RF

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LIII NO. 07 **P.O. BOX 3454, TUSTIN, CA 92781-3454** **July 2012**

The Prez Sez.....

by Paul W6GMU

I hope y'all had as great a Field Day as I had! It seems that all to whom I spoke had the same feeling. We beat last year's score by 7% and had a blast doing it. In this, **Dee**'s (**N8UZE**) excellent leadership and FD expertise were instrumental.

I was gratified to see such a great turnout for all 3 operational phases: Setup, Operation and Teardown.

Member Bob KJ6VQW created a 3-minute YouTube video of the OCARC FD in action. See the front page of WEB site for link.

Well done, Team OCARC!

Next up is the July 20th General Meeting presentation **"Solar Panels & Ham Radio"** by Peter Putnam, NI6E. This is a very important and quite interesting subject which may give us ideas on how to operate under emergency conditions when the power grid is down. I suggest that all those interested take notes! Our own Nicholas, AF6CF is also an in-house solar power expert and is always glad to offer technical aid in this area (among others).

With that, I hope you all continue to have a wonderful summer!!

73 de Paul W6GMU
The Prez

Next Meeting

Our General Meeting will be held on Friday, July 20th

"Solar Panels & Ham Radio"
by Peter Putnam, NI6E

The next general meeting will be on:

Friday, July 20th
@ 7:00 PM

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

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www.W6ZE.org

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Monthly Events:

General Meeting:
Third Friday of the month
Meeting begins 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:

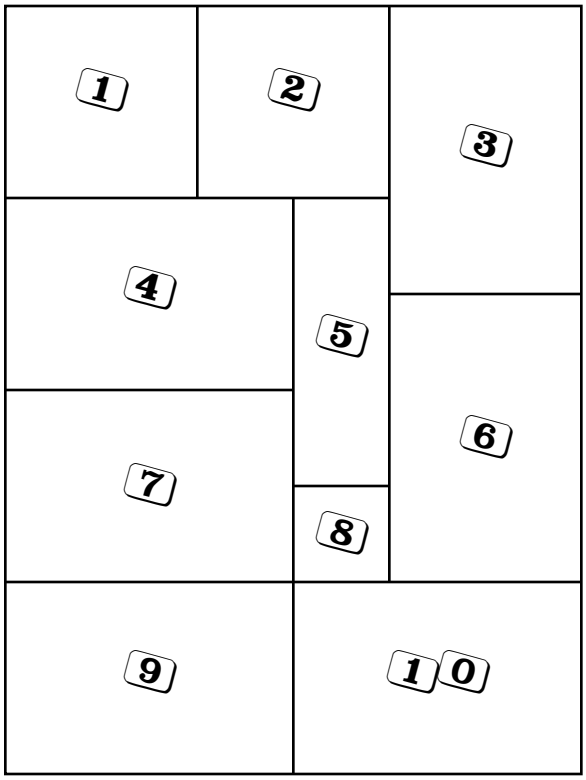
Regular Members	...$20
Family Members*	...$10
Teenage Members	..$10
Club Badge**	.....$3

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.

OCARC 2012 FIELD DAY - W6ZE (Walter Knott Education Center)



COLLAGE KEY

1. 20 meter yagi and 20 phone tent. *(Photo by W6HHC - DSC_1334)*
2. Assembling the 15 meter yagi. L-to-R W6HHC, N6UX, AF6C. *(Photo by N6UZE, - AF6C - 100_0085)*
3. 40 meter inverted-vee wire-beam. *(Photo by WØMEC - FD2012-01)*
4. Satellite antenna in foreground; 20 CW tent and 40/15 meter trailer in background. *(Photo by W6VKO - 2012 057)*
5. 15 meter Moxon antenna. *(Photo by KE6ZMG - DSC_1334)*
6. Carl - N8AE enjoys operating in the 80/10 meter tent. *(Photo by W6HHC - DSC1333)*
7. A class was given at Field Day on the proper installation of PL-259 coaxial connectors. *(Photo by WØMEC - FD2012-09)*
8. Solar panel voltage regulator designed by Nicholas - AF6CF. *(Photo by AF6C - 100-0090)*
9. Friday dinner after setup. L-to-R W6GMU, KI6WZU, Gordon Lewis (no call), KJ6NGF, KB6CJZ and AF6C. *(Photo by W6HHC - DSC_1307)*
10. Boy Scout Troop 788 led by Brett - W6BAC participated with our club, running the GOTA station. L-to-R W6BAC, Brian - KI6LSJ and Bryan Coultier. *(Photo by W6HHC - DSC_1332)*

In the middle of teardown early Sunday afternoon the 2012 FD team paused for a Field Day photograph taken by Ken, W6HHC. *(Photo by W6HHC- DSC_1349)*

