 cps. The choke coil (RFC-120) presents a higher impedance to the higher frequency audio components, which are then fed back to V12B providing degenerative feedback, canceling the higher frequency audio components, some of which may be noise.

AVC Circuit (D120 & D121)
The AVC (Automatic Volume Control) circuit, also sometimes referred to as AGC (Automatic Gain Control) reduces the gain of the RF amplifier, receiver IF and the audio output stage when a strong signal is received. A sampling of the received signal, isolated by R128, is coupled to two crystal diodes (D120 and D121) that, in conjunction with C121 and C88, form a negative voltage doubling rectifier. C121 charges quickly, providing fast gain reduction, while C88 discharges slowly providing delayed recovery for proper SSB reception. The AVC voltage is fed to the RF amplifier directly, while lower voltages are tapped off to control the receiver IF and 1st audio stages. This divider string is returned to the cathode of the 1st audio stage, providing a slight positive voltage during weak reception, canceling and AVC action due to noise and improving the weak signal sensitivity. As part of the transmit - receive

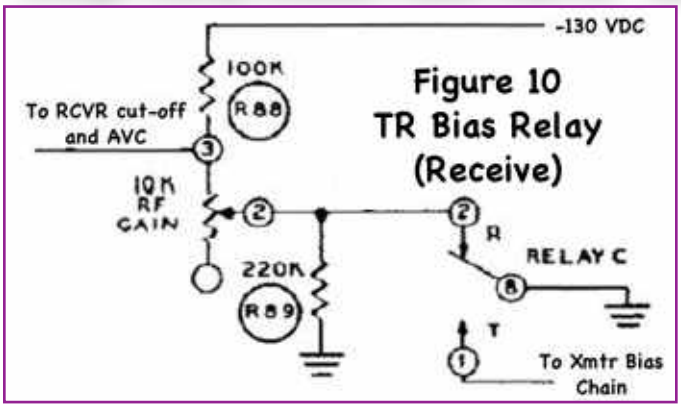


Figure 10
TR Bias Relay
(Receive)

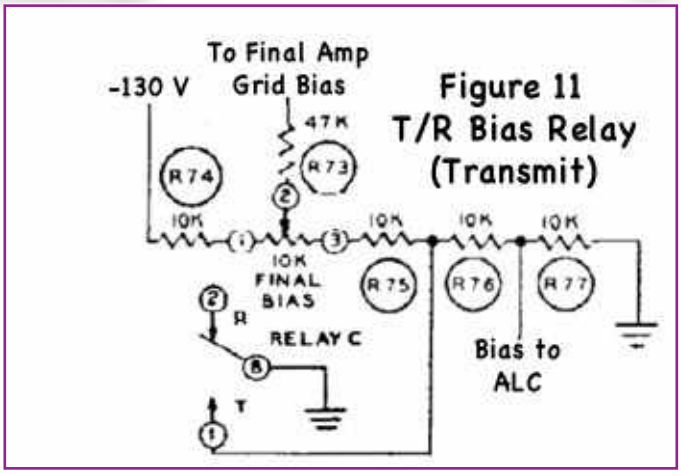


Figure 11
T/R Bias Relay
(Transmit)

switching circuitry, to be discussed next, a high negative voltage is applied to the AVC line during transmit, effectively cutting these three stages off.

TRANSMIT/RECEIVE Switching:

T/R Relay:
A 3-pole relay controls whether the transceiver is in transmit or receive mode. One of the poles switches the antenna between the RF amplifier during receive, and the pi-network during transmit. The second section controls an external contact that is open during receive and grounded during transmit, allowing the user to switch an amplifier or use otherwise as desired. The third contact switches the bias on various stages, biasing them heavily off when they are not in use. The relay is controlled either by the VOX (Voice Operated Xmit) circuit or the PTT (Push-to-Talk) circuit, depending on the setting of the front panel FUNCTION switch.

A resistor divider chain from the -130-volt power connection to ground, consisting of R88, the RF gain control and R89, provides bias to the receiver mixer and the low end of the receiver AVC line (Figure 9). During receive, the wiper of the RF GAIN control is grounded, and the bias voltage on the receiver cut-off bias line is determined by the position of that control. The line goes to the low end of the AVC circuit adding to any AVC created bias, and the gain of V8A, V9 and V12A decrease as the pot is turned CCW. On transmit the ground is removed from the RF GAIN control and the RCVR cut-off line bias jumps to negative 90 V. This voltage is added to the low end of the AVC line forcing all the tubes affected by the AVC into cutoff. This line also directly biases off V8B, the receiver mixer stage, effectively turning the receiver off.

