



VOL. LX NO. 07

P.O. BOX 3454, TUSTIN, CA 92781

July 2019

The Prez Sez.....

by Dan KI6X



Another Field Day has come and gone and OCARC has always put a priority on FD activity and fun. It was a very enjoyable FD and you saw great coordination among the participants.

Stations were on the air, when conditions permitted, set-up was flexible to cover needed changes to the plan, and everyone was motivated to participate. We never seem to have enough helpers with towers but got the number of helpers we felt comfortable with and put them up and took them down safely. Again, a very safe and well-planned FD year. Only injury I heard of was a screwdriver that slipped into a hand (minor).

Majority of the thanks goes to our FD captain, Tim G. N6GP, who assigned station captains and kept verifying we had what we each needed. Then at FD set-up, the band captains got to work and made sure everything was ready for the start. Thank you all that attended.

Please note the programs coming up at future meetings.

Most interesting is the type of presentations and activities that makes OCARC unique and a fun place to be. We schedule a variety of programs and activities that I think keeps the diverse OCARC membership informed and engaged. Seeing the members at the meetings and at the club activities is always special.

The Board is always interested in your feedback and suggestions on how we can better meet the needs of its membership in this exciting and ever-changing Amateur Radio hobby.

A special note for the August meeting: Our VP is planning a session on **'Building 2M Direction Finding Portable Antennas'**. See the announcement elsewhere since we are checking member interest in a limited amount of available "kits" with all the parts included. Kit's can save a lot of time when it comes to prepping materials for very little \$ cost.

Well, that does it for another month. Time sure has flown by being club President and I appreciate all the workers that make the job easier. You can only imagine all the work involved and it is appreciated.

In addition, I hope the monthly Board member duties write-ups get all members thinking of areas they would like to help OCARC in the future. 73,

Dan, KI6X, President

NEXT GENERAL MEETING:

Friday, July 19, 2019

ENTER from the WEST SIDE entrance of the
Red Cross Building, Room 208
Take Elevator to the 2nd Floor.

Presenter will be
Robert MacHale, KE6BLR

His TOPIC will be on:
**APRS, Satellites &
the Space Station**
See page 3 for more information



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2019 Club Appointments:

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Submit articles:

editors@w6ze.org

Donations to OCARC:

Bob Eckweiler, AF6C

Monthly Events:

General Meeting time & location:

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

Club Breakfast (Board Mtg):

Held the First Saturday*
of the month at 8am
Marie Callender's Restaurant
307 E. Katella Ave
Orange, CA 92867
*unless otherwise advised

Club Nets (Listen for W6ZE):

10M: 28.375 ± MHz SSB
Wed- 7:30 PM - 8:30 PM
Bob AF6C, Net Control
Alt: Corey, KE6YHX, Net Control

2M: 146.55 MHz Simplex FM
Wed- 8:30 PM - 9:30 PM
Corey, KE6YHX, Net Control

80M 3.883 MHz LSB
Wed- 9:00(+-) PM
Follows right after end of 2M Net
Corey, KE6YHX, Net Control

2019 DUES:

OCARC Membership period is:
1 January to 31 December

Individual New or Renewal: \$30
Family New or Renewal: \$45
Teen New or Renewal: \$15

New Member Dues are prorated
quarterly and includes a badge:
Additional Badges¹ \$3

Use one of our interactive on-
line forms to calculate current prices,
join, renew, or order badges:

[Dues and Badges Forms](#)

¹ \$3 or less + mailing. See form.



July 19th OCARC Membership Meeting Speaker will be Speaking on...

“APRS and Satellites / Space Station”

Our guest speaker for July 19th, 2019 OCARC membership mtg. will be: **Robert D Mac Hale Jr. - KE6BLR.**

Robert will present some of his in-depth knowledge of APRS and related Satellite communications. Robert also maintains a website called www.spacecommunicator.club that you may want to check out. He also hosts regular meetings of the Space Communicator Club where he helps students and Scout groups learn about and make ARISS contacts with the ISS.

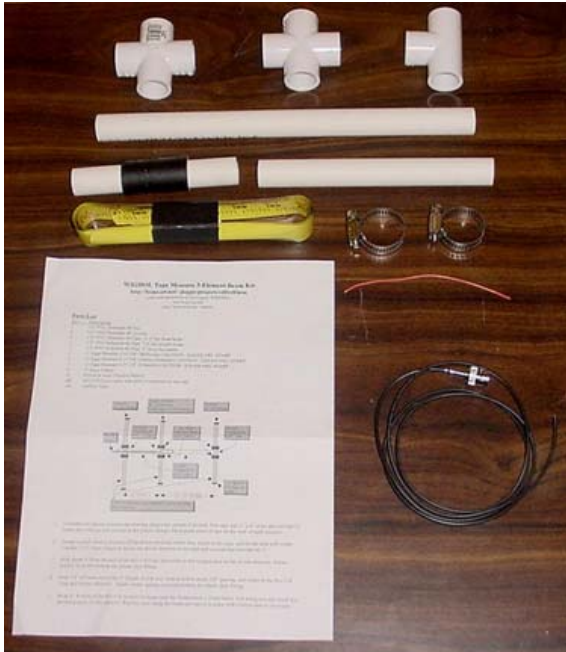
Bio (biography added by Editor):

Robert Mac Hale Jr. (KE6BLR) is a software engineer in Irvine, Ca. He obtained his Amateur Radio license in the 1990's and is most interested in satellite communications. About once per month he teaches groups of Boy Scouts how to track the International Space Station and how to connect to satellites via APRS on FM 145.825MHz. He is a Merit Badge counselor for both Radio and Space Exploration. He designed a lightweight Az/EI (Azimuth-Elevation) motor system for use with Elk and Arrow antennas.

Bio Source: 2018 International DX Convention Speaker information.



Tim's Tape Measure Antenna Offer



The **August 16th General Membership Meeting** is all about **Tape Measure antennas!**

This will be your opportunity to hear about them, see examples up close and if interested (provided you have or have purchased the parts in advance) you can build a 2-meter tape measure antenna. A limited number of Kits will be made available in advance of the meeting. If you desire a Kit please contact Tim N6TMT (see instructions below) on or before [Sunday, July 21st](#) if you wish to purchase one.