"RF" ORANGE COUNTY AMATEUR RADIO CLUB JULY 2012

FIELD DAY SUMMARY

FOR

THE ORANGE COUNTY AMATEUR RADIO CLUB - W6ZE

by: Ken / W6HHC & Bob / AF6C

YEAR	160M SSB	80M CW	75M SSB	40M CW	40M SSB	20M CW	20M SSB	15M CW	15M SSB	12M SSB	10M CW	10M SSB	6M CW	6M PHN	2M CW	2M PHN	220 PHN	440 PHN	UHF CW	UHF PHN	ATV	RTTY Dig	SAT-ELLITE	GOTA	- - - - TOTAL - - - - QSO's	/	(POINTS)
2012	**0**	**14**	**51**	**125**	**78**	**215**	**735**	**185**	**330**	0	0	**12**	**1**	**50**	**0**	**37**	**5**	**5**	0	0	0	**13**	**0**	**408**	2,264	/	5,634
2011	0	58	176	168	217	253	703	32	198	0	16	40	0	57	0	37	0	16	0	0	0	0	0	139	2,110	/	5,278
2010	0	0	0	240	342	223	727	49	0	0	0	0	1	96	0	32	1	7	0	0	0	0	0	160	1,878	/	4,786
2009	0	277	126	838	807	974	970	495	368	0	5	450	11	375	0	125	18	20	1	0	0	0	2	130	5,992	/	17,446
2008	0	179	204	690	405	411	878	141	43	0	22	68	15	135	0	34	2	14	0	3	0	0	5	16	3,265	/	9,468
2007	1	356	310	910	830	988	1285	381	320	0	18	150	9	145	2	175	40	70	2	9	0	2	11	142	6,156	/	17,648
2006	0	28	20	89	512	156	664	16	10	0	0	0	0	38	1	85	0	7	0	0	0	114	0	113	1,853	/	4,514
2005	0	113	6	158	481	337	534	122	17	0	0	0	0	74	0	36	16	20	0	0	0	0	0	31	1,945	/	5,350
2004	0	166	239	37	412	131	477	31	105	0	1	114	0	0	0	46	12	20			0	0	1	0	1,792	/	4,316
2003	0	0	85	52	127	27	295	0	191	0	0	41	0	52	0	64	1	13			0	0	0	0	948	/	2,054
2002	0	26	69	192	279	76	229	0	485	0	0	18	0	62	0	68	6	10			3	2	0	3	1,528	/	3,648
2001	0	0	25	101	251	0	432	0	675	0	0	109	0	48	0	28	1	0			0	0	3	-	1,673	/	3,548
2000	0	19	20	88	91	0	625	0	794	0	0	121	0	36	0	72	7	15			0	0	1	-	1,889	/	3,992
1999	0	13	20	15	237	0	996	0	724	0	0	22		5	0	2	0	0			0	0	0	-	2,034	/	4,124
1998	0	24	75	65	136	100	250	0	624	0	0	82		0	0	46	17	12			0	7	1	-	1,439	/	3,270
1997	5	81	131	83	306	150	853	14	275	0	0	106		32	0	79	4	0			0	32	1	-	2,152	/	5,024
1996	-	146	228	104	125	283	673	40	605	0	0	217		121	0	32	0	40			0	13	1	-	2,628	/	6,428
1995	-	145	272	203	94	443	572	51	451	0	0	131		66	0	93	29	8			0	33	6	-	2,597	/	6,944
1994	-	114	114	208	45	486	748	85	761	0	13	312		58	0	94	33	0			0	31	0	-	3,102	/	8,078
1993	-	150	100	159	81	530	700	131	812	0	0	179		40	0	86	12	16			0	35	0	-	3,061	/	8,132
1992	-	0	294	200	110	541	555	0	840	0	0	232		13	0	74	0	1			2	41	80	-	2,983	/	7,530
1991	-	105	308	182	182	400	623	9	463	0	0	104		4	0	141	23	11			0	48	0	-	2,626	/	6,740
1990	-	0	0	70	144	0	370	0	747	0	0	131		39	0	114	14	26			0	2	-	-	1,657	/	3,454
1989	-	30	0	98	5	0	906	21	172	0	0	238		3	0	121	24	9			1	18	-	-	1,646	/	3,590
1988	-	127	0	93	75	2	359	0	570	0	144	81		0	0	32	0	-			-	14	-	-	1,497	/	3,726
1987	-	22	0	0	39	0	708	0	18	1	117	0		1	0	51	0	-			-	5	-	-	962	/	2,202
1986	-	0	46	219	78	0	488	0	45	10	0	0		0	0	82	0	-			-	0	-	-	968	/	2,374
1985	-	85	0	315	91	35	662	78	0	-	0	0		0	0	22	0	-			-	-	-	-	1,288	/	3,602
1984	-	18	0	313	0	32	196	32	350	-	0	0		0	0	0	0	-			-	-	-	-	941	/	2,672
1983	-	3	93	200	0	0	776	0	995	-	0	43		18	0	16	1	-			-	-	-	-	2,145	/	4,696
1982	-	0	105	59	238	40	352	19	515	-	0	72		0	0	155	27	-			-	-	-	-	1,582	/	3,400
1981	-	0	167	200	265	60	699	77	717	-	0	105		0	0	197	0	-			-	-	-	-	2,487	/	5,648
1980	-	20	149	205	235	471	318	52	1,025	-	0	226		12	0	100	36	-			-	-	-	-	2,849	/	7,194
1979	-	0	195	198	92	42	773	0	737	-	0	95		0	2	124	8	-			-	-	-	-	2,266	/	5,016
1978	-	16	196	246	170	30	981	57	558	-	13	145		0	1	164	23	-			-	-	-	-	2,600	/	5,926
1977	-	25	243	182	199	0	843	81	486	-	4	309		0	4	234	0	-			-	-	-	-	2,610	/	5,812
1976	-	99	254	152	487	21	600	64	210	-	2	54		0	0	2	0	-			-	-	-	-	1,945	/	4,566
1975	-	80	120	154	274	40	863	140	259	-	0	123		0	0	0	0	-			-	-	-	-	2,053	/	4,934
1974	-	6	161	6	333	0	630	12	342	-	0	110		0	0	0	0	-			-	-	-	-	1,600	/	3,248
1973	-	90	226	0	452	0	932	0	273	-	0	0		0	0	46	0	-			-	-	-	-	2,019	/	4,218
1972	-	0	50	0	350	0	521	0	530	-	0	0		0	0	94	0	-			-	-	-	-	1,545	/	3,090
1971	-	0	274	0	106	0	530	0	136	-	0	0		0	0	0	0	-			-	-	-	-	1,046	/	2,092
1970	-	0	272	0	0	0	531	0	426	-	0	0		0	0	0	0	-			-	-	-	-	1,229	/	2,458
1969	-	0	98	0	50	0	375	0	301	-	0	0		0	0	169	0	-			-	-	-	-	993	/	1,986
1968	-	10	224	62	396	93	328	24	430	-	0	68		0	0	145	0	-			-	-	-	-	1,780	/	3,938

Note: These are raw contacts taken directly from the log sheets. Adjustments have not been made for duplicate contacts,and bonus points have not been added yet. Final scores appear in QST.

Heathkit of the Month #41:
by Bob Eckweiler, AF6C

Heathkit

Heathkit OL-1
"3-inch" Oscilloscope.

Introduction:
The first electronic kit Heathkit announced was the O-1 Oscilloscope. It came out in July of 1947. It was followed by in rapid succession by updated models, each featuring improvements, until in September of 1954 Heathkit came out with the O-10. These were all oscilloscopes that used 5-inch CRTs. However, about a month before the O-10 came out Heathkit announced its first oscilloscope with a smaller 3-inch CRT - the Heathkit OL-1.

By today's standards the OL-1 is not a great instrument, it lacks a few features that even the PACO S-50 o'scope I built in the late 50's had. Yet it was an instrument that one could use and that performed the basics very well. Viewing wave forms on a scope was not something many people outside of a well equipped electronics laboratory could do until Heathkit made the CRT oscilloscope an inexpensive and readily available piece of test equipment.

The Heathkit OL-1 was introduced in August of 1954. It remained in production for two years. This was the first Heathkit scope to use a 3-inch CRT, and the only one to use the 3GP1. The smaller CRT allows the OL-1 to be much more compact than the 5-inch CRT scopes. There was one in our science lab in high school.

I am aware of only five general purpose 3" CRT scopes they manufactured: Three were AC coupled; the OL-1 [1954 - 56], the IO-21 [1961-72] and the IO-17 [1968 - 73] – and two were DC coupled; the IO-10 [1960 - 70], and the EUW-25 [1965 - 70] The EUW-25 was part of the Malmstadt-Enke Instrumentation Lab by Heath.

Figure 1: Heathkit OL-1

The Heathkit OL-1:
The Heathkit OL-1 sold from August 1954 through August 1956. The cost was $29.50, ten dollars less than the 5" O-1 sold for in 1947 and forty dollars less than the concurrent 5" O-10. Size-wise the OL-1 measures 9-1/2" H x 6-1/2" W x 11-3/4" D and weighs 11 lbs. By comparison the larger O-10 measures 8-5/8" H x 14-1/8" H X 16" D and weighs 20-1/2 lbs.

The front panel of the OL1 contains the CRT screen, eight control potentiometers, one 6-position rotary switch, and six binding post terminals; they are outlined in Table 1. The rear of the OL-1 contains two banana jacks, a DPDT slide switch and the entrance for the power cord (See Table 2). The jacks and switch allow for direct coupling to the vertical plates of the CRT (through high voltage isolation capacitors) for monitoring high frequency RF, such as RF from an amateur transmitter.

The vertical and horizontal amplifiers are identical and are specified for a frequency response

The Front Panel can be divided into two areas.

