ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LIII NO. 10 P.O. BOX 3454, TUSTIN, CA 92781-3454 October 2012

RF

The Prez Sez.....

by Paul W6GMU

At this writing, the longest summer “warm period” that some Californians that are 65+ year-olds and that grew up and lived here can remember seems to have ended, and I look forward to a pleasant, cool “Winter” period. If El Nino kicks in, you may want to stock up on Scuba gear.

We have a fun Radio Auction happening at this month’s General meeting (I’ve had some surprising Auction deals and happily spent a tad too much) and the always terrific Holiday Party in December.

By all means bring enough Auction moolah to realize your heart’s desires and NOT be outbid (yes, that CAN happen)! Chip especially likes spendthrifts, so please reward his hard work by having a great time at this annual event.

Until the Meeting on the 19th!
Be there or be square!

73 de Paul W6GMU
The “Prez”

Next Meeting

Friday October 19th

"Yearly OCARC RADIO AUCTION”

Instead of a normal General Meeting, the October meeting will devoted to a fun auction. The doors will open at 6PM for set-up and inspection.

See Auction rules and details on Page 3.

The next general meeting will be on:

Friday, October 19th
@ 7:00 PM

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

In This Issue: Page

ORANGE COUNTY AMATEUR RADIO CLUB
www.W6ZE.org

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Monthly Events:

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

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

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

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

7.086 ± MHz CW **OCWN**
Sun- 9:00 AM – 10 AM
John WA6RND, Net Control

VISIT OUR WEB SITE

http://www.w6ze.org

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

Club Dues:
Regular Members	...$20
Family Members*	...$10
Teenage Members	..$10
Club Badge**	…....$3

Dues run from Jan thru Dec and are prorated for new members.

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

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

AUCTION !!!

AUCTION !!!

AUCTION !!!

It's that time of year again. The OCARC annual ham radio auction is **Friday, October 19th** 2012 at 7:00 PM.

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

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

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

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

Web: www.w6ze.org Email: ocarc_info@w6ze.org

ANNUAL RADIO AUCTION

Friday, October 19, 2012

Auction Rules

The OCARC Annual Auction will take place on Friday evening, October 19th, 2011, at 7:00 PM at the American Red Cross facility located at 600 N. Parkcenter Drive, Santa Ana. The room will open at 6:00 PM to allow registration, set-up and viewing. All buyers and sellers are welcome. The following rules for the auction will be in effect:

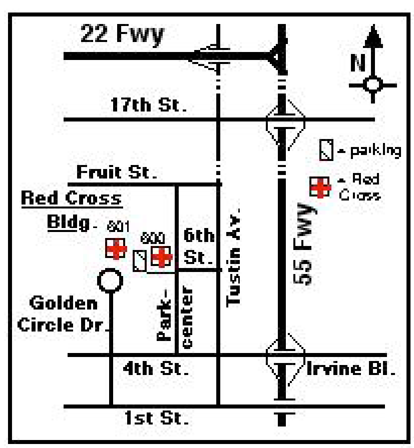
1. Only ham radio or electronic equipment / items will be auctioned (i.e.: no fishing equipment, etc)
2. Buyers and Sellers must register at the door with the OCARC Treasurer. **There is NO registration fee.**
3. Sellers should number each item in their lot. A tag should indicate the minimum bid they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

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

The American Red Cross
George M. Chitty Building
600 Parkcenter Drive
Santa Ana, CA.
Second Floor, Room 208*
(Enter from the West Side.)

Note: The door locks after 7 PM. If no one is there to let you in, call W6ZE on the talk-in frequency for admittance.
TALK-IN 146.55 MHz Simplex

* Room is subject to change.



OCARC 2012 Radio AUCTION Partial Equipment List

OCARC has the following items being brought to the AUCTION:

DESCRIPTION	MFGR	Model	NOTES
Power Meter (SWR)	Bird	43	Like new - with slugs for 2-30 MHz (250W and 1KW) 100-250 MHz – 25W
HF SSB/CW Transceiver	Radio Shack	HTX-100	Good condition - with microphone with mobile mount bracket
Multiband Dipole Antenna	Alpha Delta	DX-CC	Good condition - was outside only 9 months Covers 80-10 meters, excluding WARC
Loop 6m Antenna	M2	6M LO	Like new - with mast-mount bracket Only used few VHF contests (stored indoors)
HF SSB/CW Transceiver	YAESU	FT-101	For parts or restore
Box of COAX/connectors	???	???	Loose new PL259's & right-angle M-F & barrel Short-run indoor coax cables BNC patch cable
HF SSB/CW Transceiver	Kenwood	TS-430	80-10 meter with CW and SSB filters with Microphone and DC power cable Cabinet shows some wear - radio works fine
Grid Dip Oscillator	Millen	90652	Solid State - like new condition with manual, Seven range coils covering 1.7 to 300 MHz
2M FM/SSB/CW Amplifier	Daiwa	LA-2035	30-watt amplifier covers 144 - 148 MHz Requires 1/2 to 3 watts input
2M FM Transceiver	KDK	FM-240	Includes KDK SM-34A touch-tone microphone 25 watts on high power, 5W on low power CTCSS encode and decode are built-in Squelch control appears to be intermittent?
12V – 25 Amp Pwr Supply	Homebrew	????	Really well made
HF SSB/CW Transceiver	YAESU	FT-301D	100W RF output Digital frequency display A donation to the club

TechTalk104 - Receiving Loop Antenna for 160M

by John Roberts W6JOR © 2012 W6JOR

160M stations are best suited for being located in rural areas or out in the desert. The rural areas can allow you full-size 160M antennas and quiet electrical noise environment. The trouble with setting up a 160M station in a city (like Santa Ana) is the electrical noise can wipe out all the stations that you want to receive.

I use a long wire for transmitting on 160M that is strung out on two residential lots (thanks to a friendly neighbor). It gets out to the stations I want to talk to…but, I can hardly hear them through the noise. On my long wire the receive noise is 20 to 30 uv all the time (aka S8 to S8.5 of noise).

Fig 1 shows how I built a 160M Receiving Loop Antenna. Loop antennas use the outer braid on coax to electro-statically shield the receiving antenna loop from the RF electric-field energy of the noise. Now with the shielded loop the receive noise level is only S3. **Fig 1** describes the direction of receiving is in the plane of the loop (that only picks up magnetic-field signals after shielding).

This loop design can only be used for receiving, because the impedance of the loop is about one ohm. The toroid-transformer matches the receiver impedance to 50 ohms….but if you tried to feed 100W of RF into the transformer, then 100 AMPS would be flowing on the loop side!!!!! The frequency bandwidth of the antenna is very narrow, so you have to tune the transformer for your favorite freq.

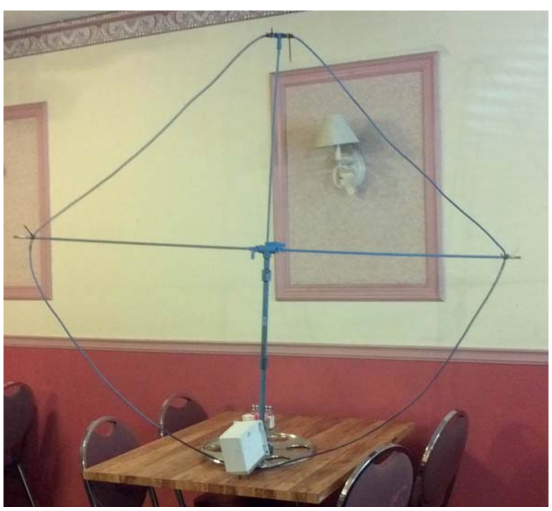


Figure 2 – Physical Construction of 160M Loop Antenna

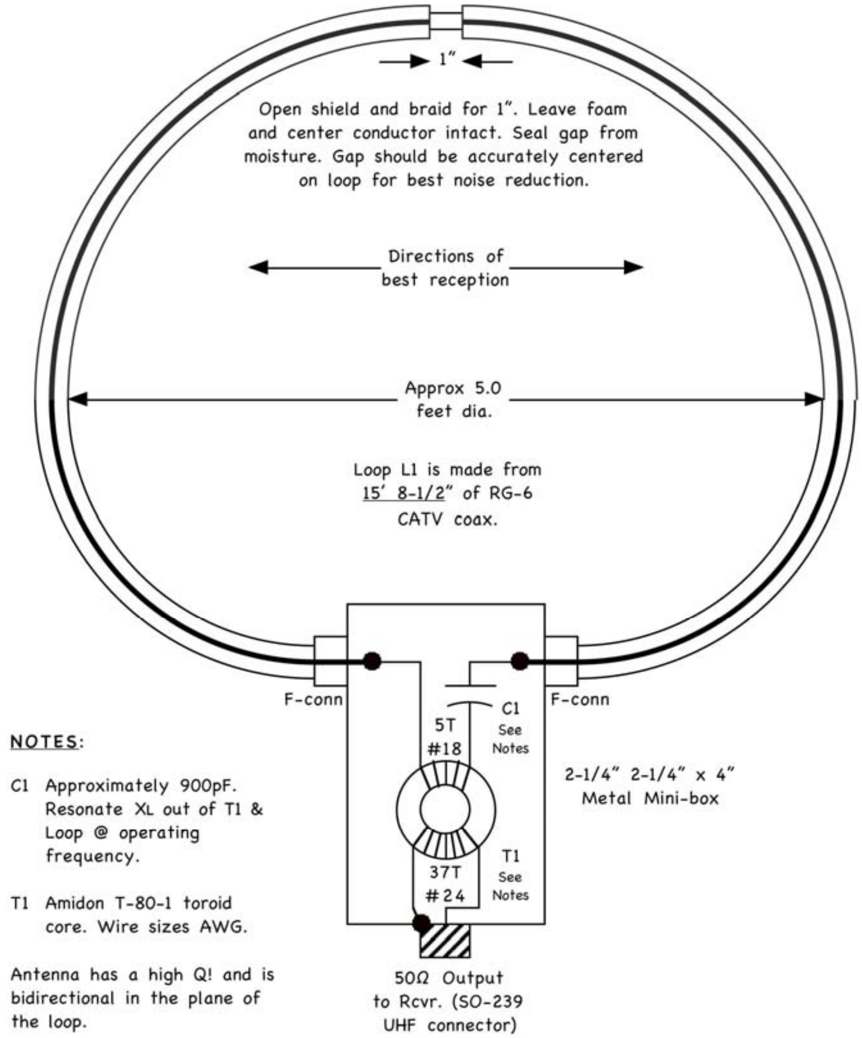


Figure 1 – Construction Diagram of 160M Receiving Loop Antenna
(Diagram Graphics by Bob AF6C)