To **PURCHASE A KIT** (orders must be place prior to July 21st) [click on the following link: tim@sherimillard.com](#). Kit's are \$20 each (see left image).

Alternatively, the plans for building one are available online.

For more information click on the following link:
http://theleggios.net/wb2hol/projects/rdf/tape_bm.htm

Note: The link above can then be utilized to obtain the needed materials to build one yourself.





Chip Margelli, K7JA

Field Day University by
Tim Goeppinger, N6GP

Collage by Tom W6ETC



OCARC Field Day 2019 Operations



Field Day 2019 Collage 3 by Tom W6ETC





Field Day 2019 Collage 5 by Tom W6ETC

Field Day 2019 Images within collage is courtesy of the following individuals:

Tom W6ETC
Dan KI6X
Vijay KM6IZO
Toni KN6CHX
Tony N2VAJ



Peter NI6E
Greg W6ATB
Ken W6HHC
John WD6ABC
Nicholas AF6CF

Editors note: I apologize if I've missed someone...

Field Day 2019 Chairman's Report by Tim Goeppinger N6GP

I am very happy with our results. I want to thank every one of you for helping in this HUGE team effort! We continued our spotless safety record, which is the most important thing. Our score of 8600 points is fantastic and we will continue our reign as Orange Section champions (see next page with our unconfirmed FD Score results). Based on last year's results, we should place in the top 5 of about 35 6A class entries.

Gene KJ6OML and June AG6UG made a huge contribution to our Field Day with their help, and with their trailer. They put a lot of time into it to get it ready. On top of that, they did a great job with the Public Info Booth.

Peter NI6E wowed visitors with his converted TV van for the VHF station. This was by far the best VHF station we have ever fielded. Tom W6ETC's shiny red trailer was impressive for the 20m SSB station.

Thanks go to the Centralia School District, and especially to Carla, who is now retired. The Walter Knott site is always fantastic. Being able to use the portable classroom was a big help to our Digital and Satellite stations.

Wayne KH6WZ sure impressed us with his laser demo. He is a great resource for showing off technology, and is an awesome speaker. Tony N2VAJ showed great perseverance in tackling his technical challenges to make the satellite contacts. He really hung in there.

Our partnership with Boy Scout Troop 440 was great again this year. Their food was delicious, and 5 of the Scouts made contacts, giving us the maximum 100 Youth bonus points. Thanks to Jesse KB6MQY and Cheyenne AJ6JZ or their leadership.

Our Publicity Chair, Vijay KM6IZO got an article published in the Buena Park Independent newspaper just before Field Day! **Great job!**

Greg W6ATB and Corey KE6YHX did a great job with Digital, using FT8 to smash our club record for digital QSOs at Field Day. Ron W6WG did a great job on 40 CW with his easy-to-set-up 3 element array.

Hindsight being 20/20 it is evident that the 20m SSB beam and 40m SSB beam were too close to each other. I applaud the 20 SSB team for their tenacity to do S&P all weekend to grind out a very good score, considering the disadvantage they had. With this in mind - I would like to suggest that we do a 1PM evaluation of each station next year to catch problems like this. Then put in some sort of remediation if needed.

A very large group of us, myself included were bestowed a N6UC Memorial Award for putting up both of the towers without attaching the 80m dipole first. It was ingenious how we recovered from this. Dan KI6X and others walked each end of the dipole up the guy ropes, using them as catenary lines.

I think this exercise is a great learning opportunity for everyone. I was with Greg W6ATB as he copied the W1AW FD Message using the MFSK16 mode. The W1AW signal was fairly weak, and we had some local interference from one of our stations. This mode copied the entire message without a single error! Forward Error Correction makes it a very robust mode.

The recent Ridgecrest earthquakes put Field Day into perspective. Field Day is a rough approximation of what it would be like if we were called upon to communicate "If All Else Fails." I have heard reports that the Ridgecrest ARES Group is doing good work up there.

Thanks again to our OCARC team, and especially to the many that I did not name in this article. Again, it took our whole team to pull together to do this, and WE did it together!

73, Tim N6GP

"RF"	ORANGE COUNTY AMATEUR RADIO CLUB																				JULY 2019				
FIELD DAY SUMMARY																									
FOR																									
THE ORANGE COUNTY AMATEUR RADIO CLUB - W6ZE -- page 1 of 2																									
by: Ken / W6HHC & Bob / AF6C																									
NOTE: Adjustments have not been made for duplicate contacts,and bonus points. Final scores appear in QST.																									
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/PSK Dig	SAT- ELLITE	GOTA	---- TOTAL ---- QSO's / (POINTS)
2019	0	43	34	392	566	536	322	29	0	0	0	7	0	10	0	18	3	8	0	0	0	271	6	0	2,239 / 7,032
2018	0	97	182	476	923	592	848	138	211	0	38	60	0	67	1	52	0	13	0	0	0	137	4	45	3,884 / 10,726
2017	0	0	12	449	852	262	787	0	0	0	0	0	0	25	0	51	0	0	0	0	0	91	4	50	2,583 / 6,770
2016	0	29	18	163	342	206	760	15	18	0	0	0	1	36	0	44	0	1	0	0	0	188	1	52	1,874 / 4,952
2015	0	53	121	115	507	661	1161	190	324	0	1	71	3	60	0	45	0	6	0	0	0	77	0	1	3,396 / 8,992
2014	0	111	122	756	723	1059	1113	559	382	0	57	134	25	133	0	43	0	11	0	0	0	121	23	47	5,419 / 16,214
2013	0	269	339	655	1052	895	1960	484	614	0	38	67	6	60	0	60	15	11	0	0	0	144	4	186	6,859 / 18,700
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

OCARC

BLAST FROM THE PAST

O.C.A.R.C.

“W6ZE”

Field Day
1967***L-R Back Row:**

Jack Hollander WB6UDC/N6UC, Rolland Miller K6KTX, Ralph Alexander W6WRJ/W6RE, Greg Cordes WB6FMJ, Paul Sheridan (later became WB6TDO), Roy Maxson W6DEY, Bud Barkhurst WA6VPP, Chuck Wohl WB6SIE, Jerry VerDuft WA6ROF/ADØA, ???, Jack Shaw WA6YWN, Dave Hollander W6COJ

***Center leaning down:** Bob Evans WB6IXN

***L-R Front Row:**

Jack Shaw's son, David Hollander WB6NRK/N7RK, ???, ???, ???, ???, Frank O'Leary WB6TBU, Bob White ?, ???

