



# RF



## ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. LVIII NO. 04

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

April 2017

### The Prez Sez.....

by Tim N6GP



It was great to see Art Goddard's program on his DXpedition to Ascension Island, and to see so many Irish hams attending for St. Paddy's Day. This month we look forward to Paul W6PNG speak on the topic of Summits On The Air (SOTA). Paul is the manager of SOTA for W6.

Some very troubling allegations have been thrown at us by a neighboring club – the East Orange County Amateur Radio Transmitting Society EOCARTS (K6HIK). 2 weeks ago we received a letter from EOCARTS attorney, Payne & Fears in Irvine, CCed to the ARRL. They claim

that OCARC had an elaborate scheme in 2016 to steal EOCARTS' secret Field Day plans, with the help of Russian hackers. Their allegation is that on May 14, 2016, Russian hackers lead by the infamous Roman Stephanenko (3W3RR) worked on our behalf to steal the "Field Day 2016 Plans.docx" file from the Members Only area of their website. They are asking the ARRL to disqualify our Field Day Score, and to ban us from participating in Field Day for the next 3 years.

To make matters worse, the Orange County Register printed an article titled "Local Radio Club Accused of Cheating in Hacking Scandal".

Our legal counsel is sending a strongly worded reply to EOCARTS and to the ARRL. We deny that there was any wrongdoing. We won the Orange Section last year "fair and square". We invite the ARRL to send observers to watch our 2017 FD. We will show them that we have the best organized effort in Southern California, and that we earn every single point. BTW, you might consider what month this column was written.

### Next General Meeting

The next OCARC General meeting presentation is By Paul Gacek, W6PNG on the topic of **Summits On The Air (SOTA)**. Did you know there are over 3,200 SOTA summits in California?

Continued page 9

*The next General Meeting will be on:*

**Friday, April 21st, 2017  
@ 7:00 PM**

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

In This Issue:	Page
The Prez Sez .....	1
Next meeting info .....	1
Club Information .....	2
Baker to Vegas Report .....	3
March General Meeting Minutes .....	7
April Board Meeting Minutes .....	8
Paul Gacek Intro .....	9
Bob's TechTalk .....	11
Field Day Meeting .....	13
Cell Phone Law Update .....	14
Puzzler Update .....	15
OCARC in Feb QST .....	15
Cashflow Report .....	16
DATV Express .....	17

**Orange County  
Amateur Radio Club**  
[www.W6ZE.org](http://www.W6ZE.org)



### 2017 Board of Directors:

#### **President:**

Tim Goeppinger N6GP  
(714) 730-0395  
[N6GP@w6ze.org](mailto:N6GP@w6ze.org)

#### **Vice President:**

Jim Schultz AF6N  
Unlisted  
[AF6N@w6ze.org](mailto:AF6N@w6ze.org)

#### **Secretary:**

Ron Mudry W6FPS  
(714) 840-3613  
[W6FPS@w6ze.org](mailto:W6FPS@w6ze.org)

#### **Treasurer:**

Ken Konechy, W6HHC  
(714) 348-1636  
[W6HHC@w6ze.org](mailto:W6HHC@w6ze.org)

#### **Membership:**

Bob Eckweiler AF6C  
(714) 639-5074  
[AF6C@w6ze.org](mailto:AF6C@w6ze.org)

#### **Activities:**

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

#### **Publicity:**

Dan Dankert N6PEQ  
(714) 599-3841  
[N6PEQ@w6ze.org](mailto:N6PEQ@w6ze.org)

#### **Technical:**

Clem Brzoznowski, WØMEC  
(714) 927-4065  
[WØMEC@w6ze.org](mailto:WØMEC@w6ze.org)

#### **Directors-At-Large:**

Nicholas Haben AF6CF  
(714) 693-9778  
[AF6CF@w6ze.org](mailto:AF6CF@w6ze.org)

Greg Bohning W6ATB  
Unlisted  
[W6ATB@w6ze.org](mailto:W6ATB@w6ze.org)