The Top Area consists of five items in three rows (Left to right and top to bottom):

INTEN[sity] - potentiometer. (no markings)
(Power sw. on pot. full CCW: **AC OFF**)
FOCUS - potentiometer (no markings)

3" CRT screen (centered)

VERTICAL CENTERING - potentiometer
(no markings)
HORIZONTAL CENTERING - potentiometer
(no markings)

The Bottom Area consists of eleven items in five rows (Left to right and top to bottom):

FREQ[uency] **VERNIER** - potentiometer
(marked 0 - 100 in steps of 20)

VERT[ical] **GAIN** - potentiometer
(marked 0 - 100 in steps of 20)
HOR[izontal] **GAIN** - potentiometer
(marked 0 - 100 in steps of 20)

SYNC AMPLITUDE pot
(marked INT 10 - 0 - 10 EXT in steps of 2)
HOR[izontal] **SELECTOR** rotary sw. (6 pos) (**HOR INPUT, 60 CY, 15 - 180, 180 - 1800, 1800 - 12KC, 12 KC - 100 KC**)

VERT[ical] **INPUT** - Binding Post - red
HOR[izontal] **INPUT** - Binding Post - red

G[rou]**ND** - Binding Post - black
(under vert. input post)
EXT[ernal] **SYNC** - Binding Post - red
60 CY[cle] **TEST** - Binding Post - red
G[rou]**ND** - Binding Post - black
(directly under horiz. input post)

Table 1 - The Front Panel

The Rear Chassis consists of four items in one row (Left to right):

Power Cord - grommet passing line cord
VERT[ical input selector] DPDT slide-switch
(**INT**[ernal] **EXT**[ernal])
Vertical direct input - two banana jacks (red)
unmarked, mounted vertically

Table 2 - The Rear Panel

of ±3 dB from 2 cps to 200 kc (±6 dB from 1 cps to 400 kc) The input impedance for each amplifier is 10 MΩ shunted by 20 μμF. Due to the placement of the vertical and horizontal deflection plates within the CRT itself, there is a slight difference in sensitivity: 250 mV @ 1 kc input gives a deflection of 1" peak-to-peak vertically while 300 mV is required horizontally. The horizontal amplifier can also be driven by a built-in sweep oscillator. The saw-tooth oscillator operates from 20 cps to 100 kc. in four ranges selected by the **HOR. SELECTOR** switch. It can be synced to the vertical signal either from an external input or from the amplified vertical signal. The **SYNC. AMPLITUDE** potentiometer controls both INT and EXT sync. Two additional positions on the horizontal selector switch are for horizontal input and a 60 cps sine-wave sweep.

The 3GP1 CRT is a 3" round green phosphor medium persistence type. The CRT mounts near the top center of the front panel and is mounted in a metal ring. A felt lining sits between the glass of the CRT and the ring. Total acceleration voltage is on the order of 1,120 volts. The trace can be positioned on the CRT screen using the **VERTICAL CENTERING** and **HORIZONTAL CENTERING** controls. Two other controls adjust the **INT**ensity and **FOCUS**. The **AC OFF** switch operates when the intensity pot is fully counterclockwise. The CRT astigmatism is fixed and no adjustment element is provided. Heathkit switched to the 3RP1 that allowed astigmatism adjustment on later 3-inch oscilloscopes.

The OL-1 utilizes eight tubes including five dual-triodes two rectifiers and the CRT. The vacuum tube lineup is shown in table 3.

The sync amplitude control is a center-zero potentiometer At center no signal is applied to the sync input of the sweep oscillator. Moving coun-

terclockwise from center increases the internal sync generated signal and moving clockwise from center increases any external signal applied to the sync input binding post.

OL-1 Circuit Description:

The OL-1 circuitry can be broken down into 5 areas: the power supplies, the CRT circuitry, the sweep oscillator and identical vertical and horizontal amplifiers. Figure 7 shows the schematic.

Power Supplies:

The power supply transformer has three filament windings, one being a 0.625 volt 0.3 A tap for the 1V2 HV rectifier tube. This winding is off the top of the 870 volt HV winding. The other two are independent 6.3 volt windings. One winding is highly insulated and designed to handle the high negative voltage on the CRT cathode that is tied internally to the CRT filament. A second 6.3 V winding supplies voltage to the remaining tube filaments and has one side grounded. The high voltage winding is multi-tapped with a 720 volt CT winding (360 - 0 - 360) for the low voltage supply and a 510 volt winding off one of the 360 volt winding ends. The aforementioned 0.625 filament winding is at the high end of this the HV winding.

The low voltage power supply is a full wave rectifier. It produces four, separately filtered, outputs on the order of 380, 240, 240 and 210 VDC. Rectification is done by a 6X4 7-pin miniature dual diode, and filtering is by a quad 20 µf 450V can capacitor. Three of the supplies have voltage dropping resistors as part of a pi filter.

The high voltage supply produces a negative 915 volts after being rectified by V6 a 1V2 HV diode tube, and filtered by a simple RC pi-network made up of two 0.1µF HV capacitors and a 47K resistor.

The CRT Circuit:

A voltage divider between the HV and ground made up of four resistors, two of them control pots, provides most of the voltage to control the CRT electron stream. The first resistor in the divider is the intensity control (50 KΩ). It varies the voltage on the control grid between -915 and -880 volts. The cathode is connected to the low end of this control which effectively varies the voltage between the CRT's control grid and cathode from -35V to 0V. It is imperative for the health of the CRT that the grid never becomes positive with respect to the cathode, and this circuit assures that won't happen. A fixed 150KΩ resistor followed by the 250 KΩ focus control and fixed 470 KΩ 1W resistor to ground complete the CRT voltage divider. The voltage on the focus grid varies between around -620 volts.

Extra acceleration for the electron stream is developed by the third grid. It sits at a fixed potential of +240V provided by the B+ supply.

The beam deflection plates are all near 270V with the beam at center. These voltages are varied by the two push-pull deflection amplifiers yet to be discussed, drawing a trace on the screen.

Sweep Oscillator:

The sweep oscillator produces a saw tooth waveform as shown in Figure 2. For best performance the slowly rising slope should be as linear (straight) as possible and the falling

Heathkit OL-1 3" Oscilloscope Tube Lineup:

V1a*	12AU7	Input Buffer - Vertical
V1b*	12AU7	Vertical Amplifier
V2*	12AU7	Vertical Push-Pull Driver
V3*	12AX7	Multivibrator Sweep Oscillator
V4a*	12AU7	Input Buffer - Horizontal
V4b*	12AU7	Horizontal Amplifier
V5*	12AU7	Horizontal Push-Pull Driver
V6	6X4	Low Voltage Rectifier
V7	1V2	High Voltage Rectifier
V8	3GP1	3" Cathode Ray Tube

* These tubes mount on the circuit board.

Table 3 - Vacuum Tube Functions

slope should be steep. This waveform draws the trace horizontally across the screen. Any vertical signal applied while the trace is sweeping across the screen, moves the trace up and down along the horizontal path.

If the vertical signal is at a different level at the start of each sweep then the image will jump all over the place; therefore a way to sync the sweep oscillator to the vertical amplifier is provided. A bit of the signal is sampled from the cathode of the vertical driver tube (V2) and coupled to the sweep oscillator. If the sync signal is large enough, and the frequency of the sweep oscillator is adjusted so that the vertical is close to a multiple of its frequency, the sweep oscillator will sync and the trace will remain steady on the screen.

The sweep oscillator uses both triode sections of V3, a 12AX7 as a free-running multivibrator circuit. The frequency is determined by an RC network in the cathode of one of the triodes. Only a small part of the full RC curve is traversed with each sweep (around 1 to 2 volts) insuring good linearity. Sync is applied to the cathode of the triode that doesn't have the RC network. This sync, if close to a multiple of the frequency of the free-running multivibrator, will force the multivibrator to synchronize. The OL-1 sweep circuit has no blanking circuit. The trace is moved horizontally across the screen left to right during the sweep and rapidly back to the left before the next sweep begins. This results in a light retrace line like the one shown in Figure 3. Many scopes blank the CRT during the retrace to eliminate the retrace line. The later Heathkit 3-inch scopes all incorporated blanking.