Thanks for David Hollander N7RK for sending up this photo of the 1967 OCARC Field Day.

Reported by Dan KI6X. Special thanks to Tim N6GP.
Digital Image enhancements (Photoshop) by Tom W6ETC.

*Please note: This is a work in process, so the names and call-signs are subject to changes without notice. Research and discovery continues. If you can assist us to fill in the blanks by identifying the names and call signs of individuals above:

Please contact Tim N6GP (N6GP@w6ze.org)



Special Note from Dan KI6X, 2019 President OCARC:
OCARC By-laws are being revised and some of the duties related to the club bulletin being mailed are further examples of outdated officer roles. The revised by-laws are expected to be presented to the membership later this fall.

Current Officer: **Corey Miller**
Call-sign: KE6YHX
Email: ke6yhx@w6ze.org

Areas that **OCARC members can assist this Officer:**
Volunteers are needed during meetings to make sure the role sheets are filled in by all attendees. There are a lot of reports created that assistance could be requested. Please contact Corey or volunteer when you hear there is an opportunity to assist with the membership role.

by Dan Violette ki6x@w6ze.org,
2019 President of the OCARC

Membership Chairman

Note: This months' Newsletter highlights an OCARC officer position of **Membership Chairman**. It includes but not limited to the duties of this office and where we, the Board of Directors of the OCARC encourage its **members to get involved by offering their assistance** in the performance of his tasks..

Duties: The OCARC By-laws list the following as duties of the Membership Chairman,

IT shall be the **duty of the Membership Chairman** to:

- Maintain to date, an accurate roll of all paid members, and all honorary members.
- After the March regular meeting, prepare a list of paid members including name, call, address, and telephone number, and submit this list to the editor of the club bulletin for inclusion in the April edition.
- Perform other duties required by the president or the Board.

Note from Editor: In the past the 'club bulletin' and membership lists were distributed to its regular (paid) members (by snail-mail) with additional copies printed and made available to visitors that arrive to the next OCARC Membership meeting. The Board recognizes that this is no longer pertinent and the by-laws still list these special mailings. At present the monthly RF Newsletter is distributed primarily by email.

What is an Elmer?



By Tom W6ETC

Simply put an **'Elmer'** is an experienced Amateur Radio Operator that acts as a **mentor** to other Radio Operators. This individual inspires and befriends other radio operators or those interested in our hobby by sharing their own experiences and insight. They are patient with operational or technical questions and can step up by offering guidance and feedback when asked to do so.

You have heard of the proverb *"Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime."* In that regard an Elmer is there to offer instruction, guidance and direction that can have a positive lifetime effect on an individual's experiences as an aspiring Amateur Radio operator. Elmer's share from their years of expertise and insight in Ham radio. Their passion for the hobby and their willingness to care, share and give of their expertise is a demonstration of an Elmer, the highest caliber of a true-blue Amateur Radio Operator.

They are the 'Best of the best' and the Hallmark of an Amateur Radio Operator! Elmer's are *"the Unsung Fathers and Heroes of Amateur Radio."* We thank you!

HOW OCARC MEMBERS SERVE OUR COMMUNITY



Close up of signage.

Tom W6ETC offering community support and celebrating the 4th of July with Family in the Tustin Meadows Parade. The image at left show the signage of top of the rack promoting the **OCARC**, Amateur Radio and ARES.



The End Fed Half Wave Antenna by Terrence AI6ZV and reported by Tom W6ETC

Recently I had the pleasure of building a 49:1 End Fed UNUN that works fantastic. Check the link below for the plans/PowerPoint presentation by K1RF that I used as reference to make my own. I built this pretty much to the exact specification for the High-Power Version, as I am using 3 Toroid's instead of 2. This required one less turn.

The image to the left is a picture of the actual unit I built. Due to my restricted lot size, I am using this primarily for 40M, not 80M. I used about 70 ft of wire and trimmed it for a 1:1 SWR match on 7.200 (which was about 66 feet, or a half wave on 40M). I have the UNUN grounded to a ground rod, and am also running a quarter wave (33 foot) counterpoise.

This antenna does not need a tuner for 40M, 20M, and 15M. If I added the full wire size of 132 feet, it should operate on 10M-80M with no Tuner. That is the big advantage of this design, it is in essence Tuner free, and over 80% efficient.

I have this installed as a Sloper, with the highest point being about 20 feet in the air. It also runs along the side of my roof, so it's not true sloper but works just fine. Compared to my 9:1 UNUN, I am getting approx. 5/9 + Signal reports to the East Coast with the 49:1, while the 9:1 would get about a 5/2 at best in a back to back comparison. This is running 100 watts maximum. This End Fed UNUN is relatively easy to make, assuming you follow the directions exactly. It also saves quite a bit of money to make this yourself then buying a pre-made version.

Click here for the PowerPoint Presentation> <http://gnarc.org/wp-content/uploads/The-End-Fed-Half-Wave-Antenna.pdf>

Heathkit of the Month #93:*by Bob Eckweiler, AF6C***KIT RESTORATION****Heathkit CS-1****Condenser¹ Substitution Box.****Introduction:**

Back in Heathkit of the Month #038 the Heathkit CS-1 Condenser Substitution Box was covered². Later, that CS-1 substitution box was used to temporarily replace a suspect capacitor in an old communications radio. The capacitor was a 0.015 μf 400V paper capacitor but using the substitution box resulted in making the problem worse. The faulty capacitor was completely removed from the radio and checked on the Heathkit IT-11 Capacitor Checker (HOM #002)³. While the capacitance was within 20% of its marked value, the capacitor had excessive leakage at 400V and even all the way down to 150 volts. The capacitor location was bridged with a new capacitor on hand for another project and the problem disappeared. The CS-1 must have some problems, so it was put away for a rainy day project. Recently the CS-1 capacitor substitution box was again needed; it was time to check and restore it.

CS-1 Preliminary Evaluation:

The 18 capacitance values were each measured with a digital capacitance meter, then the IT-11 was used to evaluate leakage; the IT-11 is able to evaluate capacitors up to 600

**Figure 1:** The Heathkit CS-1 prior to restoration

volts for excessive leakage. The equivalent series resistance (ESR) was also approximated using the size of the eye tube opening on the IT-11. **Table I** shows the results. All but four of the capacitors needed replacement.