The loop is very lossy compared to a 90 ft vert. Some ARRL Low Band DX texts refer to loops being -18 dB below the pick up of a resonated 90 ft vertical. "S"-units are voltage units that would be three "S"-units below the 90 footer! Not many of us can put up even 30 foot verticals on city size lots. And then we would still have “city noise” to deal with when using a 30 foot vertical.

Figure 3 – Close up of Weather-proof Box Containing the RF Tuned-Transformer

Western Amateur Radio Association

NOW OFFERING
AMATEUR RADIO VE TESTING SESSIONS
Contact V.E.: George T. Jacob Jr. N6VNI
Phone Numbers: Home 562 691 7898 Cell 562 544 7373
Email: jac2247@gmail.com Or N6VNI@arrl.net

Sponsoring Club: N6ME Western Amateur Radio Association, Fullerton, Ca. "WARA"

Test site location:
La Habra Community Center.
101 W. La Habra Blvd.
La Habra, Ca. 90631
Date and Time:
Third Thursday of every month, @ 6 P.M. unless otherwise noted

Pre-Registration is requested and preferred.

Walk-ins are welcome.

UPCOMING SESSIONS:
~~Thursday, July 19th, 2012 – 6 pm~~
~~Thursday, August 16th, 2012 – 6pm~~
~~Thursday, Sept. 20th, 2012 – 6pm~~
Thursday, October 25, 2012 – 6pm
(Test Session will begin at 6:00 PM)

November & December 2012 – NO exam sessions due to holiday activities at the Community Center

Contact VE: George T. Jacob, Jr., N6VNI
Phone: Home 562-691-7898 Cell 562-544-7373
Email: jac2247@gmail.com or N6VNI@ARRL.net

On Exam Day Bring the Following Items

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

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

Five New Ham Research CubeSats Launched from ISS October 05, 2012

SB SPACE ARL ARLS005
ARLS005 Space Station Deploys Five CubeSats

Five research CubeSats - all with Amateur Radio communication systems - were successfully deployed from the International Space Station beginning around 1430 UTC today (Oct 95 2012). The satellites were launched from the Kibo station module using a specially equipped robotic arm.

The group of satellites includes:

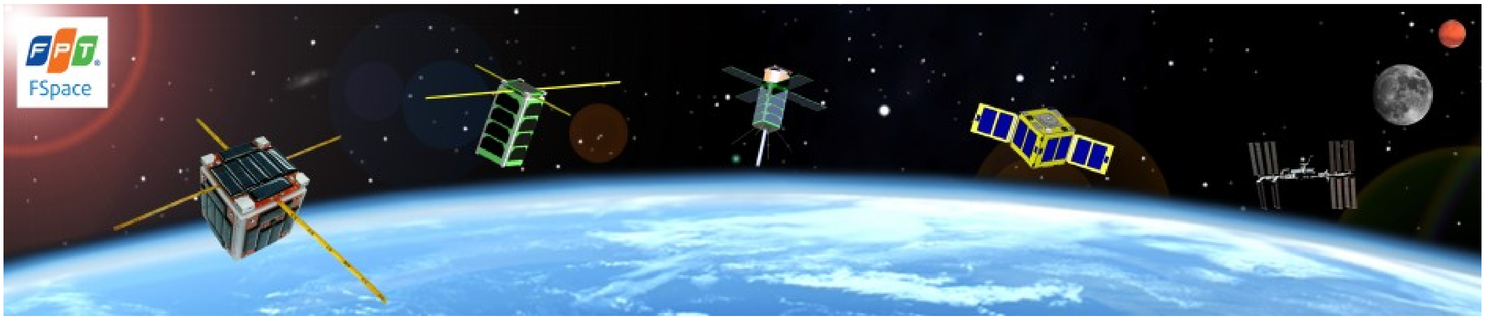
TechEdSat - a collaboration among NASA's Ames Research Center; San Jose State University; the Swedish National Space Board (SNSB) and the Japan Aerospace Exploration Agency (JAXA), will be sending AX.25 packet telemetry at 437.465 MHz. The TechEdSat team is asking for assistance from amateurs in decoding and relaying data. Follow the mission on their Twitter page at, **http://twitter.com/TechEdSat** .More information about decoding and submitting packet data is available on their website.

FITSAT-1 - designed and built at the Fukuoka Institute of Technology, Japan, will test the feasibility of high-speed microwave data downlinks in low Earth orbit. It will transmit telemetry on 437.445 MHz and 5.84 GHz. They welcome signal reports from amateurs at their website at, **http://turing.cs.fit.ac.jp/~fitsat/.**

WE WISH - from the Meisei Electric Company Radio Club, Japan, will send CW telemetry and occasional SSTV images at 437.505 MHz.

RAIKO - designed and built by students at Wakayama University, Japan, will transmit high-speed data at 2.2 and 13 GHz.

F-1 - built by students at FPT University in Hanoi, Vietnam will send telemetry at 145.980 and 437.485 MHz using 1200-baud packet and CW. Amateurs are asked to monitor and submit reports. More information can be found at, **http://fspace.edu.vn/?page_id=27.**



Photos from IOTA Expedition to Anacapa Island

In late July, OCARC members Jeff W6UX, Tim N6GP, Kenan KR6J, along with Rick AE6RS, John KQ6ES, Dave KJ6REP went over to operate Anacapa Island during the IOTA Contest. They generated 500 QSOs on 40-20-15 as W6UX/P with a little 6M thrown in as N6GP. All continents worked (including Antarctica) with 117 QSO's in Europe.

Kenan-KR6J on landing dock, 200 feet below the top. We hauled ~ 1000 pounds of gear 1/2 mile to camp

Dave-KJ6REP and Tim-N6GP make Phone contacts

W6UX/P contest station: 20m vertical, 15m Moxon, 40m inverted-V. 2 station tents and 1 for sleeping

IOTA Team Members (L-R) W6UX, AE6RS, N6GP, KQ6ES, KR6J, and KJ6REP
(Photo courtesy of David Reinhard KJ6REP)

Photos from a Vacation to France – by Ken W6HHC

The Eiffel Tower as seen just outside the front door of our Hotel in Paris

A Chateau along the roads in the French Countryside

Swans swim by as our ship is docked on the Saone River

The grapes became ripe and were harvested during our second week. These grapes in Burgundy are from the same vines as used for bubbling Champagne

Heathkit of the Month: #43
by Bob Eckweiler, AF6C

Heathkit SB-401
HF Ham Band Transmitter

Figure 1: Heathkit SB-401 Transmitter

Introduction:
In mid 1968, after finishing college and getting a job, I found myself back on the air using a new Heathkit SB-301 receiver (See Heathkit of the Month #36) and an old Heathkit Apache TX-1 transmitter (See Heathkit of the Month #17). It was obviously a good time to update to the matching SB-401 SSB transmitter (Fig 1). I had already made a few local contacts using the AM and CW capabilities of the old Apache and was to upgrade to SSB.

On December 17th I mailed a check to Heathkit for $285.00 plus $7.10 for shipping 36 lbs. from Benton Harbor, MI. The SB-401 shipped on December 23rd and was received just before New Year. Assembly commenced almost immediately, following an inventory of the parts.

An overview of the Heathkit SB line of amateur equipment was given in Heathkit of the Month #30) and the reader may want to review it prior to reading this article. The SB-300/SB-400 and later SB-301/SB-401 were styled after the then popular top-of-the-line Collins twins.

The Earlier Heathkit SB-400 Transmitter:
Heathkit introduced the SB-400 SSB/CW transmitter (figure 2) in early 1964 shortly after it introduced the SB-300. The SB-400 runs 170 watts CW and 180 watts PEP input. It covers 80 meters through the full 10-meter band (no WARC bands in those days.) All crystals are provided for operating stand-alone or in transceiver mode with the SB-300 receiver. The SB-400 sold for $325.00. The only accessory sold for the SB-400 was the HDP-21 microphone.

The Heathkit SB-401 SSB/CW Transmitter:
In 1966 Heathkit upgraded the SB-400 to the SB-401; at the same time it also upgraded the SB-300 to the SB-301. The SB-401 sold for $285; it was produced into 1976 when the stand-alone transmitter and (by then SB-303) receiver were discontinued for the solid-state SB-104 transceiver.

The SB-401 has the same specifications as the SB-400. It is rated at 180 watts PEP input on SSB and 170 watts DC input on CW. No AM option is provided. Output is greater than 100 watts on all bands except 10 where it is rated at 80 watts. SSB carrier suppression is 55 dB below rated output (About 0.32 mW). Like the SB-400 the SB401 covers 80 through 10 meters in eight 500 KHz wide band-switch positions. Four of those 500 KHz segments positions are dedicated to cover the full 10 meter band.