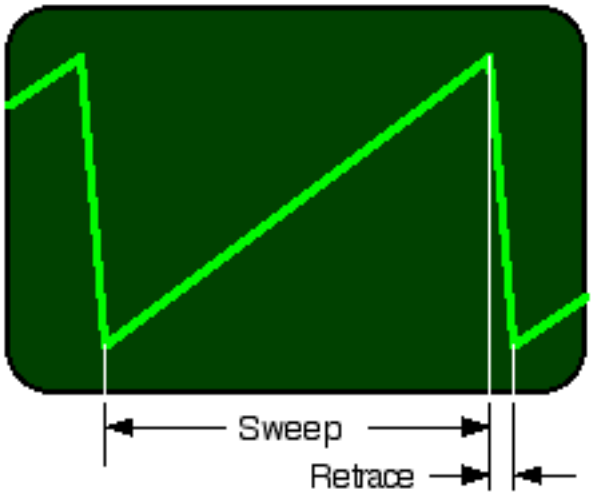


Figure 2: Sweep waveform

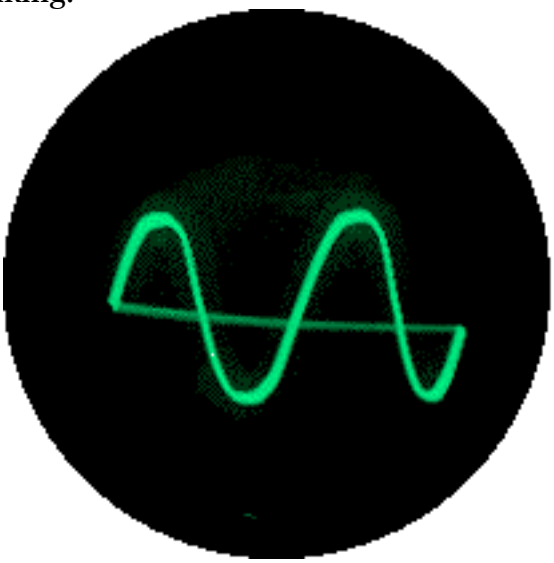


Figure 3: Two Cycles of a Sine Wave showing the Retrace Line

Vertical and Horizontal Circuitry:

The vertical (and horizontal) amplifier chains are identical; each is made up of two 12AU7 dual triodes. However, while the vertical signal only comes from the vertical input terminals, the horizontal input can be selected from three sources: the horizontal input terminals, the internal sweep oscillator or a 60 cycle test signal that is derived off the filament voltage. The selection is made with the horizontal selector rotary switch.

The input signal is coupled to V1A (V4A) [horizontal chain is shown in parentheses] a buffer stage that, using feedback from the cathode circuit to the grid bias, develops the high 10MΩ input impedance. The output is coupled from the buffer's cathode through a blocking capacitor, and the gain control potentiometer to the grid of a conventional amplifier V1B (V4B). The output of the amplifier is AC coupled to the deflection amplifier V2 (V5). The deflection am-

plifier is a fixed gain differential amplifier coupled by a common grid resistor. As the signal varies in one direction one plate becomes less positive and the other becomes more positive and vice versa. The plates are connected directly to the CRT deflection plates causing the beam to deflect. A small DC voltage controlled by a centering control differentially adjusts the bias on the differential amplifier allowing the trace to be statically positioned on the screen independent of the input signal.

Construction utilizes a printed circuit board that holds the vertical, horizontal and sweep circuitry (V-1 through V5). Heathkit stopped production of the OL-1 after two years. It was a popular model and can still be found used. However Heath didn't produce another 3-inch scope for about four years.

Heathkit IO-21 "3-inch" Oscilloscope:
The IO-21 came out in late 1961. It is similar in a lot of ways to its predecessor the OL-1 In some ways it is more advanced and in some ways it is not. Obviously missing from the front panel are the Intensity and Focus controls. The focus adjustment is internal and the intensity is fixed. The circuits are similar to the older scope but with a lot of small changes. Blanking has been added to hide the retrace line. There is no external sync input nor is there a sync level control. The front panel has only the CRT screen, the vertical and horizontal inputs and six controls - vertical and horizontal amplitude and position, **HOR/FREQ. SELECTOR** and the sweep frequency vernier.

The IO-21 has nearly the same electrical specifications as the OL-1. It measures 9-1/2"H x 6-1/2"W x 10" D. The IO-21 first appeared in the Christmas 1961 Gift Catalog, (80/01) selling for $49.95. In 1969 the price had increased to $61.95. Notice the "NEW" tag in the figure 5 ad.

The IO-21 uses a different CRT than the OL-1 - a 3RP1. This CRT features a grid to adjust the astigmatism (roundness) of the dot and is about an inch shorter than the 3GP1. Both the focus and astigmatism controls are located internally on the bracket that holds the neck of the CRT. The 3RP1 and 3RP1A became a favorite of Heathkit. It is used in the remaining 3-inch oscilloscopes as well as the HO-10 and SB-610 station monitors and the vector-scopes used for TV servicing. The HO-13 and SB-620 pan-adaptors use the 3RP7 CRT which is identical except for a higher persistence yellow phosphor screen.

Heathkit IO-17 "3-inch 5 mc" Oscilloscope:
Servicing color televisions requires a scope with a much higher vertical frequency response. Vertical amplifiers that top out at 200 or even 400 kc lack usability servicing the color circuitry; instead, a response of 5 mc is needed to properly service a color television.

Figure 4 Heathkit IO-17 "3" 5 mc Scope

Heathkit produced 5" oscilloscopes with a 5 mc frequency response since the O-10 in the mid-fifties. However most of these scopes didn't have a true 5 MHz bandwidth which is commonly measured at the -3dB point. The IO-17 was a 3" CRT scope with a vertical amplifier rated from 5 cps to 5 mc at ±3 dB.

The horizontal amplifier and sweep circuits follow closely the circuits of the previous models with a few improvements and the addition of a

Sensational Values in Heathkit® Oscilloscopes

YOU WON'T FIND A FINER SCOPE AT THIS PRICE ANYWHERE!...

THROUGH HEATH RESEARCH NEW

IO-21 **$49.95**

- ✦ *Push-pull vertical and horizontal amplifiers*
- ✦ *Wide range sweep generator 20 to 100,000 CPS*
- ✦ *Automatic sync—retrace blanking*
- ✦ *Neat, open circuit layout for easy assembly*

SPECIFICATIONS: (Vertical and horizontal amplifiers identical): Frequency response: 2 db, 2 cps to 200 kc. **Sensitivity:** .25 volts RMS/inch P-P deflection at 1 kc. **Input impedance:** 10 megohms shunted by 20 uuf. **Sweep generator:** Range: 200-100,000 cps. Automatic sync, retrace blanking. **Power requirements:** 105-125 volts AC, 50-60 cycle, 40 watts. **Dimensions:** 9½" H x 6½" W x 10" D.

Heathkit GENERAL PURPOSE 3" OSCILLOSCOPE

The brand new IO-21 oscilloscope is compact, lightweight, and surprisingly versatile in performance . . . fills hundreds of daily requirements. The exceptionally clean, open circuit layout makes assembly easy, trouble-free. Circuit design features identical vertical and horizontal amplifiers with a frequency response of ±2 db from 2 cps to 200 kc. Sensitivity is .25 volts RMS/inch peak-to-peak deflection at 1 kc. Provision is made for direct connection to the vertical deflection plates of the cathode ray tube . . . ideal for high level R.F. monitoring. The Heath twin-triode sweep generator employed in this scope functions reliably from 20 to 100,000 cps in four switch-selected ranges. Automatic sync and retrace blanking. Provision for line sweep and internal or external sweep. Other features include a 3RP1 CR tube with special alloy neck shield to minimize the effects of ambient electrical fields that might cause trace distortion; focus and astigmatism controls to assure a sharp, fine trace and a husky power transformer. Power supply is fused for protection. An unbeatable scope value! 14 lbs.