Obtaining Replacement Capacitors:

The CS-1 uses 18 capacitors starting with three mica capacitors of 100, 220 and 470 pf. Beyond those, they range from 0.001 μf (1000 pf) to 0.22 μf in a 10, 15, 22, 33, 47, 68 sequence. Other than the three mica capacitors, the rest are axial tubular paper capacitors. In recent years paper, as a capacitor dielec-

Here is a link to the index of Heathkit of the Month (HotM) articles:

http://www.w6ze.org/Heathkit/Heathkit_Index.html

ORIGINAL HEATHKIT CS-1 CAPACITOR EVALUATION										
#	Units	Marked			Measured				Brand	Cap. Okay
		Value	Tol.	Volts	Value	Tol.	Leakage Voltage	Excess ESR		
1	pF	100	5%	500	106	6.0%	> 500	no	Sangamo, Silver Mica	NO
2	pF	220	5%	500	219	0.5%	> 500	no	Sangamo, Silver Mica	YES
3	pF	470	5%	500	467	0.6%	> 500	no	Sangamo, Silver Mica	YES
4	nF	1.00	10%	600	1.50	50.0%	< 500	yes	Sangamo, Type 33 molded paper capacitor	NO
5	nF	1.50	10%	600	2.30	53.3%	< 400	no	Sangamo, Type 33 molded paper capacitor	NO
6	nF	2.20	10%	600	2.60	18.2%	< 450	yes	Sangamo, Type 33 molded paper capacitor	NO
7	nF	3.30	10%	600	4.20	27.3%	< 400	yes	Sangamo, Type 33 molded paper capacitor	NO
8	nF	4.70	10%	600	5.80	23.4%	< 450	yes	Pyramid IMP molded paper capacitor	NO
9	nF	6.80	10%	600	9.70	42.6%	< 450	yes	Sangamo, Type 33 molded paper capacitor	NO
10	μF	0.010	10%	600	0.012	20.0%	< 500	yes	Pyramid IMP molded paper capacitor	NO
11	μF	0.015	10%	600	0.021	40.0%	< 50	yes	Sangamo, Type 33 molded paper capacitor	NO
12	μF	0.022	10%	600	0.031	40.9%	< 500	yes	Pyramid IMP molded paper capacitor	NO
13	μF	0.033	10%	600	0.040	21.2%	< 200	no	Sangamo, Type 33 molded paper capacitor	NO
14	μF	0.047	10%	600	0.055	17.0%	< 200	no	Micamold Tropicap molded paper capacitor	NO
15	μF	0.068	10%	600	0.088	29.4%	< 50	no	Sangamo, Type 33 molded paper capacitor	NO
16	μF	0.100	10%	600	0.112	12.0%	< 350	no	Sangamo, Type 33 molded paper capacitor	NO
17	μF	0.150	10%	400	0.148	1.3%	> 400	no	Pyramid IMP molded paper capacitor	YES
18	μF	0.220	10%	400	0.220	0.0%	> 400	no	Pyramid IMP molded paper capacitor	YES
TABLE I - Evaluation of Original CS-1 Capacitors										

tric, has been replaced with polypropylene film for lower capacitance values and polyester film for the larger capacitor values. These dielectrics are coated with metal resulting in smaller physical sizes with higher voltage ratings. **Figure 2** shows the nine largest capacitors removed from the CS-1 above their replacement capacitors. Note the significant difference in physical size.

Axial capacitors are becoming harder to obtain, and their prices are rising as demand diminishes. Mallory/CDE series 150 capaci-

tors, used as replacements, are getting scarce unless bought in large quantities. Good quality axial capacitors may still be obtained through *Just Radios*⁴ at reasonable prices. These newer capacitors are not just smaller, they are expected to have a much longer and more stable lifetime due to their polymer film dielectric material. The fifteen capacitors that replace the paper axial capacitors cost a total of \$7.61. The three smaller mica capacitor replacements (500V) were in-house, but near completion of the restoration the decision was made to upgrade them to

1KV mica capacitors, which will be purchased in a future order. Thus the original micas were tack-soldered in-place awaiting the arrival of the new capacitors.

Disassembly of the CS-1:

The CS-1 was completely disassembled and all solder terminals were cleaned. The switch was lubricated and the contacts cleaned. The old capacitors were discarded as was the “condenser mounting unit” which is a question-mark shaped piece of #10 solid tinned buss wire. More on this part later.

Reassembly of the CS-1

The original layout of the CS-1 was tight due to the large size of the original capacitors (See **Figure 3**). The twelve smallest capacitors ($0.0001\ \mu\text{f}$ to $0.022\ \mu\text{f}$) mount vertically from the switch to the curved part of the “condenser mounting unit”. The manual instructs that the leads be cut to the specified length and that the spacing between the top of the largest of these capacitors ($0.022\ \mu\text{f}$) and the mounting unit be at most $1/8$ ". The remaining six capacitors are too large to