Another resistor voltage divider chain from the -130-volt power connection to ground consists of R74, the final bias potentiometer, R75, R76 and R77 (Figure 10). This places a large bias on the ALC controlled stages as well as the final amplifier and mic audio follower, forcing them into cutoff. When the relay activates, the junction of R75 and R76 is brought to ground potential, restoring normal operating bias on the finals, and other transmitter stages, switching the radio to transmit.

Relay Amplifier (V2B):
The T/R relay is controlled by the relay amplifier. V2B, the triode section of a 6EA8, is normally biased off by the negative voltage from the VOX DELAY control. When the FUNCTION switch is in TUNE the grid is grounded and current flows in the tube causing the relay to activate. If the FUNCTION switch is in the PTT or VOX positions, pressing the PTT microphone switch also grounds the grid of V2B, causing the relay to activate.

VOX Amplifier (V10):
Pentode V10, a 6AU6 pentode, is normally biased on. A large plate resistance results in the plate voltage being very low. In the PTT position the control grid is grounded keeping the tube from responding to any input. When the FUNC-

TION switch is moved to the VOX position the ground is removed from the grid and capacitor C105 is switched into the circuit. When microphone audio is present at the plate of the mic amplifier (V1A) it is coupled to the grid of the VOX amplifier. The negative audio peaks reduce the current flow in the tube causing the plate voltage to rise at each peak. The high plate voltage fires the neon bulb, sending a pulse to the grid of the relay amplifier, causing the relay to close. This pulse also charges C105 which holds the relay amplifier tube on and the relay closed. After a delay, determined by the bias set by the VOX DELAY control, C105 discharges and the relay opens, switching to receive.

ANTI-VOX (D100):
Receive audio, from the plate of the audio output amplifier (V12A), is rectified by diode D100. The resulting positive voltage is filtered and fed to the wiper of the VOX control. This positive voltage bucks any negative voltage that the microphone picks up, preventing speaker audio from tripping the relay. The VOX control is a single control that not only adjusts the anti-VOX, but also, since it acts as a voltage divider to the mic audio reaching V12A, acts as a sensitivity control for the VOX.

Comments:
The HW-12/22/23 became popular for mobile operations as well as use in the shack. If 100 watts mobile wasn't enough power, these transceivers could be used with the Heathkit HA-14 mobile Kompact® Kilowatt 1–KW PEP amplifier (HOM #58).

73, from AF6C

Remember, if you are getting rid of any old Heathkit Manuals or Catalogs, please pass them along to me for my research.
Thanks - AF6C

TWO NEW HEATHKITS

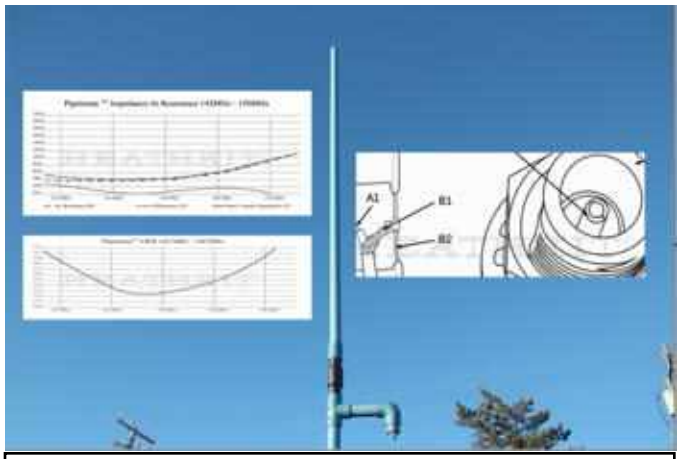
**New Heathkit GR-152-BK
TRF AM Radio (Solder Kit)**

In the December 2015 issue of ***RF*** the first new Heathkit in years was shown. It is the GR-150 Explorer Jr.™, a bolt-together (no soldering) TRF AM radio. Heathkit has since introduced the same kit in a solder kit format. Designated the GR-152, and like the earlier kit, it comes with a black case, an African Padauk hardwood front panel with a metal lower sub-panel that comes in various colors (tangerine shown above).