### 2017 Club Appointments:

#### **W6ZE Club License Trustee:**

Bob Eckweiler, AF6C  
(714) 639-5074  
[af6c@w6ze.org](mailto:af6c@w6ze.org)

#### **Club Historian(s)**

Corey Miller KE6YHX  
(714) 639-5475  
[KE6YHX@w6ze.org](mailto:KE6YHX@w6ze.org)

Bob Evans, WB6IXN (Emeritus)  
(714) 543-9111  
[WB6IXN@w6ze.org](mailto:WB6IXN@w6ze.org)

#### **RF Editor – Rotating:**

Tim Goeppinger N6GP  
[N6GP@w6ze.org](mailto:N6GP@w6ze.org)

#### **Webmaster:**

Ken Konechy W6HHC  
(714) 348-1636  
[W6HHC@w6ze.org](mailto:W6HHC@w6ze.org)

#### **Assistant Webmaster:**

Bob Eckweiler, AF6C  
(714) 639-5074  
[AF6C@w6ze.org](mailto:AF6C@w6ze.org)

Tim Millard, N6TMT  
(714) 744-8909  
[N6TMT@w6ze.org](mailto:N6TMT@w6ze.org)

#### **ARRL Awards Appointees:**

Arnie Shatz, N6HC  
(714) 573-2965  
[n6hc@aol.com](mailto:n6hc@aol.com)

John Schroeder, N6QQ  
(West Orange Co.)  
(562) 404-1112  
[n6qq@msn.com](mailto:n6qq@msn.com)

#### **Contact the Newsletter:**

Feedback & Corrections:  
[rf\\_feedback@w6ze.org](mailto:rf_feedback@w6ze.org)

Submit Articles:  
[editors@w6ze.org](mailto:editors@w6ze.org)

### Monthly Events:

#### **General Meeting:**

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

#### **Club Breakfast (Board Mtg.):**

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

### 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  
Ann K6OIO, Net Control



#### **Club Dues for 2017:**

Regular/New Members\* - - - - - \$30  
Family renewal/Join\*\* - - - - - \$45  
New Member Join Apr-Jun\*\*\* - - \$23  
Replacement Badge\*\*\*\* - - - - - \$ 3

\* New members Jan-March, w/badge.

\*\* Two members or more, w/badge.

\*\*\* New members April-June, w/badge.

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

## COAR RACES provides Communication Support for the Orange Police 2017 B2V Running Team by Ken W6HHC

Each spring since 1985, law-enforcement running teams (from around the world) have entered in a competitive foot-relay-race through the desert. This race, known as “Baker-to-Vegas” (and aka B2V), is a 120 mile long race, that starts outside Baker (CA), runs through the desert to Shoshone, then runs through Pahrump, NV and finishes at the Hilton Hotel in Las Vegas. The B2V race is broken into 20 “legs” or stages. This year, more than 275 different law enforcement teams participated. The runners of the Orange Police Department have been supported for many years with communications by hams belonging to COAR (City of Orange Amateur Radio) RACES, the OCARC members, and Communications Volunteers from Cypress. In 2017, the B2V event began on Saturday, March 25, with runners reaching the finish line on Sunday, March 26. Also this year, six OCARC members helped the OPD running team by providing planning, equipment testing, and communications over the entire race course.

The COAR RACES activities for the 2017 race began at least five months before this year's race began. The COAR B2V communications project required the following five phases:

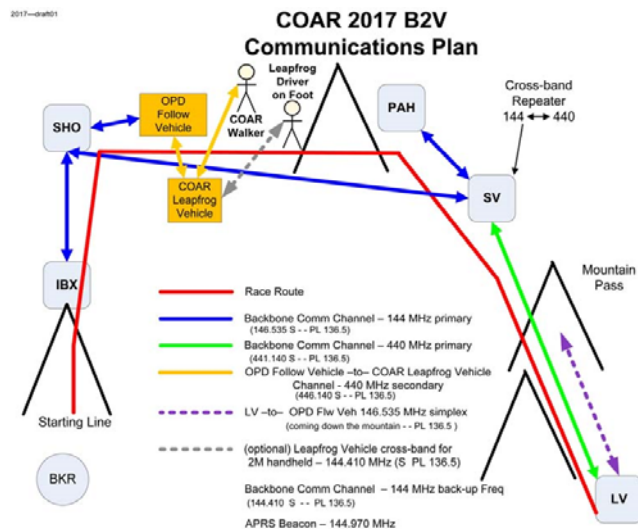
- **Planning Sessions**
- **Equipment Testing & Training**
- **Equipment Set-up for the Race**
- **Staffing and Operating the B2V event**
- **Post B2V Review Sessions**

The City of Orange RACES plan set up five communications centers along the B2V race course in order to provide a “communications backbone” to support the mobile units used during the race. The five communications centers were located at:

- **Ibex Pass, California**
- **Shoshone, California**
- **Pahrump, Nevada**
- **Sandy Valley Road (near Rt 160), Nevada**
- **Las Vegas, Nevada**

The race started on Saturday afternoon and finished Sunday morning. This year, the Orange PD running team finished very well and placed 40 out of the more than 275 teams. The OPD running time has broken the elusive 16-hour barrier for four years in a row. The running time this year was 15 hours 46 min.

The race through the desert had very mild temperatures for much of the course this year, and was mid-70 degrees when the OPD runners started at 3 PM in the afternoon. (much better than the 110 degree temperatures in 2012.)



**Fig 1 – This Diagram is for 2017 Communications Plan for COAR RACES. The Orange PD runner's Follow-Vehicle was always in contact with one of the five COAR Communications Centers. (diagram by Ken W6HHC)**



**Fig 2 –Hams involved with the Follow Vehicle gathered at the OrangePD parking lot, getting ready to test equipment and review communications procedures. (L-R) Alfredo K6EGA, Kris W6KJC, Jeff KK6YUP, Cliff KG6MIG, and Will KJ6IA (photo by Quent W6RI)**





**Fig 3 – Equipment to be used at the Pahrump Comm Center was tested before the race in backyard of Ken W6HHC (seated with brown shirt on left).  
(photo by Ken W6HHC)**



**Fig 4 – Ken W6HHC offered to grill bratwurst for lunch for the hams involved with the equipment testing. On left is Bob AF6C, and Kris W6KJC is seated.  
(photo by Quent W6RI)**



**Fig 5 - On Friday morning before the B2V race, COAR RACES volunteers at breakfast before drive to desert  
(photo by Bobbie KG6MIF)**



**Fig 6 – On Saturday morning at Baker HS, Kris W6KJC (hidden inside minivan) installs two voice radios and two APRS beacons into the Follow Vehicle  
(photo by Bobbie KG6MIF)**



**Fig 7 – The B2V race has started and the OPD is running as Team #45 in 2017. This photo was taken from the COAR “leap-frog” vehicle that provides “catchers” for the OPD runners at the next relay point. The runner is Officer Tibor Naray in Leg 4 of the B2V race.  
(photo by Bobbie KG6MIF)**