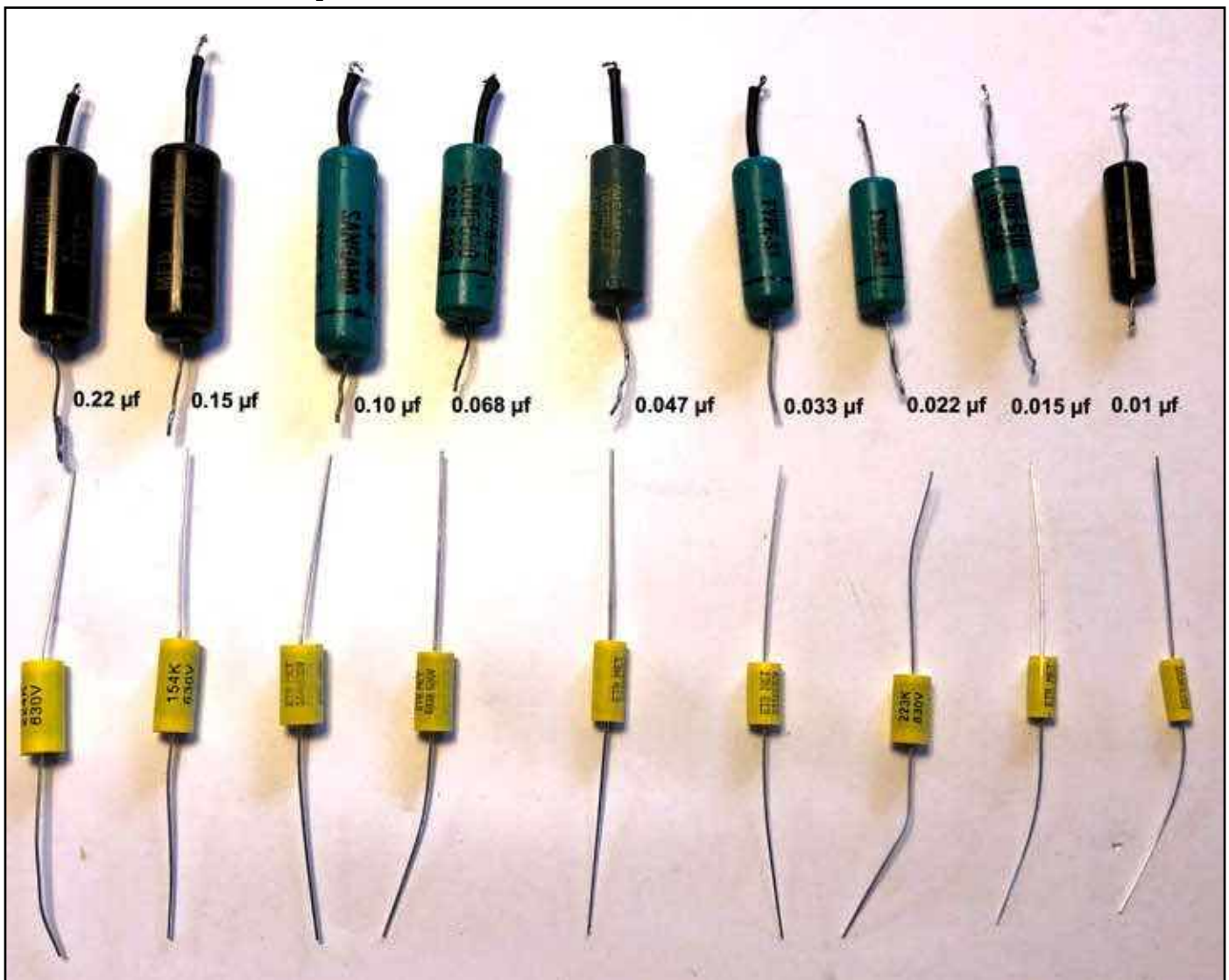


Figure 2: size comparison of the nine largest capacitors and their replacements. The voltage rating of the old capacitors are 600 VDC except for the two largest, which are 400 VDC. All the newer capacitors are rated for 630 VDC.



Figure 3: Internal view of the original CS-1.

mount vertically and mount horizontally with their common lead connecting either to the straight part of the mounting unit or the black terminal solder-lug.

Reassembly begins with reinstalling the switch, plastic insulator and the two binding posts per the manual instructions. **Figure 4** is the partially assembled CS-1 awaiting the addition of the capacitors.

Due to the smaller size of the replacement capacitors a new “condenser mounting unit” was fabricated. The plan was to fabricate it from #10 soft drawn solid copper wire and the work-harden it so it would keep its shape well. Home Depot sells solid #10 SD copper



Figure 4: partial reassembled CS-1 awaiting capacitor installation

wire⁵ by the foot. Unfortunately the pickup date kept slipping, and finally, in desperation some #12 solid copper wire that was on-hand was used. The new mounting unit has a complete 2” diameter circle and with an ‘L’ shaped tail that terminates at the black common capacitor binding post lug.

Prior to installing the mounting unit all the capacitors should be soldered to their correct switch terminal. With the physically smaller capacitors it is possible to mount all the capacitors vertically around the switch, with room to spare, and easily clear the back of the cabinet. This is done with the lead between the capacitor and the switch terminal formed in a ‘U’ shape so one end of the capacitor can mount close to the front panel. Now the new “capacitor mounting unit” shape can be adjusted and trimmed for best fit. The unit should be about 1/4” above the end of the largest capacitor, but there is lot’s of room to play with. This will give plenty of clearance between the unit and the back of

the bakelite cabinet. Before installing the mounting unit, get a plastic or rubber hammer (or use a metal hammer and a soft piece of fabric between the copper and the hammer) and tap the copper with the hammer against a solid piece of metal along its length and around the wire's diameter. A small anvil helps for the circular part. The idea is to work harden the copper wire without flattening it. You'll notice the wire becoming stiffer as you proceed. Work the circular part heavier than the tail as it will tend to anneal (get softer again) when the wire gets hot due to soldering⁶.

Now solder the mounting unit tail end to the common binding post lug and carefully solder the top capacitor leads to the ring end. Finally, don't forget the wire that goes from the red binding post lug to the wiper terminal of the switch. Alpha #22 stranded 1000V wire was used (Alpha type 1551). Heed the following warning for your other projects that use voltages over 300 volts.

CAUTION

When restoring older tube-type electronics, especially transmitters and other devices that have voltages above 300 VDC, be sure to use appropriate voltage rated wire.

A lot of today's wire is intended for lower voltage applications and is only rated for 300 VDC, sometimes even less. Wire rated for 600 V and 1KV is available but hard to find in hobbyist stores. Spaghetti tubing can also be used to increase the insulation properties of wire.