Heathkit also has introduced the 2m/440-AN-P2L VHF / UHF stealth antenna (available in various powder-coat colors), configured as a vertical folded dipole that handles 100 watts

Each kit costs $149.95 plus shipping.

http://heathkit.com



**New Heathkit 2m/440-AN-P2L
Stealth Antenna**

General Meeting Minutes
April 15, 2016

The April meeting of the Orange County Amateur Radio Club was called to order at 19:03 PDT (7:03 PM) by President Nicholas - AF6CF, with the pledge to the flag. The meeting took place at the Santa Ana Red Cross George M. Chitty Building in Room 208. (our normal meeting room).

Members and guests introduced themselves round-robin. Guests were Daniel Evora from Irvine (no call yet), Don Poysa (KØVNJ) and our speaker Eric Christensen (K6EJC) from Burbank (who arrived later).

Closeup of some handheld radios Eric brought.

Eric Christensen (K6EJC) answers questions

It was announced that Steve Long KM6AJH has moved from Technician license to Extra Class License.

Due to traffic, and our speaker commuting from Burbank, his presentation was scheduled to start around 19:30, so a short informal business meeting was held after introductions. No official board roll call was taken, but all board members were present except for the Secretary (W6HHC) and the Treasurer (W6ATB) - both with family business taking precedence.

Informal business Meeting:
Ken (W6KOS) reported that there will be a special VE testing session on Saturday April 23rd at Care Ambulance in the City of Orange (off

Eric Christensen (K6EJC) of HRO Burbank

Main Street). Now is a good time to take the test due to the new Extra class question pool coming out the first of July.

Field Day:
Field Day plans were discussed. There will be a Field Day meeting at the QTH of Tom (W6ETC) on Wednesday April 20th at 7 PM. All interested parties are invited to attend.

Our location has not yet been officially confirmed, but it appears it will be held at the Knott school property again. The FD committee has grown, with Tom (W6ETC) and Nicholas (AF6CF) going on board. Meanwhile, Ken (W6HHC) has taken a backseat due to more pressing priorities.

Tom (W6ETC) announced that CARA (Catalina ARA) and OC RACES have been invited to join us at our Field Day.

VEC:
Nicholas announced that Tony - N2VAJ has been appointed as the VEC lead.

Program:
Our guest speaker arrived right about the planned 7:30 time, and a group of members helped him unload his vehicle.

Eric Christensen (K6EJC) - manager of the Burbank Ham Radio Outlet (HRO) brought a menagerie of ham radio products to show to the club. He presented and told us about numerous handheld VHF/UHF radios including:

- Icom ID-51 Dual Band 144/440
- Yaesu VX-8DR Tri-Band 50/144/440
- Kenwood TH-F6 Tri-Band 144/220/440
- Yaesu FT-60 Dual Band 144/440
- TYT TH-UVF1 Dual Band 144/440
- Yaesu FT-2DR/DE Dual Band 144/440
- Alinco DJG-29 Dual Band 220/902

Some of "toys" the members perused!

The "D" in many of these radios and ones to follow signify "digital". Many have GPS and digital controllers built-in.

He also showed us some handheld scanners:

- Tera TR-590 Scanner
- Whistler WS-1040 Scanner

Eric also passed around some mobile VHF radios:

- Yaesu FTM-400XDR/DE
- Yaesu FTM-3200D Single Band 144
- Yaesu FTM-100D Dual Band 144/440
- Yaesu FTM-400XDR Dual Band 144/440
- BaoFeng UV-2501+220 144/220/440

Additional items included:

- Mirage BD-35 Amplifier 144/440
- RF Explorer Low-Cost Spectrum Analyzer
- SDRPlay RSP Software Defined Radio (Works with many computer platforms)
- Rig Expert AA-170 Antenna Analyzer
- LP AK-30-TGN Connector Adapter Kit (Thirty Piece)

[I was writing as quickly as I could. I'm sure I missed some items including a set of paired quick connect adaptors coax adapters that looked like they'd work with a Bird, and other wattmeters. Google the listed items for more information -ed.]

A break was held after a question and answer session with Eric, during which many members further discussed with Eric the equipment he had brought.

Show--and-Tell:
At 8:40 PM Nicholas called the meeting back to order for Show and Tell. The evening's topic was Antenna Analyzers. Tom (W6ETC) showed his Comet CAA-500 Mk II analyzer, Nicholas (AF6CF) showed his MFJ Analyzer, and Tim showed his MFJ Dip Oscillator. Many members gathered around the demos, while others took the opportunity to discuss ham related problems and solutions. And a group helped our guest speaker take his equipment back to his vehicle.