Kit IO-21 . . . no money dn., $5 mo. **$49.95**

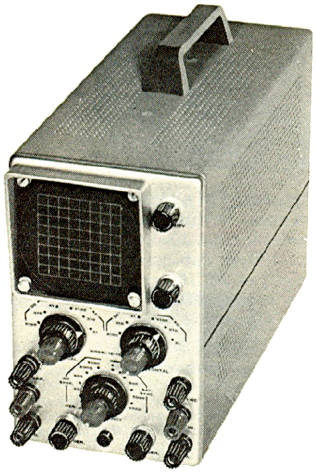
"Space Saver" 3" DC OSCILLOSCOPE . . . small, compact, easy to carry . . . ideal for use where extremely low sweep rates are desired

This attractive and versatile 3" DC scope fills a multitude of applications in industrial, medical and general service fields. Features identical AC or DC coupled vertical and horizontal amplifiers with a bandwidth of DC to 200 kc. Less than 5° phase shift between channels make it ideal for computer "read out" or for voltage, frequency and phase shift measurements. The recurrent sweep generator covers 5 cps to 50 kc in four overlapping ranges and lower sweep rates may be obtained by connecting additional capacity across the external binding posts provided. Other features include; switch-selection of internal or external sync, 3RP1 CR tube, special alloy CR tube shield to minimize trace distortion, astigmatism control for sharp trace, and voltage regulated power supply. 14 lbs.

Kit IO-10 . . . no money dn., $8 mo. **$79.95**

IO-10 **$79.95**

- ✦ *Identical vertical and horizontal DC or AC coupled amplifiers*
- ✦ *DC to 200 kc bandwidth—less than 5° phase shift between channels*
- ✦ *External capacity binding post for lower sweep rates*
- ✦ *Small compact size—measures only 7⅝" h x 4⅝" w x 11"d.*



SPECIFICATIONS—(Vertical and horizontal channels identical): Bandwidth: DC to 200 kc (2db point). **Sensitivity:** 0.1 V (peak-to-peak) per ¼" (uncalibrated). **Attenuator:** 3-position, compensated type. **Gain control:** Continuously variable. **Input impedance:** 3.6 megohms shunted by 35 mmf. **Coupling:** Either AC or DC, switch-selected. **Relative phase shift between channels:** Less than 5°. **Sweep generator (recurrent type):** Linear saw-tooth produced by multivibrator type generator covering 5 cps to 50 kc in four overlapping ranges. "External capacity" binding post for lower sweep rates. **Sync provision:** Either internal or external, switch-selected. **Power requirements:** 105-125 V 50-60 cycle AC at 100 watts max. **Dimensions:** 7⅝" H x 4⅝" W x 11" D

Figure 5: Ad for IO-21 & IO-10 Oscilloscopes from Heathkit's Christmas Gift Catalog #80/01

sync signal buffer stage and a blanking amplifier. No external sync input is provided.

Heathkit IO-10 "3-inch" DC Oscilloscope:

Neither the OL-1, IO-21 nor IO-17 can operate below a few cps. Better oscilloscopes can respond to DC voltages. The IO-10 is one of two 3-inch Heathkit scopes that is DC rated. Of course if you are measuring a small AC signal with a large DC component this can be a problem. Hence DC scopes let you choose between DC and AC coupling. DC amplification requires added circuit stability so these scopes are a lot more complex and cost more. Each amplifier has a DC balance control accessible via a hole in the cabinet or even on the front panel that needs occasional adjustment.

The IO-10 was manufactured from 1960 into the early seventies. In late 1961 it sold for $79.95. (See Figure 5) and in mid 1969 it sold for $99.95. To fully cover the circuitry would be beyond the scope of this article. Perhaps it will be featured in the future? Some major features of the IO-10 are:

a. The power supply includes regulated +150 and -75 volt supplies for the DC amplifiers.

b. Inputs include a three-section compensated step attenuator X1 - X10 - X100 for AC and DC.

c. CRT is mμ-metal shielded to protect from external magnetic interference.

d. Concentric controls are utilized to reduce front panel clutter.

The IO-10 has identical vertical and horizontal amplifiers specified from DC to 200 kc. The sweep circuit covers 20 cps to 50 kc in four ranges and has provisions for adding an external capacitor to slow the sweep even further. External as well as internal sync is provided, and the CRT is blanked during retrace.

Heath EUW-25 "3-inch" DC Oscilloscope:

The EUW-25 scope came fully assembled. It was part of the **Malmstadt-Enke Instrumentation Lab** (Also designated the **Heath Science Series**) designed for education and small laboratories. Electrically the EUW-25 is very close to the IO-10; however the physical design is quite different (See figure 6). The scope also has features that make it more useful in its educational and lab role. These include:

1. Switches to short the vertical and horizontal inputs to aid trace position and balancing.
2. Vertical and horizontal beam control adjustments for setting trace centering.
3. Front panel screwdriver adjustment of vertical and horizontal DC balance.
4. Front panel screwdriver adjustment of sweep position balance.
5. External AC coupled vertical and horizontal inputs for directly applying signals to the CRT deflection plates.
6. External Z-axis input on the rear panel to allow intensity modulation.

Figure 6: Heath EUW-25 "3-inch DC Scope

One interesting tidbit with the EUW-25 involves the first stage of the vertical and horizontal amplifiers. The IO-10 uses a dual triode 6BS8 tube with one section serving each amplifier; however, the EUW-25 uses two separate single 6AB4 triode tubes, one for each amplifier. Whether this is for signal isolation, better DC stability or due to the wider chassis layout is an interesting point for discussion.

Conclusion:

These smaller 3-inch scopes provide some portability and size advantages that are lacking in the larger scopes. Many electronic enthusiasts probably started with one of these scopes.

I remember when Ken - W6HHC first got his Apple][computer. Before obtaining a disk drive, he was loading programs by cassette tape. His old IO-21 scope allowed him to set the level to make the loading from cassette tape quite reliable. His chess program, often loaded, was a challenge!

On the last page I've written a short Sidebar on the basic Oscilloscope. There is also a short request for information any readers have on the really old O1 - O7 Oscilloscopes that might help me cover them sometime in the future.

A special thank you goes to John Roberts - W6JOR for providing me the OL-1 manual.