Differences Between the SB-400 & SB401:
Most notably, Heathkit lowered the price of the revised transmitter by $40. A significant reason for the lower cost was the SB-401 no longer

Figure 2: Heathkit SB-400 Transmitter

included the complete set of crystals needed for stand-alone operation. Heathkit evidently realized that most of the SB-400 transmitters were being used with an SB-300, and both the SB-300 and SB-301 provides the needed frequencies to operate the SB-401 in both transceiver and split modes except in CW. Thus all but one of the crystals are redundant if either transmitter is used with the SB-300 or SB-301. For those who want to operate the SB-401 with a different receiver, Heathkit offered the optional SBA-401-1 Crystal Pack for $29.95. (See Table 1)

Four other significant changes were made to the SB-401: The crystal filter was updated from the 404-200 to the physically smaller 404-283; a chassis mounted CW sidetone oscillator level control (accessible on the upper right of the chassis after lifting the hinged top cabinet cover) was added; the LMO was changed from part #110-13 using a 6AU6 to part #110-32 (and in 1968 to 110-40) both using a 6BZ6 tube; finally a switch, mounted concentric with the **MIC CW LEVEL** potentiometer on the front panel, was added that allows switching between the receiver LMO (Linear Master Oscillator) and the transmitter LMO. On the older SB-400 this switching was inconveniently done by the operator raising the cabinet top and changing a coaxial jumper link.

Optional crystals supplied by the SBA-401-1 Crystal Pack:

	KHz	Operation
Y1	38,395.0	29.5 MHz Heterodyne Crystal
Y2	37,895.0	29.0 MHz Heterodyne Crystal
Y3	37,395.0	28.5 MHz Heterodyne Crystal
Y4	36,895.0	28.0 MHz Heterodyne Crystal
Y5	29,895.0	21.0 MHz Heterodyne Crystal
Y6	22,895.0	14.0 MHz Heterodyne Crystal
Y7	15,895.0	7.0 MHz Heterodyne Crystal
Y8	12,395.0	3.5 MHz Heterodyne Crystal
Y9	3,396.4	USB Carrier Crystal
Y11	3,393.6	LSB Carrier Crystal
Crystal Supplied with SB-401 Kit		
Y10	3,395.4	CW Carrier Crystal

Table 1 - Optional & Supplied Crystals

Front panel controls are located in three rows.

<u>**Left to right on the top row**</u>:

FINAL Tuning: Variable Capacitor

Final Loading: Variable Capacitor
← INC LOAD; 50Ω
(Concentric with Final Tuning)

MIC CW LEVEL: Dual Ganged Pot
(unnumbered gain scale)

[**FREQ. CONTROL*** 2 pos. rotary sw.
LOCKED (RCVR.), UNLOCKED
(Concentric with Mic CW Level) - SB-401]

Multi-Meter (lighted): meter (0-1 ma)
0 - 10 by 2; **0 - 500** by 100; **ALC** zone

<u>**Left to right on the middle row**</u>:

DRIVER Tuning: Variable Capacitor
(unnumbered 180° scale)

MAIN TUNING LMO var. capacitor
0 - 5 turns scale, 0 - 100 frequency scale
(both lighted)

METER switch 5 pos. rotary sw.
GRID ma, **PLATE** ma, **ALC, HV** x100, **REL PWR**

<u>**Left to right on the bottom row**</u>:

FUNCTION switch: 5 pos. rotary sw.
OFF, **STBY**, **TRCV**, **TRAN**, **SPOT**

BAND switch: 8 pos. rotary sw.
3.5, **7.0**, **14.0**, **21.0**, **28.0**, **28.5**, **29.0**, **29.5**

MODE switch: 4 pos. rotary sw.
LSB, **USB**, **CW**, **AM**

MIC connector: 2-pin connector

<u>**Notes**</u>:

[SB-401 differences are shown in brackets]
*** Early (or prototype) SB-401 marked LMO MODE**

Table 2: SB400/401 Front Panel Controls

There are numerous small circuit changes. The component designations (such as R1 etc.) changed dramatically between models. In most cases the component values remained the same. Unfortunately, the schematic of the SB-400 is not readily available on the Internet so

Connectors are listed from left to right as viewed from the rear.

The left most top connector is an RCA jack:

PATCH:	Phone patch audio 600Ω

Below it is a 1/4” phone jack:

KEY	Key
AC INPUT:	2-pin male AC socket.
Accessory Socket	9-pin Molex (See text)
Pins 1 to 7:	Spare (no connection)
Pin 8:	Ext. Ant. Relay 120 VAC
Pin 9:	Ext. Ant. Relay 120 VAC

The next ten RCA jacks are mounted vertically in pairs and are listed top then bottom:

RCVR AUDIO:	Audio from receiver
SPKR:	Audio to speaker
RCVR LMO:	Frm SB-300/301 for xcv
ANTI-VOX:	To rcvr Hi-Z audio out
HET OSC:	Frm SB-300/301 for xcv
RCVR BFO:	Frm SB-300/301 for xcv
RCVR MUTE:	Audio to Transmitter
SPARE:	Not used
LINEAR RELAY:	Keys linear amplifier
ALC INPUT:	From linear amplifier

The next connector is an SO-239 coax jack:

ANTENNA:	RF output

The last two RCA jacks are next to each other:

RCVR ANT:	Antenna out to receiver
SPARE:	Not used

Table 3: SB-300/301 Rear Connectors

the circuit changes could not be explored more deeply. One known change is R71 in the SB-400 (R402 in the SB-401) was increased from 1/2 to 1 watt. This change is also recommended for the earlier SB-400 in a Heathkit service bulletin.

The front panel of the SB-400 and SB-401 are almost identical with the exception of the added concentric **FREQUENCY LOCK** switch. Table 2 lists the front panel controls with the printed nomenclature in bold. Likewise Table 3 gives the rear panel connectors.

No.	Type	Function
V1A	1/2-6EA8	Audio Preamplifier (5)*
V1B	1/2-6EA8	Cathode Follower (3)
V2A	1/3-6AV11	LSB Carrier Oscillator
V2B	1/3-6AV11	USB/CW Carrier Osc.
V2C	1/3-6AV11	Cathode Follower
V3	6AU6	Isolation Amp/ALC Cntl
V4	6EW6	LMO Mixer
V5	6EW6	Heterodyne Mixer
V6	6AU6	LMO #110-13 (SB-400)
V6	6BZ6	LMO #110-32 (SB-401)
V6	6BZ6	LMO #110-40 (SB-401)
V7	0A2	Voltage Regulator
V8A	1/2-6AW8	Heterodyne Osc. (5)
V8B	1/2-6AW8	Rcvr. Het. Osc. Amp. (3)
V9	6CL6	RF Driver
V10	6146	Final Amplifier
V11	6146	Final Amplifier
V12A	1/3-6D10	VOX Amp
V12B	1/3-6D10	Relay Amplifier
V12C	1/3-6D10	Sidetone Amplifier
V13A	1/2-6J11	Anti-VOX Amplifier
V13B	1/2-6J11	Sidetone Oscillator

(3) refers to triode section of tube
(5) refers to pentode section of tube

Table 4: SB-400/401 Tube Line-up

CW Operation:
On CW both the SB-400 and 401 transmit on a frequency 1 KHz above the frequency the radio is tuned to. This is so that the transmitted signal will create a 1 KHz note in the receiver. This is true in both transceiver and transmitter modes. The actual CW carrier developed by the carrier generator is 1 KHz low, but is inverted later in the heterodyne mixer, as are the sidebands.

SB-400 and SB-401 Circuit description:
Since the SB-400 and the later SB-401 transmitters are so similar in design, this article will focus on the SB-401 and point out differences in the earlier SB-400 where they occur. The transmitters can be divided into 14 sections:

	Tuned Frequency	BFO Frequency	Bal. Mixer Post Filter	LMO* Frequency	LMO Mixer Output	Heterodyne Oscillator	Het. Mixer - Xmit Freq.
Nom. Oscillator Freq:	28,375.000	(As Shown)	–	5,125.000	–	36,895.000	–
USB							
Carrier (suppressed):	**28,375.000**	3,396.400	*3,396.400*	5,123.600	*8,520.000*	36,895.000	*28,375.000*
Low Tone - 500 Hz:	28,375.500	3,396.400	3,395.900	5,123.600	8,519.500	36,895.000	28,375.500
High Tone - 2300 Hz:	28,377.300	3,396.400	3,394.100	5,123.600	8,517.700	36,895.000	28,377.300
LSB							
Carrier (suppressed):	**28,375.000**	3,393.600	*3,393.600*	5,126.400	*8,520.000*	36,895.000	*28,375.000*
Low Tone - 500 Hz:	28,374.500	3,393.600	3,394.100	5,126.400	8,520.500	36,895.000	28,374.500
High Tone - 2300 Hz:	28,372.700	3,393.600	3,395.900	5,126.400	8,522.300	36,895.000	28,372.700
CW							
Carrier (1,000Hz Tone):	**28,375.000**	3,395.400	3,395.400	5,123.600	8,519.000	36,895.000	28,376.000

Table 5: USB & LSB frequencies in KHz for a two-tone (500 Hz & 2,300 Hz) signal, and for a CW signal, as they appear within a properly tuned SB-401 (See Text). Frequencies in *italic red* are suppressed by the balanced modulator as well as the crystal filter and are shown for reference only. * See LMO circuit description.