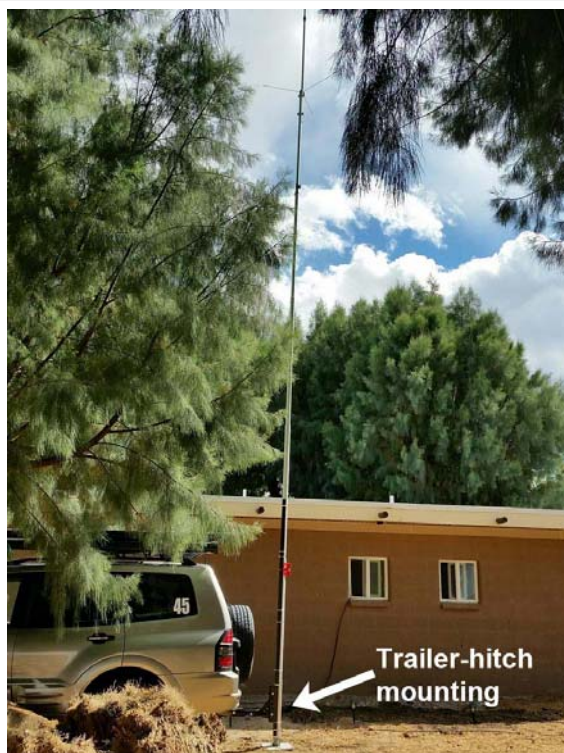


**Fig 8 – This photo taken in 2006 provides a great “feel” and terrific view of the open desert with the OPD runner (then Team #57) leading what seems to be an endless line of runners and support vehicles from the competing teams.  
(photo by Byron KC6YNG)**



**Fig 9 – Rich KR6BA sits in front of the second Comm. Center in the small town of Shoshone, CA. Not shown is radio operator, Steve KB6ROL  
(photo by Quent W6RI)**





**Fig 10 – The 144/440 voice vertical antenna at Shoshone attaches securely to a trailer-hitch without guy ropes.**  
(photo by Rich KR6BA)



**Fig 11 – In Pahrump, (L-R) Nicholas AF6CF, Ken W6HHC, Bob AF6C, and Kris W6KJC set up the voice 144/440 vertical antenna by attaching it to the railing.**  
(photo by Sam W6RDS)



**Fig 12 – At Pahrump Comm. Center, Ken W6HHC (R) explains the frequencies being used to Quent W6RI**  
(photo by Sam W6RDS)



**Fig 13 – Friday evening after the B2V antennas were set up and after dinner, Nicholas AF6CF tested out his newly constructed “Go Box” HF/VHF radio with a portable “screwdriver” type vertical antenna. The “Go Box” contains an FT857 rig and even a 20 AH battery. But, periodic long bursts of noise (>20dB-over-S9) made it impossible to make a contact on 20M or 40M.**  
(photo by Sam W6RDS)



**Fig 14 – Ken W6HHC (L) and Nicholas AF6CF start to remove the radio equipment used in the Pahrump Comm. Center on Sunday morning.**  
(photo by Quent W6RI)



**Fig 15 – The check points take on a completely different atmosphere when running at night. Here the OPD runner and the OPD Follow Vehicle can be seen approaching the “chute” for the baton handoff.**  
(photo by Sam W6RDS)





**Fig 16 – The motor home of Mike KF6WRM is the fourth comm. center located at Sandy Valley Rd (in the “middle of nowhere”). This critical location provides a cross-band repeater using the 144 MHz vertical and an 11-ele 440 MHz beam (shown near Mike’s head) pointed down the mountainside to Las Vegas**  
(photo by Chris Groves KJ6KRC)



**Fig 17 – Las Vegas is the location of the fifth comm. center. (L-R) Joe KE6ZMG, Robbie KB6CJZ and Don KØVNJ set up the station called “Las Vegas Annex”. The long yagi antenna is for 440 MHz and points up to the top of the mountain ridge. The vertical antenna is for 2M and can communicate directly with the Follow Vehicle on the LV side of Mountain Pass.**  
(photo by Will KJ6IA)



**Fig 18 – Don KØVNJ checks out the radios at “Las Vegas Annex”. The “LV Radio Room” listened to the antennas at the “Las Vegas Annex” through a small cross-band repeater shown here (since they could not get coax through the hotel room windows).**  
(photo by Will KJ6IA)



**Fig 19 – People involved with COAR RACES headed to the Bellagio Hotel after the race was over to attend an Orange Police Association sponsored brunch.**  
(photo by Bobbie KG6MIF)



**Fig 20 – Orange PD runners, their family, friends and COAR volunteers listened to the runners report on the race results. Seated second-from-left is the new Orange PD Chief of Police, Tom Kisela.**  
(photo by Bobbie KG6MIF)

## OCARC GENERAL MEETING MINUTES 2017-03-17

The OCARC General meeting was held at the Red Cross Complex in Santa Ana on March 17, 2017.