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

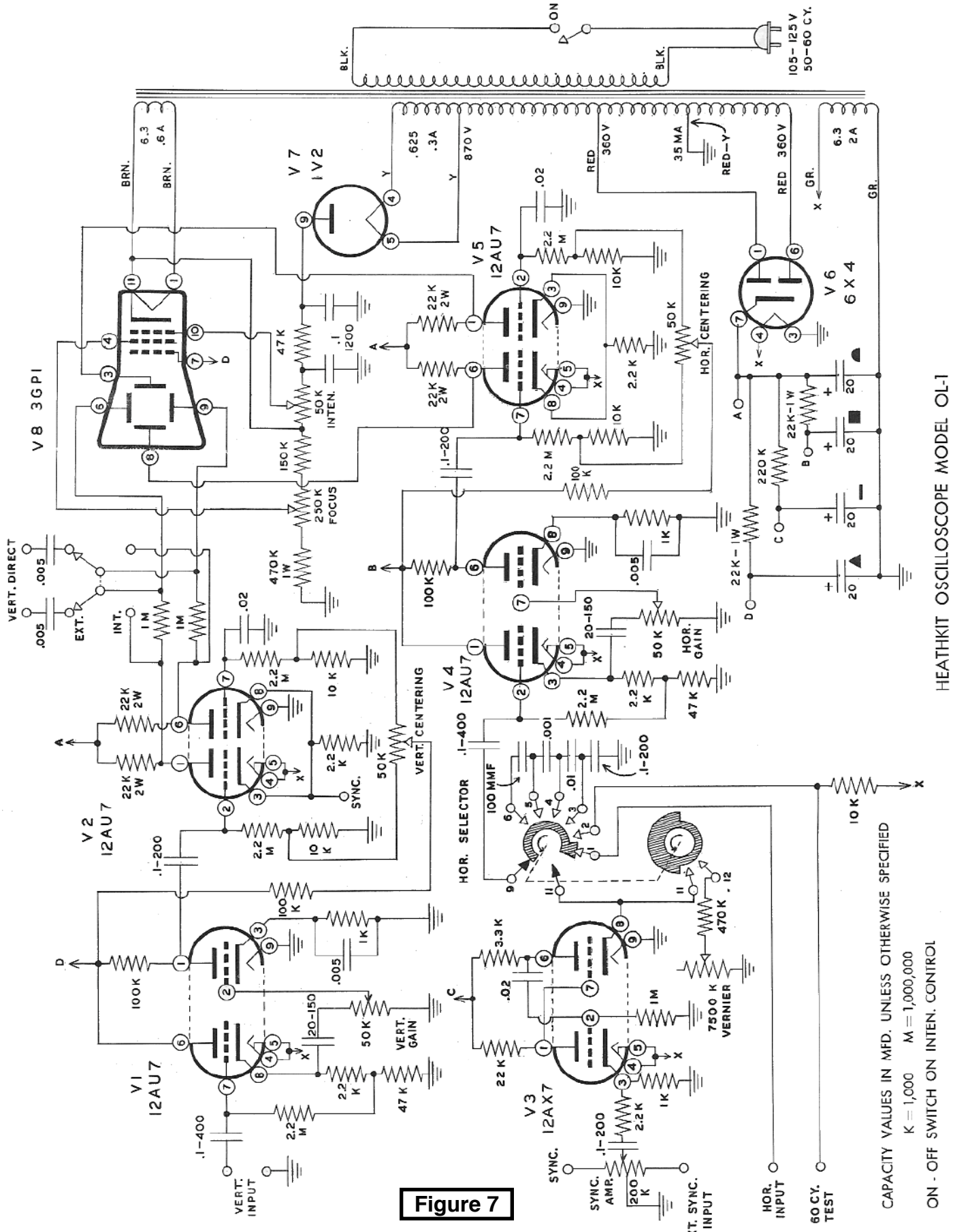

HEATHKIT OSCILLOSCOPE MODEL OL-1
V 8 3GP1
V 7 1V2
V 6 6X4
V 5 12AU7
V 4 12AU7
V 3 12AX7
V 2 12AU7
V 1 12AU7
CAPACITY VALUES IN MFD. UNLESS OTHERWISE SPECIFIED
K = 1,000 M = 1,000,000
ON - OFF SWITCH ON INTEN. CONTROL
105-125 V 50-60 CY.
VERT. DIRECT
VERT. INPUT
SYNC.
SYNC. AMP.
EXT. SYNC. INPUT
HOR. INPUT
60 CY. TEST
HOR. SELECTOR
VERT. CENTERING
HOR. CENTERING
VERT. GAIN
HOR. GAIN
VERNIER
FOCUS
INTEN.

Figure 7

SIDEBAR:

The Basic Oscilloscope:
The heart of a cathode ray oscilloscope is the cathode ray tube - CRT. The tube has a cathode that emits an electron stream that is accelerated and hits a phosphorescent screen producing a dot of light. Multiple grids control the stream of electrons and the focus and astigmatism of the dot; a final accelerating grid speeds up the electrons. Two sets of deflection electrodes can bend the electron stream and cause it to move position on the screen when differential voltages are applied to them.

One set deflection electrodes are connected to a "vertical" amplifier. This amplifier determines the vertical position of the dot. There is a position control that sets the static position with no signal applied and a gain control that sets the amplitude of the applied signal. Thus an AC signal applied to the vertical amplifier will draw a vertical line on the screen of the CRT. The line's amplitude is proportional to the gain of the amplifier and the peak-to-peak voltage of the signal.

The second set of deflection electrodes is connected to a "horizontal" amplifier, often similar to the vertical amplifier. A signal to the horizontal amplifier will move the dot in a horizontal direction. Independent of the horizontal input, the horizontal circuitry also contains a sweep circuit that can be used to move the dot across the screen from left to right at a constant rate, bringing it quickly back to the left edge of the screen before starting the next sweep. There is usually an adjustable sync circuit that couples the vertical signal to the sweep oscillator trigger so that the waveform displayed on the screen remains constant. The sync circuit also normally has the capability of syncing off an external sync input.

The pattern shown on the screen of the CRT is representative of the waveform of the signal applied to the vertical amplifier. As an example if a 60 Hz signal is applied to the vertical input, the sweep is adjusted to 30 sweeps per second and the sync is adjusted for a steady image you would see two complete 60 Hz sine waves displayed on the screen of the CRT.

Of course modern CRT oscilloscopes have many additional features. First is increased bandwidth; scopes capable of reproducing waveforms up to a few hundred kHz were adequate for audio and even black-and-white TV servicing. Color TV requires a bandwidth around 5 MHz and modern scopes have bandwidths up to hundreds of MHz. Another feature is DC coupling where the vertical and horizontal amplifiers respond to DC inputs. Calibrated amplifiers with step attenuators that allow voltage measurements is another feature. Other modern features include triggered sweep, delayed sweep, and multiple vertical channels just to cover a few.

Today there are digital oscilloscopes that digitize the incoming signal and display it on a color LCD screen with very high bandwidth and a lot of features only a computer can easily provide. These units can be made compact since the large and often long CRT is no longer needed, just as LCD TVs are thinner than their CRT predecessors.

Request:
I would like to cover the original Heathkit Oscilloscopes from the O1 through the O11 in a future column. These were the kits that gave Heathkit a leg up in dominating the electronic kit business.

If you have one of these units and would be willing to send me some digital photos it would help me tremendously. Also if you have manuals I'd like to ask you some questions that I might have while working on the article. Schematics would also be nice to have so I can compare circuitry updates. I have schematics for the O-2, the O-7 the O-9, the O-10 and the O-11. If anyone can fill me in with others I'd appreciate it. GIFs JPGs or PDFs are fine. - de AF6C

Submitted by Tim Goeppinger N6GP

You are invited…

Roving from Hilltops in CQ WW VHF Contest – July 21st

We still have a few more weeks left in the Sporadic E season on 6 meters, and the CQ World-Wide VHF contest is designed to take advantage of it. This contest is EASY. 6 meters and 2 meters only. For rovers the rules are interesting. Each new grid square allows you to work everyone all over again, and get credits for multipliers. One other person can assist me, according to the rules. If someone has a rig that operates SSB or CW on 6 or 2 meters, I can help with a temporary setup with batteries, antennas etc. so you can operate with your own call. Please contact me ahead of time.

From local hilltops during the ARRL VHF contest last month, I was able to contact Colorado, Nebraska, Texas, Louisiana, Oregon, Washington and British Colombia on 6 meters, and worked the grid square in Santa Barbara on 2 meters. I met a rover with a 7 call in Newport Beach who had some MONSTER antennas. I think he had 19 elements on 432 strapped on to his car.

Where and when?
Saturday July 21st

Site #1 - Grid DM13 – Coastal Peak Park, Newport Beach 11:00AM – 12:30

http://goo.gl/maps/T0r6 **(Google Map)**

See the June OCARC newsletter for directions on how to avoid the toll road.

Site #2 - Grid DM03 – Near 2637 Panorama Dr, Signal Hill 1:30PM – 3:00PM
http://goo.gl/maps/7g4m (Google Map)

See the June OCARC newsletter for directions

Site #3 - Grid DM04 – Scholl Canyon Park, Softball Field Parking, Glendale 4:00PM – 6:00PM
(Hills above the 2 and 134 freeway interchange)

If you need directions, please call me at my cell – 714-875-2344 Hope to see you on one of the hilltops!
Tim N6GP n6gp@w6ze.org

Resources:

CQ WW VHF Contest Rules http://www.cqww-vhf.com/index.htm

Grids on Google maps http://www.levinecentral.com/ham/grid_square.php

Bring yourselves, your radios, your questions, and your friends and family who are interested in ham radio to the Ham Jam at Ham Radio Outlet on Saturday, July 21, 2012.