The power supply; the balanced modulator including the speech and isolation amplifiers; the carrier generator; the crystal filter, the LMO; the LMO mixer; the heterodyne oscillator and buffer; the heterodyne mixer, the RF driver; the final amplifier; ALC; metering circuits, the sidetone generator and the VOX T/R circuits. The SB-400/401 uses 13 tubes. they are shown in Table 4 and listed in each section header. A block diagram (figure 4) for the SB-401 is included at the end of the article.

1. Power Supply (V7):

The power supply is transformer based. SB-400 and early SB-401 kits came with a transformer (#54-143) that had a single 120V primary. Later units came with dual primary windings (#54-198) that could be wired for 120 or 240 volt operation. This change is believed to have occurred in the early fall of 1968.

The secondary of both transformers appear similar with three tapped windings. The filament winding provides 12.6 VAC with the center-tap grounded. One-half the winding provides 6.3V for the two 6146 final tube filaments as well as the driver tube. The other half provides 6.3V filament voltage to the rest of the tubes and the dial and meter pilot lamps. All rectifiers employ silicon diodes.

The high voltage winding supplies around 275 VAC power to a full-wave voltage doubler. Two 125 µF capacitors are effectively in series providing 63 µF of filtering, providing good regulation and 720 VDC at 250 ma load for the final amplifier tubes.

The third winding provides low voltage and negative bias power. The low end of the windings is grounded and a tap at about 95 VAC drives a half-wave voltage doubler. Two large filter capacitors and a heavy choke provide a low-ripple 250 volts DC at 100 ma to most of the circuitry. Power for the LMO and crystal heterodyne oscillator is regulated at 150 volts by V7, an 0A2 gas VR tube.

The full third winding provides about 125 VAC to a capacitor input RC filter supplying –170 VDC. Multiple resistive dividers provide negative bias voltages to numerous stages including adjustable bias to the final amplifier tubes.

2. Audio & Balanced Modulator (V1A,V1B, V3):

Audio from a high impedance microphone or a separate 600Ω phone patch jack is fed into the audio preamplifier, the pentode section of V1, a 6EA6 dual-section tube. The audio is filtered to limit RF as well as high and low frequency audio from reaching the amplifier. Output from the amplifier is sent to the VOX circuit as well as the triode section of the 6EA8 through the **MIC LEVEL** control. The triode is a cathode follower designed to match the low impedance of the balanced modulator.

Low-level RF from the carrier generator (to be discussed next) is fed into a balanced circuit consisting of four crystal diodes and an RF transformer. A capacitor and internal pot are adjusted to balance the circuit so no RF appears in the secondary of the transformer. When audio is applied, the bridge is unbalanced and two RF signals are produced; one is the sum of the carrier and the audio and one is the difference of the carrier and audio. These are the two sidebands, upper and lower. On CW no audio is present but a DC voltage is applied to the balance modulator allowing the carrier to be present at the output. This voltage is adjusted by the **CW LEVEL** that is ganged to the **MIC LEVEL** control.

The signal from the balanced modulator is amplified by V3, a 6AU6. this stage performs multiple functions. The stage gain is controlled by the ALC circuit, reducing output in response to any overdriving condition. This stage also matches the signal impedance to the next stage - the crystal filter.

3. Carrier Generator (V2):

The carrier generator is a crystal oscillator that can produce one of three frequencies in the 3,395 KHz range depending on whether the transmitter is set for USB, LSB or CW. The SB-400 comes with all three crystals, while the SB-401 has only the CW crystal, the others being part of the optional crystal kit. Both transmitters use the receiver BFO crystal signals when in transceiver mode on SSB. On CW the transmitter crystal is used since it is 1 KHz different in frequency than the receiver CW BFO crystal. On LSB the carrier signal is 3,393.6 KHz; on USB it's 3,396.4 KHz and on CW it is 3,395.4

It is interesting to note that the carrier frequencies are such that when in USB the balanced modulator and filter actually produce a LSB signal and vice-versa. The reason is because the sidebands are inverted in the later heterodyning process effectively swapping the two sidebands and producing the desired output.

The carrier generator uses a 6AV11 triple triode tube (V2). One section is the oscillator for the LSB crystal (when installed), the second section is the crystal oscillator for the USB crystal, when installed, and the CW crystal when in CW or Tune mode. The third section is a cathode follower that buffers the crystal oscillators or the transceive carrier signal from the receiver.

4. The Crystal Filter:

The crystal filter performs an important SSB function; it allows only one of the two sidebands to pass while rejecting the other sideband and also further reducing any remaining carrier signal. The output signals from the balanced modulator, contains the audio signals, the upper and lower sideband signals around

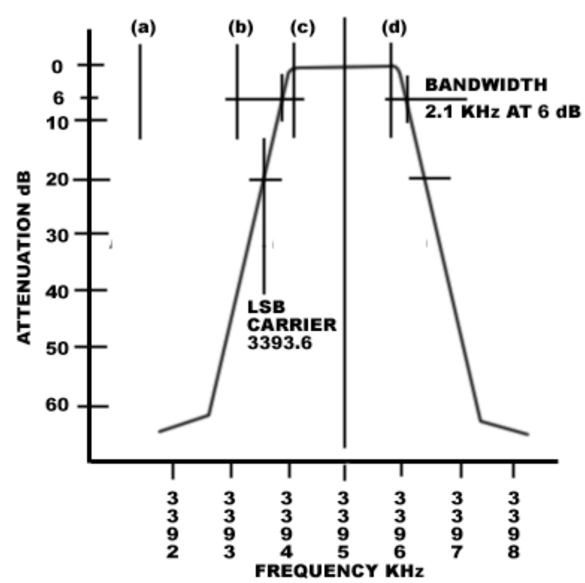


Figure 3a Crystal Filter in LSB Mode

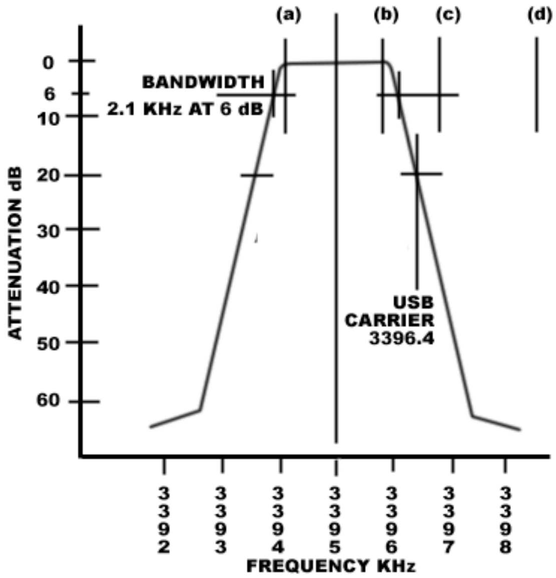


Figure 3b Crystal Filter in USB Mode

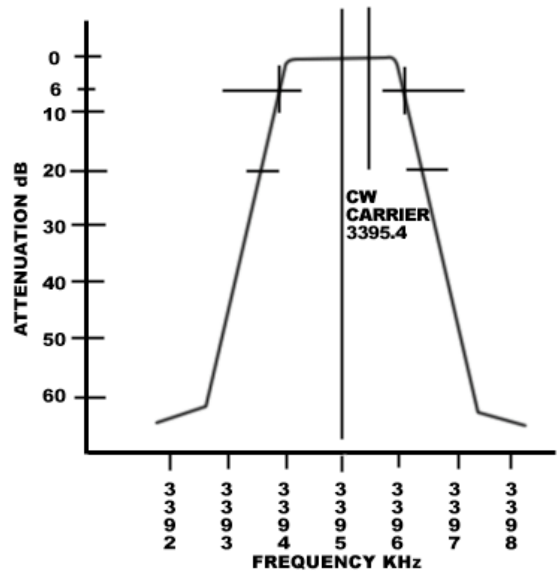


Figure 3c Crystal Filter in CW Mode

the carrier frequency and any residual carrier that is not balanced out. The audio is too low to pass the balanced modulator transformer. The remaining signals are fed to the crystal filter. Figures 3a, 3b and 3c show how the filter handles a two tone SSB signal modulated at 500 and 2,300 Hz. This signal is composed of the carrier signal (heavily suppressed by the balanced modulator), a signal (c) 500 Hz above the carrier, a signal (b) 500 Hz below the carrier, a signal (d) 2,300 Hz above the carrier and a signal (a) 2,300 Hz below the carrier.

Figure 3a shows the LSB signal. The filter further suppresses any carrier not suppressed by the balance modulator at 3,394.6 KHz by 20 dB as well as suppressing the sideband signals at 3,394.1 KHz (b) and 3,391.3 KHz (a) while passing the sideband signals at 3,395.1 KHz (c) and 3396.9 KHz (d). As stated earlier, this is really an upper sideband signal which will be inverted later.

Figure 3b shows the same function for the USB signal. The carrier is at 3,396.4 KHz and the tone are at (a) 3,394.1 KHz, (b) 3,395.9 KHz, (c) 3,396.9 KHz and (d) 3,398.7 KHz. Again the carrier is further suppressed by the filter as are the signals at (c) and (d), while the (when inverted) USB signals at (a) and (b) are passed.

For completeness, Figure 3c shows the CW carrier which passes easily within the bandpass of the filter at 3,395.4 KHz.

The SSB output of the filter is a complete USB or LSB signal and only needs to be heterodyned to the correct frequency, inverted and amplified.