BaoFeng UV-2501+220 - 144/220/440 Tri Band Radio

At 21:01 PDT Nicholas called for adjournment. Kris (W6KJC) made the motion and Bob (AF6C) seconded it.

Tim (N6TMT) examines an IC-7300

Respectfully submitted:
Bob Eckweiler - AF6C
Director at Large,
Filling in for Ken - W6HHC

Welcome to My Shack

Doug Wood - K6PGH

Occasionally the shack of one of our members is featured in a short article in RF. This month the shack of Doug - K6PGH is featured. If you'd like to see your shack featured, please submit a short writeup with photos (one to two pages worth) to the submission address given on page 2.

Doug - K6PGH operates from his trailer during the Winter Field Day

I have been an amateur radio operator since September 2012 when I passed my Technician exam and was licensed as KJ6ZNT. I upgraded to General in March of 2013 and obtained my vanity call, K6PGH, which is an abbreviation of K6PittsburGH. I became interested in radio as a kid because my dad was into CB radio as he was on the road a lot. I was a Communications Officer in the Marine Corps so I was involved in planning communications for operations more so than actually operating.

I mainly operate HF in chasing DX and contesting. I currently qualified for and received my DXCC . In contests I don't have the station to compete with the "Big Guns" so I set goals for each contest and am satisfied in exceeding the goal for each contest.

Doug - K6PGH's home station featuring an ICOM IC-718 and Dell Laptop

My station consists of an Icom IC-718 with a LDG IT-100 autotuner fed into a Cushcraft MA-5B antenna at 35 feet. I use a SignaLink USB into an ancient Dell laptop for digital, mostly PSK-31. I use the laptop for logging and use N1MM for contesting and Log4OM for general logging.

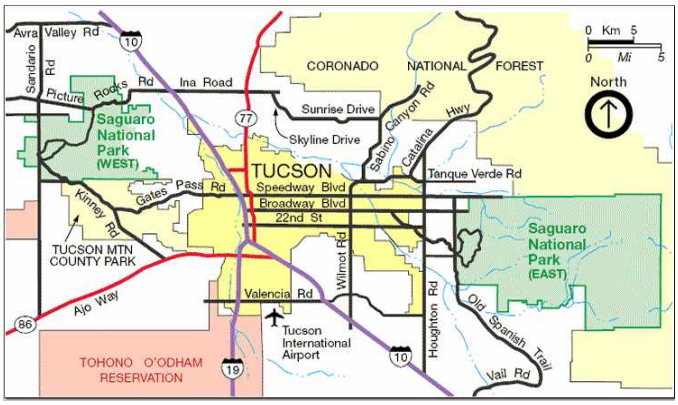
I joined OCARC in 2013 and have served as Activities Chair and am current Publicity Chair. I am also a member of 10-10 International (76945).

Doug's Cushcraft MA-5B Antenna at 35'

N6GP/7 In Saguaro National Park for ARRL National Parks On The Air (NPOTA)

By Tim Goeppinger, N6GP

After activating Chiricahua Natl Monument the previous day (see March RF) , we went to Saguaro National Park NP49 on Sunday, January 24. Prior to visiting there, I didn't realize that the park had two parts that are just east and west of Tucson.



Weather was ideal, about 65 deg F and sunny. Saguaro NP (west) is a short 30 minute drive out of Tucson on Ina Rd. We found the Cam-Boh Picnic area just inside the park boundary, and it has a nice picnic shelter, and is a great radio location, about 2500 ft up. I set up my antenna (patio umbrella base, painter's pole, and 20m End Fed Dipole), and supported the far end with a dead branch on a bush. This must be the most picturesque and comfortable portable operation I've ever done.

I ran my IC-7000 at 100W. As I began to operate on 20 CW, a middle-aged woman galloped down the trail on her horse. it was almost like a stereotypical scene from a Western movie. Since I had cell/internet coverage on my phone, I self-spotted myself on DX Summit, and had a roaring CW pileup in no time. My CW was a little slow and choppy due to the fact my netbook is too slow for N1MM+.

10 minutes into my operating, I heard a woman yelling behind me as she limped into the picnic area. She was asking for help, and said that she was thrown off of her horse. I immediately QRTed to help her. I was shocked to see that she landed in some of that nasty "Jumping Cholla" cactus that clung to one side of her body.