Store hours are from 10AM-5:30PM, and at various times during those hours there will be scheduled “classes” on the basic workings of VHF/UHF handhelds and mobiles by someone representing Wouxun, Yaesu, Kenwood, and Icom.

Come meet Gordon West, WB6NOA, and learn about all aspects of ham radio from the master himself. Want to test to become a new ham? We will be able to take up to 15 prospective new hams for a Technician test session in HRO’s back room, so please call in advance to make sure we have space for you: 714-533-7373 and ask for Janet.

Tour one of the OC Red Cross Emergency Vehicles that will be on site, and learn about volunteering and helping with disaster relief and communications.

Learn about AMSAT and satellite communications with Clint Bradford, K6LCS. We hope for one decent satellite pass and perhaps a quick listen to the International Space Station that day.

All clubs are welcome to bring a card table and set up in front of the store with any club related literature that might appeal to new members.

Bring an appetite, as hot dogs, chips, and sodas will be available, proceeds going to the lovely young ladies who will be selling them.

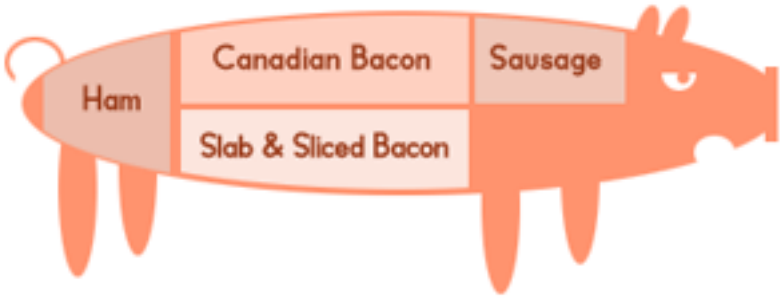
Three prize drawings throughout the day, at noon, 2PM, and 4PM only.

Because of the limited parking in our center and restricted parking at the front of the building, if you’re planning on spending much of the day, please consider parking along the side of the building, in the back, or down the residential area behind us in consideration of our neighboring tenants.

Let’s have some HAM RADIO FUN!

Kind 73 de
Janet Margelli, KL7MF
Manager
Ham Radio Outlet
933 N. Euclid St. Anaheim, CA 92801

(714)533-7373 Tel
(800)854-6046 Tel
(714)533-9485 Fax



Ham Cuisine

by Kristin, K6PEQ

Ham and Cheese Egg Casserole

Ingredients:

2 cups shredded cheddar cheese
2 cups cubed fully cooked ham
¾ cup shredded mozzarella cheese
¼ cup all-purpose flour
½ pound fresh mushrooms, sliced
8 eggs
8 green onions, sliced
1 ¾ cups milk
1 medium sweet red pepper, chopped
2 tablespoons butter
Salt and pepper to taste

Cooking Directions:

1. Combine the cheeses and sprinkle into a greased 13″ x 9″ baking dish. In a large skillet, sauté the onions, mushrooms and red pepper with 2 tbs. of butter and then stir in the ham and put in the baking dish on top of the cheese.
2. In a bowl, mix the flour, milk, eggs and salt and pepper and then pour over the ham and cheese mixture in the baking dish. Cover and refrigerate overnight.
3. Remove the casserole from the refrigerator 30 minutes before baking. Bake uncovered at 350 degrees for 40 minutes or until a knife or toothpick inserted near the center comes out clean. Let stand for 5 minutes before serving.

Suggestions:

Serve with your favorite toast and fresh fruit for a wonderful morning brunch. A mimosa would be a wonderful addition to this meal as well! ☺

OCARC
BOARD MEETING MINUTES
2012-06-09

The OCARC Board meeting was held at the JägerHaus Restaurant, 2525 East Ball Road, Anaheim, and called to order on June 9, 2012. There was a quorum with all Directors present except Doug W6FKX and Kristin K6PEQ.

DIRECTOR REPORTS:

- **Treasurer -** Bob AF6C reported $6,529 in the club bank accounts.
- **Membership** – Jeff reported that the club had a total of 81 members.
- **Publicity** – Tim N6GP agreed to continue marking up the date for Club Breakfast on the printed "tri-fold" brochures instead on throwing them away and printing new brochures at this time.
- **Technical** – John W6JOR reported he had successfully installed a 160M antenna on his postage-stamp size city lot.

OLD BIZ:

- **Newsletter Editors**
  - July – Doug W6FKX
  - Aug – Jay KI6WZU
  - Sept – Tim N6GP
  - Oct - ???

- **Field Day**
  - The Board approved the Field Day budget that will be voted on at the General Meeting in June.
  - There was no further progress on the topic of holding the 2013 FD at the Los Alamitos JFTC.
  - A FD planning meeting was held immediately after the Board mtg.

- **LoTW** – Bob AF6C reported that efforts to obtain a Logbooks-of-The-World account to W6ZE were continuing.

- **OCCARO** – Paul reported that an OCCARO meeting was planned for June 13.

NEW BIZ

(none….everyone was excited about Field Day!!)

GOOD of the CLUB

- **VHF-UHF Contest** - Tim N6GP reminded everyone that they are invited to visit the contest grid sites that he published in the RF Newsletter. Tim's car was loaded for the contest and he was planning to leave right after the FD planning meeting.

- **Great Editor** – Ken W6HHC praised the June editor, Nicholas AF6CF, for turning out a really terrific newsletter. The Board Members agreed.

Respectfully submitted by:

Ken Konechy W6HHC, Secretary

OCARC
GENERAL MEETING MINUTES
2012-06-15

The OCARC May General Meeting was held at the Red Cross complex in Santa Ana on Friday evening, June 15, at 7 PM. There were a total of 39 members and visitors present. Eight club officers were present for a quorum….only Kristin K6PEQ and John W6JOR were absent.

The club President Paul W6GMU introduced our speakers, club web-masters Ken W6HHC and Bob AF6C, who presented on:

" Discovering the OCARC Web Site contents….."

The OCARC web-masters provided a live tour of the OCARC web site

The "Ken and Bob show" explained that the OCARC web site contains many resources for hams and plenty of information about OCARC events. They explored the club photo galleries, finding indexes to newsletter articles, the club "For Sale" pages, past Field Day scores, and much much more!

OLD BUSINESS

- **Field Day**

– Dee N8UZE, our FD Chair, reported the details of the planning for next week-ends FD effort. Including meals that were planned. A donation-can was passed around to help defray the cost of FD food.

– Dee N8UZE made a motion to budget $1,500 for this year's Field Day expenses. The membership approved the budget.

- **OCARRO**

– Kristine KC6TOD, Chair of the Orange County Council of Amateur Radio Organization reported that location difficulties have resulted in NO Ham Radio Booth for this year's OC Fair.

-Kristine explained that OCARC is now focusing on organizing other events (monthly?) for the county ham clubs

Respectfully submitted by:

Ken Konechy W6HHC, Secretary

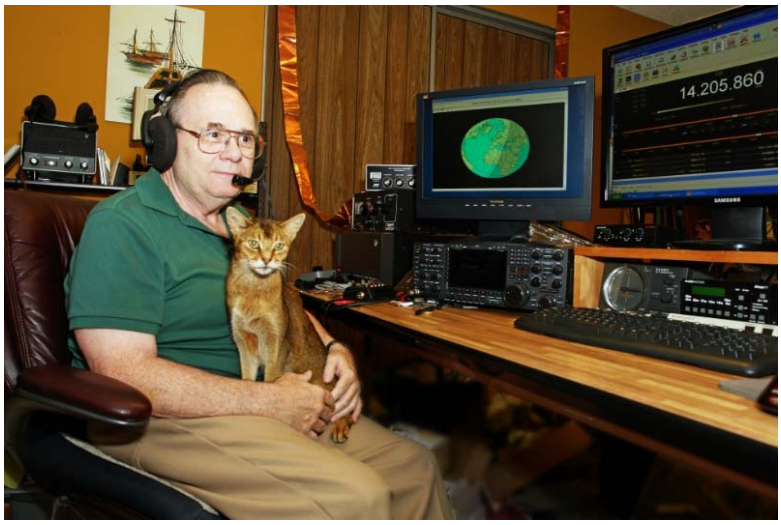
Club Member Photo Montage!