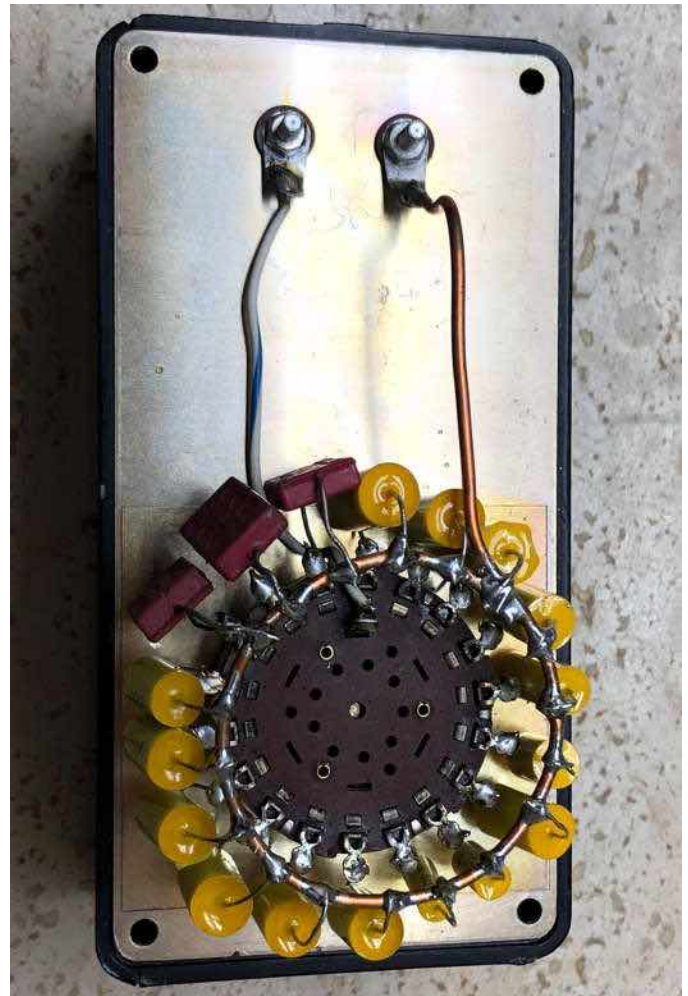


Figure 4: Completed wiring for the restored CS-1. Note that the three mica capacitors in the 10 o'clock to 11:30 o'clock position are just tack-solder in position awaiting replacement with 1KV silver mica capacitors.

Finally it is probably a good idea to make a new set of test leads for your CS-1. One red and one black. Banana plugs and alligator clips are still easy to get as is quality test wire (though the price has gone up).

Summary:

There are still many CS-1 Condenser Substitution Boxes and their descendants in use in ham shacks and electronic labs, it is likely their components have deteriorated with time. This has always been a handy piece of test equipment. Heathkit first released the

CS-1 in 1956 and followed it with the IN-22 (1962), IN-47 (1967) and finally the IN-3147 (1977) which remained in production into the 80's. When the IN-47 replaced the IN-22 they replaced the word "condenser" with "capacitor." All are very similar to the CS-1, and many of each model were sold. They can still be used with transistorized equipment, and at the lower voltages leakage may be less of a problem than ESR and the length of the test leads.

What's Next?

The IT-11, mentioned near the beginning of this article, is getting old, other than an oscilloscope and VTVM, it is probably one of the most used test equipment items in the shack. It is due for a full restoration; Perhaps that will be a future article.

Meanwhile there is a Heathkit IP-27 LV Regulated Power Supply on the shelf that would make a good topic. I have the manual but have not plugged it in since I got it. This too would make a good topic. Anyone have any other ideas for kits to write on?

73, from AF6C



Notes:

1. The electronic industry replaced **condenser** with the more descriptive word **capacitor** in the fifties or sixties. The exact date is elusive.
2. www.w6ze.org/Heathkit/Heathkit_038_CS1.pdf
3. www.w6ze.org/Heathkit/Heathkit_002_IT11.pdf
4. www.justradios.com A supplier of capacitors and resistors. They are located in Canada, but ship from the US. I've placed numerous orders from them, and have always been happy. They have a \$20 US minimum order so plan ahead or pool orders if you are purchasing just a few items.
5. Home Depot item #10626090 Southwire 10-Gauge Solid SD Bare Copper Grounding Wire 34¢ per foot.
6. Google "Tempering copper wire" for some You-Tube videos on tempering and annealing copper wire.

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

Thanks - AF6C

? ? PUZZLER ? ?

In the May 2019 issue of RF there was a simple puzzle on page 22 that should have been of interest to radio amateurs. It was a simple photo showing three resistors of different sizes with a scale, and the puzzle was to guess which resistor is the 2-watt resistor. The response was overwhelmingly POOR. Only one answer was received via the RF Feedback email address. That answer was from Fried - WA6WZO. Two non-official answers came from KI6X and W6HHC during the proofreading of the May RF issue.

At the June board meeting the board was asked to look over the May puzzler and take a stab at the answer. No response.

So if you're waiting for the correct answer you'll have to wait another month (at least). Meanwhile why not take a crack at the answer?

Send your answer to rf_feedback@w6ze.org

If the response is reasonable the answer will appear in the August RF. Otherwise the Puzzler may go...

POOF # #





Upcoming Activities

July

- [FISTS Summer Unlimited Speed Sprint](#): 0000 UTC through 0400 UTC Saturday July 13.
- [IARU HF World Championships](#): 1200 UTC Saturday July 13 through 1200 UTC Sunday July 14.
- *[CQ WW VHF](#): 1800 UTC Saturday July 20 through 1159 UTC Sunday July 21.
- **[North American QSO Party / RTTY](#): 1800 UTC Saturday July 20 through 0600 UTC Sunday July 21.
- [RSGB IOTA Contest](#): 1200 UTC Saturday July 27 through 1200 UTC Sunday July 28.
- [ARS Flight of the Bumblebees](#): 1700 UTC through 2100 UTC Sunday July 28.

August

- [10-10 International Summer Contest, SSB](#): 0100 UTC Saturday August 3 through 2359 UTC Sunday August 4.
- **[North American QSO Party / SSB](#): 1800 UTC Saturday August 3 through 1800 UTC Sunday August 4.