(This picture is not her, but a good example)

She is a local resident, and was yelling to her parents to go find the horse. My fiancée' Edna used a pliers to pull the wicked, barbed cactus clusters off of the poor woman. The woman said her ribs might be broken, and tried to get her father to call 911. Due to some weird family situation, he refused, and had no interest in helping her. The woman asked me to call 911 which I did. The Sheriff, Park Rangers, and ambulances arrived in good time, and transported her to a hospital.

I'm sure that chasers noticed the pauses in my operating with all of the commotion. I logged 38 CW QSOs in 38 minutes, which seemed to exhaust the pileup. Maybe that was due to the NFL Football NFC Championship game at that time. I switched to SSB and logged 65 QSOs in 40 minutes. Had a strong pipeline into Northern Calif. , with signals S9. Also booming was OCARC Member Ron Cade W6ZQ, who lives just over the mountain from Saguaro. I worked all over US and Canada. Italy and Hawaii were best DX. The pileup was fairly well behaved, and let me pause for DX.

Logs have been uploaded as N6GP/7, and have an amazing 84% confirm rate.

I had a local resident visit on his daily walk. He is a CERT team member, and is studying for his Technician license. I took a few minutes to explain my portable setup to him.

For Tucson hams, Saguaro is a terrific place to operate from. As of May, there have been 37 activations of Saguaro, with over 2500 QSOs. This park turned out to be quite an adventure for us, and I hope the woman is OK.

Next month: I took a very long detour to activate Joshua Tree National Park in February.

OCARC NPOTA CHASER LEADERBOARD as of May 14		
Name	**Callsign**	**Parks Worked**
Ron	W6ZQ/7	233
Arnie	N6HC	177
Tim	N6GP	58
Dan	KI6X	45
Doug	K6PGH	36
Dick	W6WVW	12
Dan	N6PEQ	3

Coming in August Show and Go

Tim Millard - N6TMT

What is Show and Go : A remote activation followed by a fox hunt.

Member will arrive at the appointed time and place where the Board members will be waiting. We will assist you to activate on HF with just your normal "go kit" gear. No generators, towers or fancy gear needed. Just the basics Then all participate will have the opportunity to further hone their skills by joining a "fox hunt". So watch for dates, times and location in the near future. Hope to see you there.

Field Day University Class #1
6 PM May 20th

Our first Field Day University Class meets one hour before our general meeting at the Red Cross. This course is targeted at the beginning level operator, who will be using the microphone (phone) on Field Day.

We hope to train some new operators for either the GOTA station or the other Phone stations. This class was a secret weapon that helped propel us high ranking scores in previous year. Topics for this class include:

Introduction to Field Day – What is it?

How to call "CQ Field Day"