5. Linear Master Oscillator (V6):

The LMO was discussed in the SB-301 article and will be covered lightly here. It covers a nominal frequency of 5.5 MHz when tuned at the low end of a band and 5.0 MHz when tuned at the high end of a band. The actual frequency is either 1.4 KHz above or 1.4 KHz below that frequency depending on whether you are in LSB, or USB-CW. This shift is determined by a voltage applied to the bias terminal of the LMO.

6. LMO Mixer (V4):

The signal from the crystal filter is mixed with the output of the the LMO in V4, a 6EW6 pentode. Either the LMO from the receiver or transmitter is used depending on the **FREQUENCY CONTROL** switch position on the SB-401. On the earlier SB-400, this switching is done by moving a coaxial jumper. Only the sum product of the LMO mixer's output passes through a factory tuned coupler transformer with a bandpass of 8.395 to 8.895 MHz.

7. Heterodyne Oscillator Buffer (V8A, V8B):
The heterodyne oscillator generates the frequency needed to heterodyne the output from the LMO mixer to the final frequency. In transceiver mode the heterodyne signal is created in the receiver and buffered in the transmitter by the pentode section of V8(A), a 6AW8. In the transmit mode the triode section of V8(B) is a crystal oscillator that generates the heterodyne signal in the SB-400 (and SB-401, assuming the crystal pack option is installed). Table 1 list the heterodyne frequencies.

8. Heterodyne Mixer (V5):
The 6EW6 mixer mixes the heterodyne oscillator and LMO mixer output signals. The desired product is the difference between the two signals. In the process it inverts the sidebands. The unwanted sum product, which is ~17 MHz above the desired product, is easily filtered out in the plate circuit, which is tuned by coils, switched for each band and a variable capacitor, which is one section of the **DRIVER** tuning capacitor.

9. Driver Stage (V9):
The driver stage is a 6CL6. It amplifies the desired signal to the level needed to properly drive the final amplifier tubes. The plate circuit is tuned by coils switched by each band in conjunction with a section of the **DRIVER** tuning capacitor.

When operating near the high end of 40 meters an unwanted 8.6 MHz signal may be present. This is generated by the LMO and leakage of the BFO summing in the mixer. This signal is removed by a series tuned LC trap in the grid circuit of V9.

RF energy is coupled from the plate circuit of the final amplifier to the B+ end of the driver plate coils. This energy is reduced significantly by a small coupling capacitor in series with a trimmer capacitor. This "neutralization" circuit, when adjusted properly, cancels the effect of the plate to grid capacitance on the final tubes improving stability. An RF choke keeps the energy from being shunted by the low power supply impedance.

10. Final Amplifier (V10, V11):
The final amplifier uses two 6146 beam-power pentodes in parallel operating as linear class AB1 Amplifiers. Power input is 180W PEP on SSB and 170W on CW. Power output is on the order of 100W on 80 through 15 meters and 170W on 10 meters.

An operating bias of about -50V produces a resting plate current of 25 ma per tube. In standby mode, instead of raising the negative bias, the tubes are cutoff by removing the screen voltage. (see modifications section).

The plate circuit of the final amplifier uses a standard pi-network. Tuning and loading are performed by a 250 pF high-voltage variable capacitor and a 245/245/354 pF variable capacitor respectively. On 20, 15 and 10 meters just the two 245 pF sections are used. On 40 and 80 all three sections are used. An additional fixed loading capacitance of 100 pF and 200 pF are also added on 40 and 80 meters respectively. A tapped silver plated tank coil on a ceramic form in series with a separate 10 meter air coil provides the tuning inductance. A wafer on the band-switch selects the proper coil segment shorting the remaining segments out.

11. Automatic Level Control (ALC):
When the final tubes are over-driven in SSB they start to draw grid current. This current varies at the audio rate and it is rectified and the resulting negative voltage is applied to the grid of the isolation amplifier V3 reducing the overall gain. ALC voltage from an external linear amplifier can be input on the rear panel of the transmitter and provide additional input to the isolation amplifier.

12. Metering Circuits:
The front panel meter measures five parameters via a 0 – 1 mA meter with an internal resistance of 100Ω:

GRID current - (0 - 1 mA full scale). is measured by switching the meter in parallel with a fixed 4.7KΩ resistor that is in the grid circuit. The resistor is so large in relation to the meter resistance that it is effectively swamped out. Normal grid current is on the order of 0.1 mA on SSB and 0.5 mA on CW.

PLATE current - (0 - 500 mA full scale). A group of six 10-ohm resistors in parallel, and well bypassed, are in the cathode of the final tubes. These resistors drop about 0.85 volts with a plate current of 500 mA. The 100 Ω meter in series with a 750 Ω resistor will read full-scale when the cathodes are at 0.85 volts. Normal plate current peaks at about 250 mA on SSB and CW.

ALC - (arc from 0 to 1/2 of full scale). In this position the meter is placed in a bridge circuit between the screen grid and the cathode resistor of the isolation amplifier. An adjustment pot allows the meter to be set to zero when the tube is operating without any ALC bias. As ALC voltage is applied the cathode becomes less positive and the meter begins to read. When the transmitter is in standby a large negative bias is applied to cutoff the tube. This results in no cathode current and the meter reads full scale or more. During SSB operation the MIC LEVEL should be set so the meter peaks at or below half scale on the meter to prevent distortion and adjacent channel interference.

High **V**oltage - (0 - 1,000V full scale). A 500 K resistor is placed in series with the meter turning it into a 0 - 500 V voltmeter. This measures the voltage at the center-tap of the voltage doubler of the high-voltage power supply, effectively measuring the high voltage which is double the reading. A 10K resistor shunts the meter to prevent limit high voltage on the circuit when the meter is switched to a different position. the resistance is so large compared to the meter that it doesn't affect the reading.

REL PWR - (0 - 10 units full scale) A sample of the RF at the antenna jack is attenuated, rectified, and fed through an internal adjustment pot to the meter. The pot is adjusted for near full scale indication on the 80 meter band.

13. Sidetone Oscillator & Amplifier (V13B, V12C): The Sidetone oscillator produces an approximately 1,000 Hz tone when in CW and the key is pressed. this allows the operator to monitor his code sending. V13B (1/2 of a 6J11 dual pentode tube) is used as a phase-shift-oscillator. The phase shift is determined by a printed electronic circuit in the feedback circuit. The oscillator is normally biased off with a large negative bias that is grounded whenever the key is pressed. When not in the CW mode, the cathode of V13B is opened disabling the circuit.

Output of the sidetone oscillator is coupled to the sidetone amplifier V12C (1/3 of a 6D10 triple triode tube). The amplifier is coupled through an audio transformer and a sidetone level internal pot to a set of contacts on the T/R relay that switches the external speaker between the sidetone audio and the receiver audio. The adjustment pot was not used on the SB-400. Audio from the amplifier is also coupled to the VOX circuit to switch allow "break-in" operation, switching to transmit when the key is pressed.

14. VOX Circuits & TR Relay (V12A, V12B, V13A): The VOX circuit controls the switching of the radio between receive and transmit in all modes. Switching is done with a six-pole relay in the plate circuit of V12B, a triode relay amp. The cathode is biased positive by a resistive divider resulting in the tube being normally cutoff. However, the tube can be made to conduct and actuate the relay by either grounding the cathode or applying a small positive voltage to the grid. In USB and LSB the cathode is connected to the push-to-talk (PTT) line; it is grounded directly in the dune position. In SSB audio from the VOX circuit is rectified by a diode and fed to the grid causing the relay to operate. A long time-constant adjustable RC circuit keep the relay closed for a length of time; this is the VOX delay control. The diode prevents the time constant from discharging back through the VOX circuit.

Audio from the mic preamplifier (V1A) is fed through the **VOX GAIN** internal control to the VOX amplifier V12A, a triode section of a 6D10. tube. The audio from the sidetone generator is also coupled to the input of the tube. The output of this stage is coupled to the relay amp so when a sidetone is generated in CW or mic audio is present in SSB the relay switches to transmit.

To prevent extraneous audio from the receiver from tripping the relay V13A operates as an anti-VOX circuit. Audio from the receiver is amplified by the other pentode section of the 6J11 tube acting as an amplifier. It is AC coupled to a diode which rectifies the receiver audio into a negative voltage. This voltage is fed in parallel with the output of the VOX amplifier bucking any audio present on both the receiver and microphone. An internal **ANTI-VOX** control adjusts the level of the receiver audio reaching the anti-VOX amplifier.

The TR relay has six poles of contacts that, when energized:

1. Switches AC line voltage to an accessory socket for an external antenna relay.

2. Applies screen-grid voltage to the finals and operates the internal antenna relay.

3. Opens the receiver **RCVR MUTE** jack and grounds the **LINEAR RELAY** jack.

4. Switches the grid bias for the isolation amplifier from cutoff bias to the ALC line in SSB and to ground in CW.

5. Removes cutoff bias to the final driver in SSB and connects the bias to the key jack in CW.

6. Disconnects the **SPKR** jack line from the **RCVR AUDIO** jack line and connects it to the sidetone generator output.

Assembling the SB-401:
This is an advanced kit and assembly takes some time. Due to six-night work weeks and other obligations almost a month passed before the transmitter was completed and checked out. Assembly was straightforward and the manual instructions clear, making time spent in assembly as much fun as the later operating.