* Indicates club entries are accepted

** Indicates team entries are accepted

Note: When submitting logs for ARRL Contests indicate your club affiliation as "Orange County ARC"

State QSO Parties:

- [Maryland-DC QSO Party](#): 1400 UTC Saturday August 10 through 0400 UTC Sunday August 11.
- [Hawaii QSO Party](#): 0400 UTC Saturday August 24 through 0400 UTC Sunday August 26.
- [Ohio QSO Party](#): 0400 UTC Saturday August 24 through 0400 UTC Sunday August 26.
- [Kansas QSO Party](#): 1400 UTC Saturday August 24 through 0200 UTC Sunday August 25 and 1400 UTC through 2000 UTC August 24.
- [All State & Province QSO Party Calendar](#)
Updated 06/09/2019

Repeating Activities:

- [Phone Fray](#) Every Tuesday night at 0230Z to 0300Z
- [SKCC](#) Weekend Sprintathon (Straight Key CW) on the first weekend of the month after the 6TH of the month. 1200 Sat. to 2359Z Sunday.
- [SKCC](#) Sprint (Straight Key CW) 0000Z to 0200Z on the 4th Tuesday night (USA) of the month.
- [CWops](#) Every Wednesday 1300 UTC to 1400 UTC 1900 UTC to 2000 UTC and Thursday 0300 UTC to 0400 UTC

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



GENERAL MEETING MINUTES

2019-06-14

The OCARC General meeting was held at the Red Cross Complex in Santa Ana on Friday evening, June 14. This meeting was held one week earlier than the normal 3rd Friday schedule, due to Field Day occurring on the following weekend. Attendance was 35 members and visitors. All of the directors were present for a Board quorum.



Tim N6GP covered many basic steps during the Field Day University Class

Field Day University:

Prior to the General Meeting, **FD2019 Chairman Tim N6GP** conducted a **"Field Day University Class"** with many examples of how to operate the best way...even if this you first time at FD. The 45-minute class included how to use the N3FJP Field Day logging program, many basic contest steps, and also "Search and Pounce - Knowing If and When - to Use It".

Program:

The main presentation for the evening was presented by Chip Margelli K7JA on:

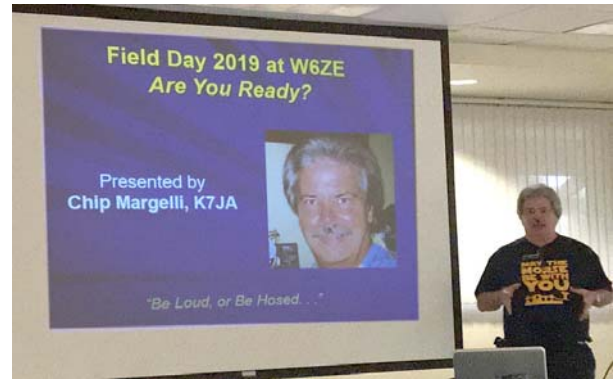
"Are You Ready? - How to Prepare for Field Day".

Chip emphasized that "making sure that equipment will work at Field Day"... means **"TESTING ALL of the equipment at home prior to FD."** Chip carefully listed what needs to be tested before FD:

- 1) Test your rig
- 2) Test your antenna
- 3) Test your generator
- 4) Test your logging program/computer
- 5) **Coil your coax cable the correct way**
- 6) Have a "last minute doomsday plan" (fishing pole dipoles)

General Short Video on Manufacturing at Bioenno Power

Tom W6ETC introduced Kevin Zanjani KI6DHQ of Bioenno Power (the local "battery guys"). The short video made by Tom showed the manufacturing area at Bioenno Power Santa Ana Facility and the steps that they take when building and testing their Lithium Iron Battery packs.



Chip K7JA focused his presentation on
Knowing if you are REALLY READY for FD?



Kevin KI6DHQ displayed many of the battery packs and chargers from Bioenno Power www.bioennopower.com

Business:

• Field Day Budget

FD Chairman Tim N6GP proposed a \$400 budget for 2019 Field Day expenses. The motion was approved by the general membership.

• OCARC Christmas Party Plans

VP Tim N6TMT reported that the club has completed reservations and plans for holding the OCARC Christmas Party at Mimi's Café in Tustin this year on Friday Dec 7. More details will follow.

• OCARC FD Timeline

Tim N6GP reviewed the timeline for FD as published in the June RF Newsletter. A special call for volunteers to load the trailer being provided by Gene KJ6OML at the club "storage locker" in Placentia at 4PM on Thursday, June 20. The BSA Troop 440 Scoutmaster, Jesse KB6MQY reviewed the times that meals would be provided by the Boy Scouts during Field Day and the price for meals.

Good of the Club:

Kevin from Bioenno Power donated a very impressive 12V/12AH battery-pack and charger as the grand-prize for the club's opportunity drawing at the meeting. Jesse Mendez KB6MQY, Scoutmaster of Troop 440, won the new battery-pack and charger.

Submitted by: Ken, W6HHC
OCARC Secretary

OCARC BOARD MEETING MINUTES 2019-07-06

The OCARC Board meeting was held at the Marie Calendar's Restaurant at 307 E Katella Ave. in Orange on Saturday morning, July 06. Attendance was 9 members. All of the directors, except Tim N6GP, were present for a Board quorum.

Director Reports:

- **Treasurer** – Greg W6ATB that YTD, the club has about a \$352 net profit so far. Although not all Field Day expenses have been turned in, yet.
- **Membership** – Corey KE6YHX report that the OCARC currently has a total of 92 paid-up and honorary members.

Old Business:

• Newspaper Editors

Jul – Tom W6ETC (this issue)
 Aug – Tim N6GP
 Sep – Greg W6ATB
 Oct – Tim N6TMT
 Nov – TBD (any volunteer?)

• General Meeting Programs

Jul – “APRS plus Satellites” by Robert KE6BLR
 Aug – Building Tape-Measure antennas
 Sep – “Ducie Island DXpedition” by Arnie N6HC
 Oct – “OCARC Radio Auction”
 Nov – TBD

• By-Laws Update Committee

“El Prez” Dan KI6X reminded board members that now that FD is completed, it is time to finish reviewing the proposed changes to the club's By-Laws. A fresh and updated revised set of by-laws will be sent out to the board.

• Field Day Reports

1. Chairman Tim N6GP has submitted the scores and all of the bonus info to the ARRL. The QSO's per band are listed in the July Newsletter.
2. Bob AF6C reported that because the 20M-SSB beam and 40M-SSB inverted-V-beam were located too close to each other on the 50 foot tower, the 40M antenna definitely affected the radiation pattern of the 20M Beam. 20M SSB was not able to have a strong enough signal to “control a frequency” this year and had to “search out” FD stations on the spectrum (most of the time).
3. While the club had just enough people present to safely put up towers and take down towers, there was a general discussion that the club needs to work on attracting younger hams into the club (who do not have gray hair yet).