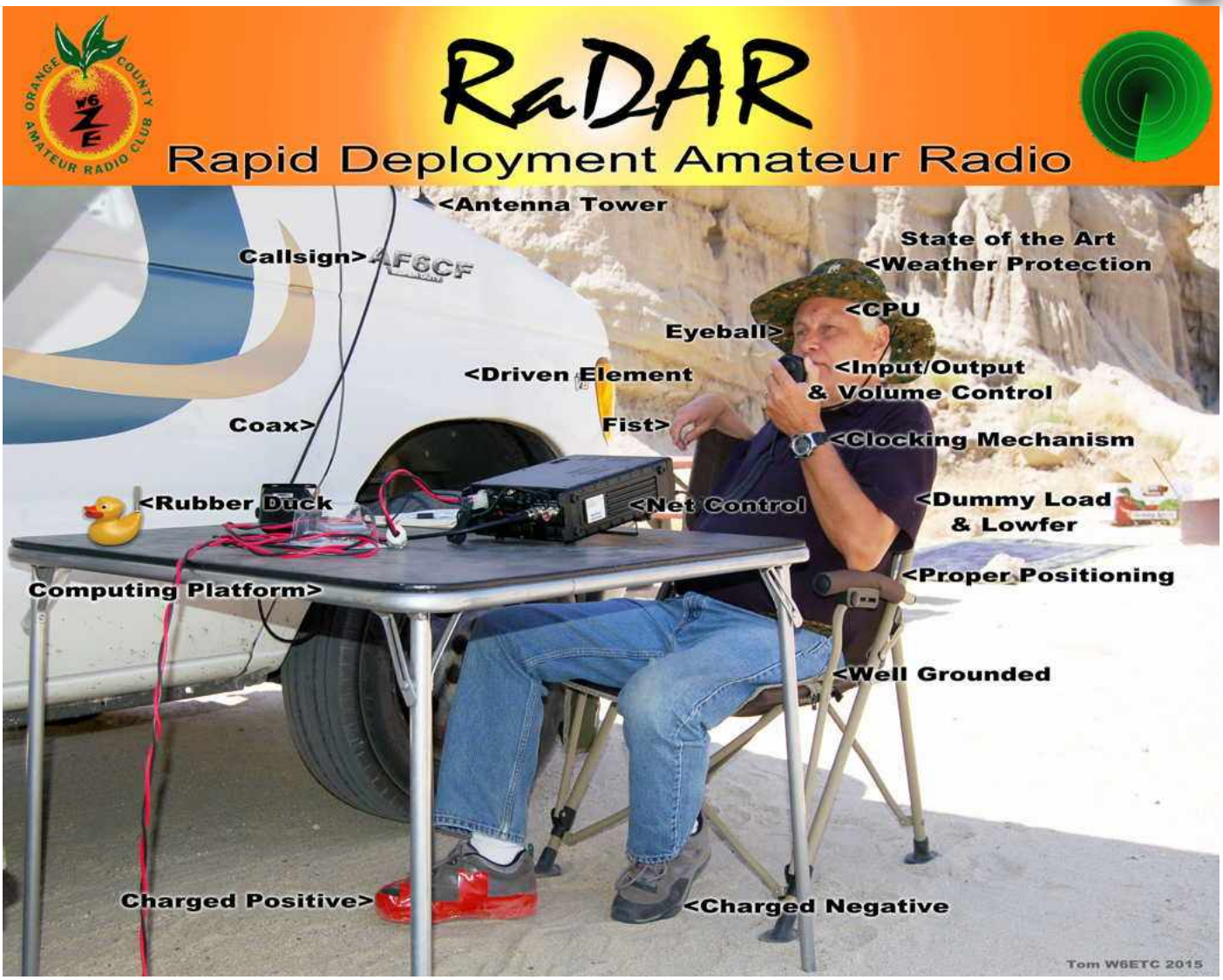
Use of Phonetics on the air

US and Canadian Callsigns –
How to enter them correctly

Establishing and holding a frequency.

Search and Pounce -
Knowing if and when to use it.

This is the first class of a two-part series taught by Tim Goeppinger N6GP. The class in June will be hands-on training of the N3FJP software. As the mattress salesman says "…it's FREEEE."



Nicholas, AF6CF will tell us more about RaDAR at the Friday program.

OCARC Historian

Corey Miller - KE6YHX

Some of you may have noticed the change in the 2016 Club Appointments on page 2. Here is why: After having requested assistance with his duties as Club Historian, Bob Evans WB6IXN decided to pass the office to another member. After having deliberated the appointment, the Board decided to offer it to a good friend of Mr. Evans, myself. On April 13th, I got a call from the club Vice President, Tom Cowart W6ETC, who proposed that I take the appointed office of Club Historian. At first, I thought of Bob Eckweiler as the prospective historian, who is a tenured member, and has been with the club many years longer than myself. Then I thought of my affinity for digital record-keeping, and propensity towards keeping and preserving books and paper documents, for reference, posterity, and otherwise. I told Tom to let me know what is involved, and I will give him my decision. Two days later, at the April Club General Meeting, I discussed the appointment with Bob Evans, and he told me the ins-and-outs of the office of Club Historian. His service to the club is much appreciated.

On April 20th, at the Field Day Meeting at Tom's residence, I spoke with Nicholas Haban AF6CF, our Club President, and Tom Cowart W6ETC, our Club Vice President, and formally accepted the Office of OCARC Historian. Then, at the May Club Breakfast and Board Meeting, the Board Members affirmed my title of Club Historian, and Bob Evans' new title of Historian Emeritus. At the meeting, I also handed out two reports, and two proposals for the Board of Directors to decide on. They passed the resolutions, and we are now negotiating for a Club Digital Archive.

At present, I am working on an OCARC Archive database, to catalog all the items, pictures, and documents in the club archives. There are now 222 records in the database. I will also be scanning the pictures, newspaper articles, and other graphic media for storage in the digital archive. Like any museum archive, all the hard copies will be kept and cared for, and we will continue to rely on Bob Evans for his knowledge, experience, and wisdom as Historian Emeritus. It is an honor and a privilege to serve the OCARC as Club Historian.

de Corey - KE6YHX

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

First Class Mail
Time Dated Material.
Please Expedite!
http://www.w6ze.org