Parts are shipped sorted in five separate packs; the kit is assembled in five sections. Each section has its own parts list and, except for the larger parts, its own pack. Assembly is eased somewhat by two printed circuit boards that are assembled first. Pack one is for the Mixer Bandpass circuit board that contains the LMO and heterodyne mixers - V4 and V5. Pack two is for the Carrier Generator circuit board that contains the speech amplifier, balanced modulator, isolation amplifier, VOX/T-R and sidetone circuits - V1, V2, V3, V12 and V13. Pack three contains parts for the chassis assembly and initial wiring. Pack four contains parts for the majority of the chassis wiring. And pack five contains parts for the final wiring along with the larger parts that don't fit in the smaller packages. The kit is well shielded and assembly includes installing compartment shields, many of which contain components. This adds to chassis rigidness, a plus for frequency stability.

Initial Test and Alignment:
Plugging in a newly completed kit is always an exciting moment; something rarely experienced by the instant gratification folk. Before powering up, however, Heath, in its manual leads you through a series of resistance checks. These test for major shorts that could result in significant damage. Once plugged in and turned on, voltages are checked. If all appears well, then it is time to move on to alignment.

Alignment requires a VTVM (also used for the initial test) along with an RF probe for the VTVM such as the Heathkit #309C, a dummy load such as the Heathkit Cantenna, a receiver and a hi-Z microphone. Coil and capacitor adjustment tools are included with the kit.

You are given two choices fot alignment; one uses an SB-301 receiver, the other the optional SBA-401-1 crystal pack. Both are identical except for heterodyne and carrier oscillator sections. Alignment is straightforward using the chosen SB-301 method, and all went well until the final stage was reached!

This is the only time that I recall building a Heathkit that didn't operate right off the bat. When the transmitter was first set to transmit a sizzling noise was heard and sparks were seen in both of the 6146 final tubes. Power was quickly removed; a check showed that the antenna relay was wired improperly resulting in no load on the transmitter. It was quickly fixed and the tubes inspected. There were a few little balls of once molten metal rattling around in each final tube; but I had no spares so they were plugged back into their sockets and the transmitter cautiously powered up. Surprisingly, the transmitter worked and the tubes still gave full output. I used those tubes for years without changing them, though a new set of spares went on the shelf within a few days of encountering the problem.

Modification & Upgrades:
Over the life of the SB-400 and SB-401 there have been some upgrades that Heathkit has quietly introduced into the SB-401. Most of these are included in the Heathkit SB-401 service bulletins, which can be found online at:

https://puck.nether.net/pipermail/heath/1998-June/029701.html

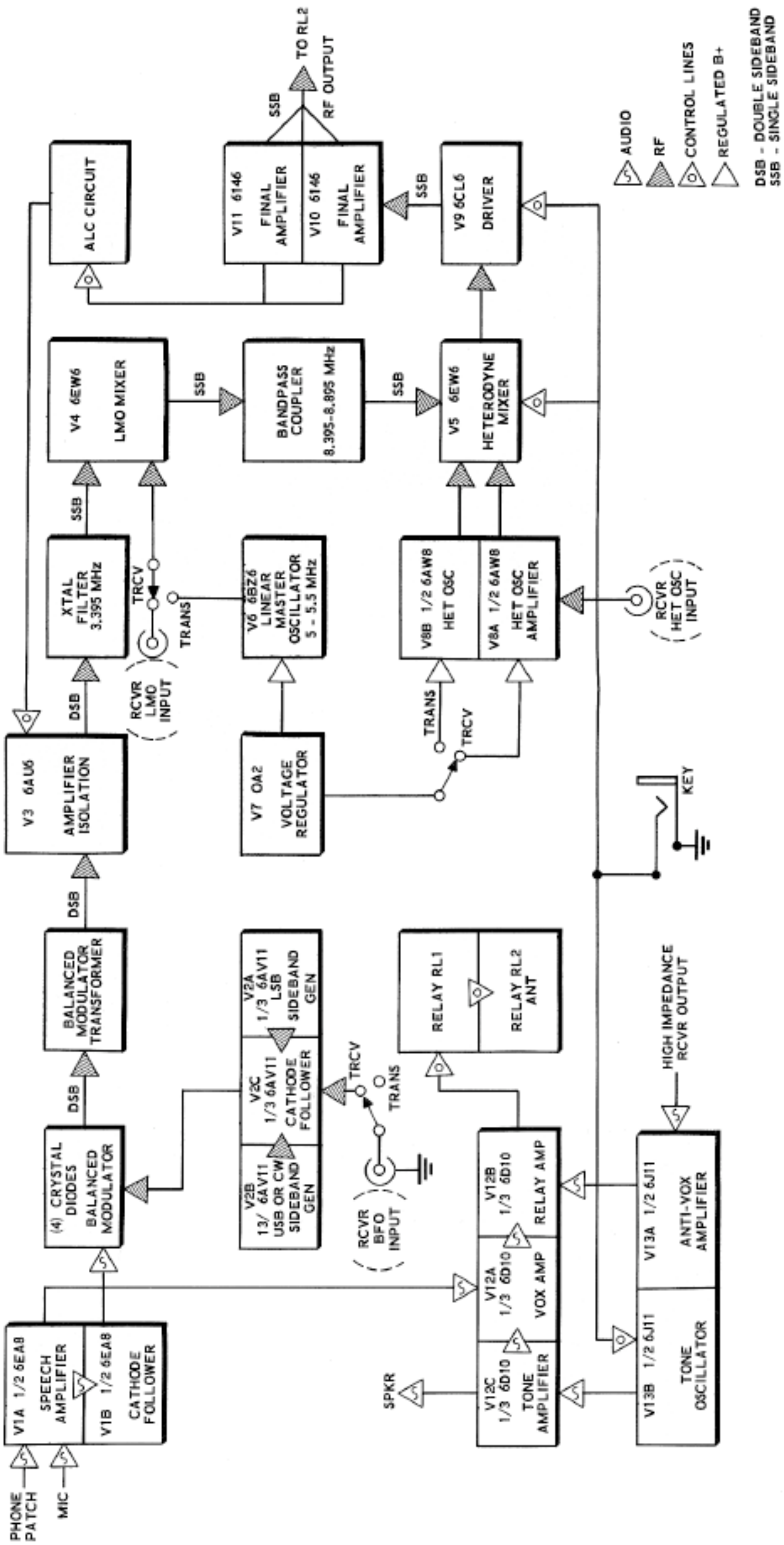
One modification that Heathkit recommended, and I made, solved a long time problem; when switching from transmit back to receive the antenna relay would hang causing me to miss the first few seconds of reception. This is most notable after the radio gets hot. It turns out that the antenna relay is powered by the screen grid voltage supply. This voltage is switched by the T/R relay. As the final tubes age they get gassy resulting in enough secondary emission from the screen grid to keep the antenna relay closed. The solution is simply to add a jumper from the formerly unused NC contact of that relay section (pin 7) to ground. This grounds the screen grid in receive instead of just leaving it open. Gassy tubes are often still able to put out full power so changing them would be an expensive and temporary solution.

Operation:
The SB-401, along with its companion SB-301 receiver provided good service here in the shack for more than 25 years. The original finals are still installed and when last checked it still exceeded 100 watts out on 15 meters. The transmitter never required repair, though it has been removed from the case and dusted more than once. The switch contacts and relay contacts were usually cleaned at the same time. The radio was used to work DXCC and worked well in the split and transceiver modes. The optional crystal pack was never installed nor needed. Stability, CW note and audio quality have always been reported as very good. It's hard to believe that the radio is approaching 44 years of use. It was recently put back on the air while the TS-440 was being repaired. Other than missing the noise blanker and being a few hundred cycles off the 28.375 MHz net frequency, it worked just fine.

Next Month:
This month's article was quite long, there was a lot to cover. Next month we'll look at a simpler kit from Heathkit's test equipment line.

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



Heathkit SB-401 Block Diagram
From Early SB-401 Manual
(Dated: 3/24/67)
Heathkit Part No. 595-823

Figure 4

Swains Island NH8S 2012 DXpedition

by Arnold I. Shatz N6HC
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Swains Island (IOTA OC-200) is privately owned by the Jennings family. It is a low-lying coral atoll located about 200 miles northwest of Tutuila, the main island of the American Samoa island group. The reefs have high coral cover with many different types of corals and maintain a low incidence of disease. Near shore waters are home to large schools of predators like barracudas, jacks and snappers. Sharks and large humpback wrasse are frequently seen. Dogtooth tuna are also more common around the island than elsewhere in American Samoa. Swains Island has a rich cultural history and was once the site of an active copra plantation. Its scenic beaches and abundant natural resources make it a potential eco-tourism destination.

One of the mysteries of Swains Island is the presence of an eighteen inch stone idol that sits on top of a four foot stone structure in a clearing. No one knows the origin of the idol although some of the Jennings family members have speculated that in the past, the ocean water flowed into the lagoon through a small channel at high tide. They suggest that the idol may have been a marker to show traveling Polynesians how they could enter the lagoon and seek shelter on their journeys throughout the Pacific.

The last DXpedition to Swains Island was in 2007. In September of 2012, a group of eighteen amateur radio operators reactivated Swains Island under the callsign NH8S. These hams were K9CT – Craig (co-leader), W8GEX – Joe (co-leader), ND2T – Tom, N2TU – Lou, AA4NN – Joe, K5AB – Alan, NA6M – Mark, W6KK – Charlie, N6HC – Arnie (team physician), N6HD – David, W8TN – Clark, W8HC – Hal, K9CS – Carl, WB9Z – Jerry, K9NW – Mike, SM5AQD – Hawk, DL3DXX – Dietmar, and 9V1FJ – Barry. The team DXpedition members' experiences varied from many prior major DXpeditions to no prior major DXpedition experience. A nineteenth member of the group got as close as off shore of Swains Island but he needed to return on the ship to Pago Pago for medical treatment…DJ2VO-Jurgen.