Good of the Club:

Ken W6HHC reported that he will be moving to a different house later this year and has a 42-ft crank up tower that is available. Nicholas AF6CF and Ron W6WG offered to remove Ken's tower for use at their “Boron remote station project”.

Submitted by Ken, W6HHC
 OCARC Secretary





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

10 Meters Net
 28.375 ± MHz SSB
 Wed- 7:30 PM - 8:30 PM
 Corey, KE6YHX, Net Control

80 Meters Net
 3.883 MHz LSB SLX
 Wed- 9:00 PM Following 2M Net
 Corey, KE6YHX, Net Control

www.W6ZE.ORG



Image by Tom W6ETC

Cash Flow - Year To Date

1/1/2019 through 7/5/2019

Category	1/1/2019- 7/5/2019
INFLOWS	
ARRL FD 2019 T-shirts	79.40
ARRL Membership Dues	49.00
Badge Income	8.00
Dues, Family 2019	120.00
Dues, Membership (PayPal) 2019	1,023.32
Dues, Membership 2019	817.50
Food Snacks Donations	88.00
Raffle Reg Income	196.00
TOTAL INFLOWS	2,381.22
OUTFLOWS	
ARRL FD 2019 T-shirts Expense	79.40
ARRL Membership Expense	34.00
Field Day - Flowers	71.00
Field Day - Generator Rental	85.00
Field Day Equipment	49.79
Field Day Food	17.58
Field Day Rental - Tent (UF)	140.00
New Bank Checks (Refill)	47.16
OCARC Equipment Repairs	270.00
OCARC Historian	48.97
PO Box Rental	80.00
Raffle - Monthly Exp	98.12
Refreshments Expense	93.08
Storage Locker	813.00
Web Site Hosting	101.94
TOTAL OUTFLOWS	2,029.04
OVERALL TOTAL	352.18

NOTICE

MEMBERSHIP MEETING

JOIN US FOR THE LATEST & GREATEST
AMATEUR RADIO HAPPENINGS

7:00pm FRIDAY JULY 19TH 2019



American Red Cross
600 Parkcenter Drive
Santa Ana, CA



MiniTiouner-Express

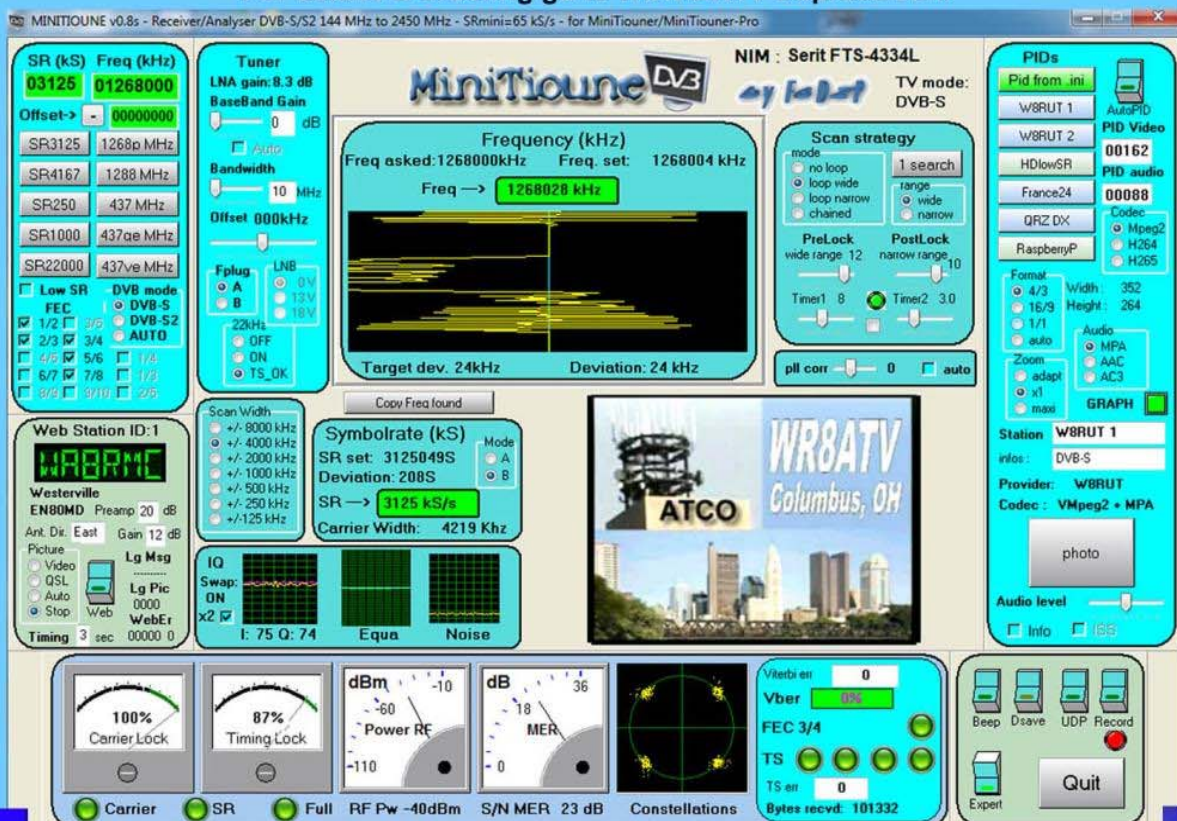
Digital Amateur Television DVB-S/S2 Receiver / Analyzer



Available at DATV-Express.com

- Operates with Windows PC using free MiniTioune software from Jean-Pierre F6DZP
- Smaller than a stack of 2 decks of cards (picture above is full size)
- Two independent simultaneous RF inputs with internal preamps
- High sensitivity -100dBm @1288MHz – at 1/2 FEC
- Fully assembled/tested in aluminum enclosure
- Covers 144-2420MHz (ideal for Space Station DATV reception)
- Symbol rates from 75 KSymb/s to >20 MSymbols/sec
- Uses external 8-24VDC supply or +5V from USB-3 port (with small modification)
- Real time signal modulation constellation & dBm signal strength display
- Price: US \$75 + shipping – order with PayPal

For details & ordering go to www.DATV-Express.com



(MiniTioune display above is the ATCO 1268MHz DVB-S repeater signal at WA8RMC QTH 15 miles away).