Hey OCARC Members, I would like to put together a photo montage (this means multiple pictures of multiple members!) of us ham's operating our stations. Please send me a picture of you at your station, humble or extravagent, neat or a disaster. Lets see ourselves enjoying our hobby. Send your photos to me at: w6fkx@w6ze.org or w6fkx@arrl.net.

Thanks and I look forward to seeing you in action,

Doug Britton W6FKX, OCARC Activities Director

Here is the first submittal; do you recognize him?



Looking good John N6QQ

Selected Upcoming Special Event Stations (Source: www.arrl.org)

07/12/2012 | Nude Awareness Celebration - Nude Recreation Week

(I wonder what the QSL Card looks like??? --ed.)

Jul 12-Jul 15, 1800Z-2300Z, NU5DE, McDade, TX. Naturist Amateur Radio Club. 28.465 21.365 14.265 7.265. QSL. Naturist Amateur Radio Club, PO Box 200812, Austin, TX 78720. www.nu5de.org

07/22/2012 | Brickyard 400

Jul 22-Jul 29, 2200Z-2000Z, W9IMS, Indianapolis, IN. Indianapolis Motor Speedway Amateur Radio Club. 21.350 14.240 7.240 3.840. Certificate & QSL. Indianapolis Motor Speedway Amateur Radio Club, PO Box 30954, Indianapolis, IN 46230. w9ims.org

07/27/2012 | Camp Perry National Match

Jul 27-Aug 4, 0000Z-2359Z, KB3WBE, Summit Station, OH. Shooters Amateur Radio Club. 14.261 7.213. QSL. SARC, PO Box 147, Summit Station, OH 43073. A number of shooter/hams at the Camp Perry, Ohio National Matches are slated to field calls between shooting matches at the Camp Perry Nationals this year under the umbrella organization of Shooter's ARC. This will include a number of military, military packsets, civilian packsets and other portable rigs. Scheduled frequencies are 14.261Mhz between 1600 and 2200Z and 7.213Mhz between 2200 and 0400Z or until the band drops out. All QSL will be paper and all requests for QSL must arrive on or before 30 September 2012. A donation of either $1 and SASE, or $2 to help defray costs would be appreciated. piccolo834@gmail.com

08/04/2012 | US Coast Guard 222 Birthday

Aug 4-Aug 5, 1400Z-0400Z, K1CG, Port Angeles, WA. Coast Guard CW Operators Association. 21.327 21.052 14.327 14.052 7.227 7.052 3.827 3.552. QSL. Fred Goodwin, 424 N Bagley Ck Rd, Port Angeles, WA 98362. K1CG will be operated by several different stations across the country starting on the East coast and moving west.

08/12/2012 | The Navajo Code Talker

Aug 12-Aug 14, 1400Z-1400Z, N7C, Window Rock, AZ. Navajo Amateur Radio Club. 14.265 7.240. QSL. Herbert Goodluck, PO Box 3611, Window Rock, AZ 86515.

08/13/2012 | Corvette Reunion and Back to the Bricks

Aug 13-Aug 18, 0001Z-2359Z, N8C, Flint, MI. Noobz Contest Club. 14.240 14.070 7.240 7.035. QSL. Noobz Contest Club, 4318 Greenbrook Ln, Flint, MI 48507. Celebrating the 3rd Annual Corvette Reunion and 8th Annual Back to the Bricks event in Flint, MI. Flint was the birthplace of the Corvette before moving to Kentucky. Draws more than 400,000 people, triple the city's population. Will operate 10-80 m with concentration on SSB and PSK31. Operating from a public booth at the event. www.noobzcontestclub.org

(IRD, just for you –ed.)

2012 ARRL CONTEST SCHEDULE

JULY

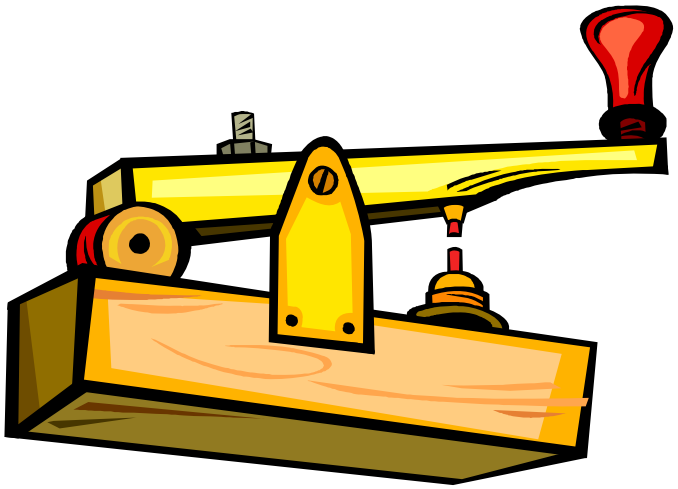
IARU HF World Championships: The second full weekend of July, 1200 UTC Saturday through 1159 UTC Sunday.

AUGUST

August UHF Contest: First full weekend of August, 1800 UTC Saturday through 1759 UTC Sunday.

10 GHz & Up Contest - Leg 1: Third full weekend of August, 6:00AM local time Saturday through 11:59pm local time Sunday.

Rookie Roundup: Third Sunday, 1800 UTC through 2359 UTC.



Don't miss this!!

FIELD DAY SITES AROUND OC

ARRL Affiliated Club Coordinator, Bill Prats K6ACJ put together a web site full of pictures from several Field Day sites around Orange County. There are a few nice pictures from each of the following groups that operated FD this year

- **Huntington Beach RACES**
- **Hospital Disaster Support Communications Systems**
- **Combined Fountain Valley RACES and West Coast Amateur Radio Club**
- **OCARC**
- **MESAC**
- **SOARA**

Take a peek at Bill's photo collection at

https://picasaweb.google.com/b.bill.p/ARRLFieldDay2012?authuser=0&authkey=Gv1sRgCNyd3uC_7OGj5QE&feat=directlink

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

OPERATING INCOME

Dues 2012:
- 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: $536.00

Soldering Class:
- Class Kits: $63.25

Field Day:
- Food Donations: $570.60

TOTAL: $2,383.85

OPERATING EXPENSES

Operations and Supplies (Total: $389.60):
- Calif. Corp. Fee: $20.00
- Insurance: $300.00
- PO Box (1 Yr Renewal): $52.00
- Postage: $17.60

Club Badges:
- Materials: $0.00

ARRL Membership Thru Club (Total: $24.00):
- New: $24.00
- Renewal: $0.00

Monthly Opportunity Drawing:
- Purchases: $897.52

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: $71.94

TOTAL: $2,786.63

SAVINGS ACCOUNT BALANCE

Jan 1 Statement Balance: $2,300.04

Moved from Checking: $0.00

Moved to Checking: $0.00

Interest: $1.13

Jun 30 Statement Balance: $2,301.17

SUMMARY

January 1, 2012
- Savings Account: $2,300.04
- Checking Account: $3,867.06
- **Total: $6,167.10**

June 30, 2012
- Savings Account: $2,301.17
- Checking Account: $3,464.28
- **Total: $5,765.45**

Net Gain (Loss): ..... ($401.65)

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

1st Half. Income: $2,383.85

1st Half. Expenses: ..... ($2,786.63)

Jun 30 Checking Balance: $3,464.28

Checks outstanding as of Jun 30: $76.79

Jun 30 Statement Balance: $3,541.07

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