Four members of the team are members of the Chiltern DX Club (CDXC) based in U.K.: SM5AQD, 9V1FJ, ND2T and N6HC.

Three members of the team are Southern California DX Club members: W6KK, N6HD and N6HC (see **Fig 1**).

Figure 1 – SCDXC members (L-R) W6KK, N6HC and W6HD

No major DXpedition can function successfully without support personnel. Our sterling support team consisted of NV9L – Valerie (North American pilot), MM0NDX – Col (European pilot), John – K6MM (Relay pilot and webmaster extraordinaire); Paul – W8AEF (testing), Paul – W6XA (testing), Tom – N4XP (testing), and John – N7CQQ (testing); Don – N1DG (logistics), Max – I8NHJ (logistics); Markus – DL9RCF (fundraising), Janet – W8CAA (fundraising), and Margarett – XYL of AA4NN (fundraising).

The co-leaders made all the requisite arrangements with Alex Jennings who is the family representative and has the authority to grant access to the island. Sponsors were asked to help fund the expedition by either supplying equipment or donating to the operational account…or both. A team of operators was chosen. All of the electronic equipment and antennas were tested before being staged for shipping from Southern California by Arnie (N6HC). Four heavily laden pallets were sent to the Port of Los Angeles for shipment to Pago Pago. The pallets were then transferred to the MV Lady Naomi and delivered to Swains Island in advance of the arrival of the DXpedition team.

The multinational DXpedition team met in Honolulu, Hawaii on September 1, 2012. We had a lovely dinner at Sam Choy's restaurant with many of the local Hawaiian hams including Kimo-KH7U, Eran-WH6R, Martin-KH6MB, Mark-WH7W and last, but not least, Lee-KH6 Blooming Zipper Flipper. On September 3, 2012 we boarded a flight to Pago Pago, American Samoa. We spent the night at the Tradewinds Hotel where we had our last comfortable shower and our last air-conditioned night of rest in a comfortable bed. We also hooked up with John – N7CQQ and Ron – N6XT who were staying at the same hotel and were planning a trip to Tokelau for a two man DXpedition. The following day we departed for Swains Island for a 22 hour cruise on the MV Lady Naomi with her resident roaches and "interesting" aromas. Most of the team made use of a Scopolamine patch to prevent motion sickness. In spite of this precaution, a couple of the team members required ancillary treatment to control their uncomfortable sea sickness symptoms. One of the team members became disoriented, had memory disturbances, dizziness, restlessness and confusion. He wandered the ship alone during the nighttime passage and sustained a deep, extensive lower leg laceration that required multiple sutures to repair. This laceration was complicated by the fact that he was also taking an anti-coagulant for a cardiac condition. The co-leaders and team physician agreed that it would be very prudent to send him back to Pago Pago for further evaluation and treatment. The differential diagnosis of this symptom complex was eventually determined to be a rare adverse reaction to the Scopolamine patch and after several days of hospitalization and diagnostic tests he recovered completely. He rejoined the team when they returned to Pago Pago twelve days later.

Our DXpedition contract called for the food and drink, tents, generators and fuel to be provided by the Jennings family represented by David Jennings on Swains Island. He had a crew of twelve to service our needs during the island stay. A four wheel drive ATV pulling a small wagon was indispensable in transporting equipment and personnel to the SSB and CW tent sites. Our "tent city" was on the west side of the island and our operating tents were on the north side of the island. We spent the better part of two days erecting our antennas and setting up the stations in 100 degree plus heat. Generally, the weather during our stay was "hot, hot, hot" with occasional passing tropical squalls which provided us with fresh water that could be used for washing dishes or clothes and for showering. There were two antenna fields positioned well away from each other. We never experienced interference between the CW and SSB/RTTY sites. For 10, 12, 15, 17 and 20 meters we used SVDA two element arrays. On six meters we had a five element InnovAntenna yagi. For 30, 40 80 and 160 meters we used vertical arrays. The SSB site had a four square 40 meter array but the CW four square was problematic and we just used one element as a simple vertical. The beach was quite narrow and primarily made of crushed coral with little sand; secure guying became an issue at high tide. Late in the expedition, we lost the 80 meter vertical due to a guying issue at high tide and we lost the 160 meter Titanex vertical due to a high tide issue and the control box at the base of the antenna.

The transceivers were provided by Icom…IC-7600. We had five KPA500 amplifiers by EleCraft and two PW-1 amplifiers by Icom. There was a phase noise issue associated with the radios which we worked around by adjusting our operating bands. The amplifiers performed flawlessly. Our generators were the Home Depot Generac 5000 model and we had two at each operating site. A maintenance engineer provided by the Jennings family serviced and filled the generators, as needed, and we never had a power challenge during the entire operation. Our logging program was N1MM.

Our operating schedule was simple. Three teams of six individuals each – three for the CW tent and three for the SSB/RTTY tent each shift. What wasn't simple was the rotation of three hours on the radio and six hours off…. around the clock. I think that almost everyone felt sleep deprived by the end of the trip.

We had three cooks to prepare our meals. For breakfast we might have eggs, bacon, oatmeal or pancakes with juice or coffee. For lunch we free lanced with snacks. Dinner varied from pasta, ribs or sea food including fresh sashimi, crab, lobster or fish. There was plenty of bottled water, Gatorade, soda, coffee, tea, cocoa and beer. No one went hungry on this trip and no one lost any weight!

Hygiene was a challenge. Our shower consisted of a tent housing a fifty gallon drum filled with rain water at ambient temperature. A moderate sized tureen floated in the drum. You simply filled the tureen with water, poured some water over your body, used your bar soap and then poured some more water over your body to wash away the soap. This set-up trumped an ocean bath where bar soap is useless.

We had a two drop water closet that was flushed with sea water. It was a challenge to keep the toilets from backing up. But at least we didn't need to dig an 8-ft long drop capped by a toilet seat.

Medical issues that came to my attention ranged from anorexia, nausea, vomiting, diarrhea, constipation, "stuffy" ears, sun burn, rashes, sole of the foot blisters in a diabetic with peripheral neuropathy, mosquito and spider bites. Unfortunately, one of the bites became infected with MRSA, and when my patient returned home, he required hospitalization and IV antibiotics and incision and drainage of an abscess. Several of the islanders made use of my services and medical kit supplies. This was a very geriatric crew with the youngest member being 49 years old and the eldest, 79 years of age.

We had both Inmarsat and BGAN satellite access on Swains Island. This facilitated communication to friends and relatives as well as allowing us to upload our log data on a daily basis.

A summary of our statistics show that over nine days of operation, we totaled 105,455 QSOs, with 54,128 on CW, 43,126 on SSB and 8,201 on RTTY. Continental breakdown revealed 41% North America, 28% Europe, and 27% Asia. Please see our web site at www.nh8s.org for a further breakdown of the statistics and to view our photo module.

The trip back to Pago Pago was quite similar to our previous passage to Swains Island. We were all looking forward to getting back to the Tradewinds Hotel to get a long, warm shower and a rest on a firm mattress in an air-conditioned room. Alex Jennings gave us a tour of Pago Pago the following day and then hosted the entire team at his home for dinner. After the meal, we were transported to the airport where we boarded a Hawaiian Airlines 737 for our return to Honolulu. The team members said our goodbyes in the Honolulu airport and we went our separate ways.

Friendships were made on this trip that will undoubtedly last a lifetime. Mutual respect for one another was religiously practiced. We supported each other in and out of the radio tents. We laughed together and we worked hard together under conditions that can only be described as "basic." We had great leadership throughout the DXpedition.

Figure 2 – The NH8S Team on Swains Island 2012

I would like to thank all the sponsors and donors for their generosity. Without that support, this DXpedition would not have happened.

I hope that you were able to make it into the log. It wasn't for lack of trying on our part if you were not fortunate enough to contact us. Our QSL manager is AA4NN. Please check the web site for QSL card options.

OCARC GENERAL MEETING MINUTES 2012-09-21

The OCARC General Meeting was held at the Red Cross complex in Santa Ana on Friday evening, September 21st at 7 PM. There were a total of 24 members and no visitors in attendance, with five directors present, so a quorum was declared. Absent were Secretary W6HHC, Membership W6UX, Activities W6FKX, Technical W6JOR and Director at-Large K6PEQ.

Vice President Robbie KB6CJZ introduced the speaker. Chip Margelli K7JA. The theme of the presentation was:

"WY7FD Field Day Adventure 2012"

Chip KJ7A presented on operating FD from high above Devils Tower, WY and its challenges like 80 MPH winds, antennas falling over, and lightning strikes.

OLD BUSINESS

- **2012 Elections** - Nicholas AF6CF, as the Elections Committee Chairman explained that OCARC 2012 Elections would be held at the Nov General Meeting. Nicholas asked the membership if anybody present wanted to run for office and passed a signup sheet.
- **LoTW** – The OCARC License Trustee, Bob AF6C, reported that "We (the OCARC W6ZE) are now in LOTW, the Logbook of The World system".
- **FD 2013** - A conversation about the 2013 Field Day was held, with input from several members regarding site banners. Postcards, Logistics, etc.

NEW BUSINESS

None

Respectfully submitted by:
Nicholas Haban AF6CF, for Sec. W6HHC

Some W6HK History – Ken Bourne W6HK Replies:

Last month a photo from the December 1964 issue of CQ was published in the RF Newsletter. The picture shows club member Ken Bourne - W6HK, (then K9GHR) at his station. In the article I asked Ken W6HK to pass along a run-down of his equipment in the photo.

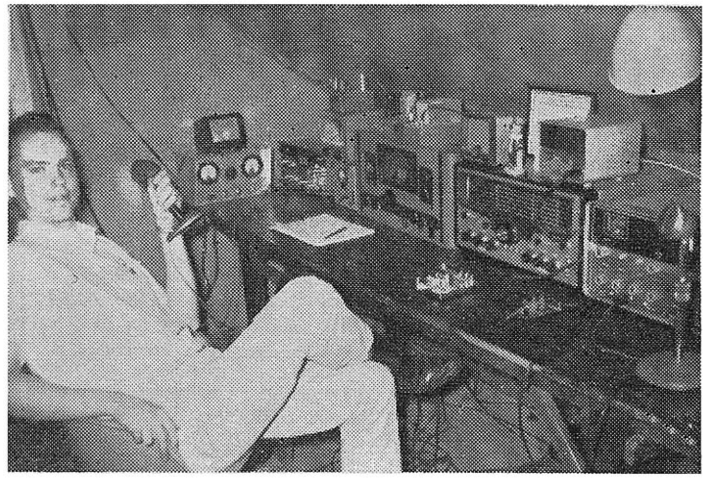


Photo of Ken Bourne, K9GHR, at his new VHF equipped QTH. A big Illinois signal during the August 1964 CQ VHF Contest

Here is his reply:
"Thanks for running an article about my 1964 exploits in the RF Newsletter. It sure brought back memories! In response to your request for a rundown on my 1964 ham shack, here goes:

"At the far left, under the CDR rotator control, is a precision noise generator that I designed and built as my last-semester lab project at Valparaiso Technical Institute. I was using it in the ham shack for a number of projects, including measuring the noise figure of a nuvistor 6-meter preamp that I homebrewed. That preamp is sitting near an International Crystal 6-meter converter that is perched on top of a VFO for my Globe Scout Deluxe (left end of table), the transmitter that I used on 6 meters for taking the Illinois certificate in the August 1964 CQ VHF contest. The converter was connected to the RME-45 receiver.

By the way, my wife Carol, N6YL, bought that RME-45 receiver before we got married in 1963, to listen to me on 10 and 15 meters AM. She got her first license (WA9NEJ) in 1964.

- - Continued on next page - -

OCARC BOARD MEETING MINUTES

2012-09-08

The OCARC Board meeting was held at the JägerHaus Restaurant, 2525 East Ball Road, Anaheim, on 2012-09-08 at 8:15 AM. There was a quorum of board directors present with only AF6C, K6PEQ, W6FKX, and W6UX absent.

DIRECTOR REPORTS:

- **VP –** Robbie KB6CJZ reported that the programs for the rest of year:
  - Sept – Chip K7JA on FD in WY
  - Oct – OCARC yearly Radio Auction
  - Nov – Arnie N6HC on Swains DXpedt'n
  - Dec – OCARC Holiday Party
- **Technical –** John W6JOR brought in the 160M receiving antenna using a 5-ft diameter loop of coax. The antenna details can be read in TechTalk on Page 6.

OLD BIZ:

- **Newsletter Editors**
  - Oct – Ken W6HHC
  - Nov – Paul W6GMU
  - Dec – AF6C?? or AF6CF?
  - Jan – AF6CF?? or AF6C??
- **CA QSO Party –** Tim N6GP reported that the California QSO party is scheduled to begin on Oct 6 at 16:00 GMT. All members will be encouraged to operate the contest from home and submit their score combined under OCARC-W6ZE.
- **AUCTION –** Tim N6GP reported that Auction Flyers were at HRO. Ken explained that he needed members to e-mail in a list of equipment, so that we can place the list on the WEB site.

NEW BIZ:

- **Elections for 2013 Officers -** President Paul W6GMU appointed Nicholas AF6CF to be Chair of the Nominating Committee. Nicholas asked any member who is interested in helping to run the club…to please contact him. The election is held at the General Meeting in November.

GOOD OF CLUB:

- **APRS Tracker** – Nicholas brought in a new APRS tracker from Bionics that has a GPS antenna on the PCBA and has a built in 2M transmitter. He plans to test it on a trip to Colorado soon…and show it to the Baker-2-Vegas RACES team on Orange.

Respectfully submitted by:
Ken Konechy W6HHC, Secretary

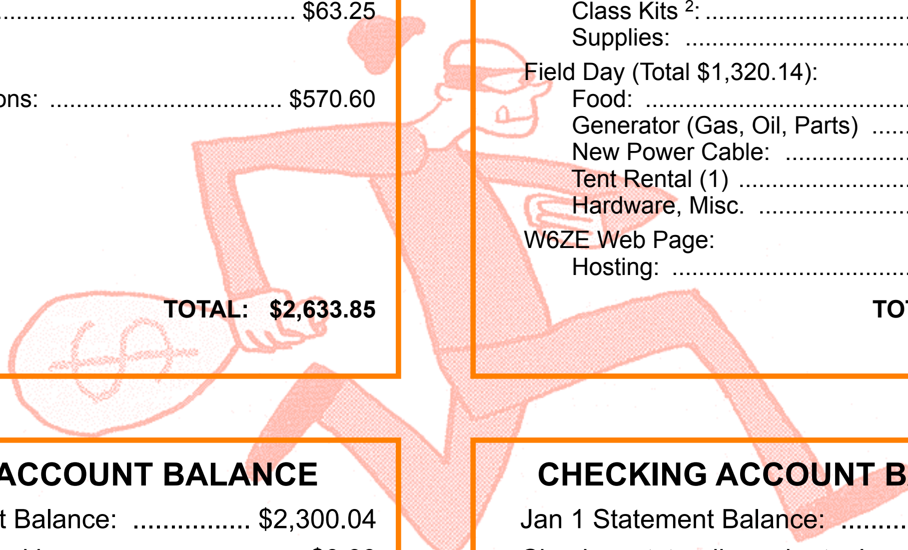
Some W6HK History – Ken Bourne W6HK Replies:

- - - continued - - -

Between the Globe Scout Deluxe and the RME-45 is a military surplus switching unit with AC voltmeter and a nice big lever switch that I used for push-to-talk. Another piece of homebrew equipment is a 10-meter AM transmitter with a 2E26 as the final amplifier. To the right of the RME-45 is a Hallicrafters SX-101A receiver with a speaker on top left and a Hallicrafters HA-1 T.O. Keyer on top right. Carol lugged that keyer to the FCC in downtown Chicago in 1973 to pass her 20-wpm CW transmitting test, when she got her Extra Class license. To the right of the SX-101A is a Hallicrafters HT-37 transmitter. Under the table are Motorola 5V transmitter and receiver strips that I padded and tweaked for use on 2 meters FM, along with a homebrew AC power supply. I wish I had saved that equipment, but just looking at the picture is a nice trip to Nostalgia Land.

"73,
Ken, W6HK (ex-K9GHR)"

OCARC TREASURER'S REPORT
Jan 1, 2012 Through Sep 30, 2012
OPERATING ACCOUNT



OPERATING INCOME

Dues 2012 (Total: $1,145.00):	
Regular Member[1]:	$1,075.00
Family Member[1]:	$70.00
Club Badges:	
New Badge:	$29.00
Mailing:	$1.00
ARRL Membership Thru Club:	
New:	$39.00
Renewal:	$0.00
Monthly Opportunity Drawing:	
Ticket Sales:	$786.00
Soldering Class:	
Class Kits:	$63.25
Field Day:	
Food Donations:	$570.60
TOTAL:	**$2,633.85**

OPERATING EXPENSES

Operations and Supplies (Total: $456.41):	
Calif. Corp. Fee:	$20.00
Insurance:	$300.00
PO Box (1 Yr Renewal):	$52.00
Postage:	$17.60
Flowers (Filed Day site)	$66.81
Club Badges:	
Materials:	$0.00
ARRL Membership Thru Club (Total: $24.00):	
New:	$24.00
Renewal:	$0.00
Monthly Opportunity Drawing:	
Purchases:	$1,345.07
Soldering Class (Total: $83.43):	
Class Kits [2]:	$75.70
Supplies:	$7.73
Field Day (Total $1,320.14):	
Food:	$1,014.94
Generator (Gas, Oil, Parts)	$50.93
New Power Cable:	$124.42
Tent Rental (1)	$25.86
Hardware, Misc.	$103.99
W6ZE Web Page:	
Hosting:	$107.91
TOTAL:	**$3,336.96**

SAVINGS ACCOUNT BALANCE

Jan 1 Statement Balance:	$2,300.04
Moved from Checking:	$0.00
Moved to Checking:	$0.00
Interest YTD:	$1.72
Sep 30 Statement Balance:	$2,301.76

SUMMARY

January 1, 2012	
Savings Account:	$2,300.04
Checking Account:	$3,867.06
Total:	**$6,167.10**
September 30, 2012	
Savings Account:	$2,301.76
Checking Account:	$3,163.95
Total:	**$5,465.71**
Net Gain (Loss):	**($701.39)**

CHECKING ACCOUNT BALANCE

Jan 1 Statement Balance:	$4,165.36
Checks outstanding prior to Jan 1[3]:	($298.30)
Jan 1 Checking Balance:	**$3,867.06**
Quarter 1 - 3. Income:	$2,633.85
Quarter 1 - 3. Expenses:	($3,336.96)
Sep 30 Checking Balance:	$3,163.95
Checks outstanding as of Jun 30:	$78.97
Sep 30 Statement Balance:	$3,242.92

Notes:
[1] $420.00 of 2012 dues collected in 2011 are not included in 2012 accounting.
[2] One kit not sold.
[3] All 2011 outstanding checks have cleared.

73, from Treasurer - AF6C