**Club Officers:** There was a quorum with all officers present with the exception of Dan N6PEQ and Greg W6ATB.

**Attendance:** There were a total of twenty-eight club members, two guests (Vince AF6YG, Bruce KJ6DXJ), and the guest speaker (Art Goddard) in attendance.

Meeting Started at 7:03 pm

Keeping in the spirit of St. Patrick's Day, Tim N6GP passed out "EI" stickers that could be applied to our membership badges to convert our calls to Irish calls.

Following that was a round of introductions with everyone using the new Irish calls or their portable /EI call.

### **Program:**

Jim AF6N introduced this month's speaker Art W6XD. Art's presentation was an informative and entertaining travelogue of his 2015 trip to Ascension Island to work the CQWW-CW contest. Art along with Dick Norton N6AA and Oliver made 10,605 contest contacts from the remote island in the South Atlantic Ocean.

Intermission was taken from 7:57 pm to 8:20 pm

### **From the membership:**

- Tim N6GP, Jim AF6N & Ron W6FPS gave an update on the status of the 2017 Field Day organizational effort. We are planning on a 5A effort with the emphasis on 20 & 40 meter CW & Phone. If anyone would like to put his name in for support help get in contact with Tim N6GP, Jim AF6N or Ron W6FPS. The next Field Day planning meeting will be 7:00 April 27 at Jim's AF6N house.
- Nicholas AF6CF said the charger for the Bioenno battery pack wasn't working properly. Tom W6ETC and/or Tim N6GP

will contact the manufacture to get the problem resolved.

### **Show and Tell:**

- Tim M demonstrated a CW resonant speaker that he constructed. The speaker was featured in the February edition of QST, page 43. The audio from the speaker is designed to peak at a specific audio frequency with a narrow band width and suppress the background noise level.
- Nicholas AF6CF demonstrated a portable HF antenna the he will take to the Baker to Vegas event to use during the off hours. It consisted of a Tarheel antenna mounted on a tripod. Nicholas will be using the antenna with his Yaesu FT 857 mounted in a Go-Box that he demonstrated at the February General Meeting.

### **Ask the Elmers:**

- Tim N6GP asked for advice on how to check your antenna balun to make sure it is working. Ken suggested substituting a balun that is known to be good and see if there is any improvement. Others suggested checking for water in the balun.
- Tom W6ETC asked why he was getting flutter on reception while his transmitted signal was reported to be steady from his mobile installation. Tom was given a few possible causes for the problem that he can ponder.
- A follow-up on the question about using your mobile rig while driving. For now don't operate while driving, similar to the use of a cell phone.

### **Good of the Club:**

- Ron W6FPS suggested that the members listen to the recent podcast episode of "The Doctor is In" which addressed remote antenna tuners and feedline losses.

Meeting Adjourned at 9:22 pm

**Submitted by** *Ron Mudry W6FPS*

- OCARC Secretary

# OCARC BOARD MEETING MINUTES 2017-04-01

The April OCARC Board meeting was held at the Marie Callender's Restaurant at 1821 N. Grand Ave in Santa Ana on April 1, 2017.

Meeting Called to Order: 8:00 am

## Roll Call:

Pres.: Tim N6GP, Present	Vice Pres. Jim AF6N, Present
Sec.: Ron W6FPS, Present	Membership: Bob AF6C, Present
Tech.: Clem W0MEC, Present	Treasurer: Ken W6HHC, Present
Activities: Tim N6TMT, Present	Publicity, Dan N6PEQ, Present
Directors at Large: Greg W6ATB, Absent	Nicolas AF6CF, Present

Members Present: Tom W6ETC, Rodger Kerr KM6IZR and his XYL

## DIRECTOR REPORTS:

- ☐ **Vice President** – Jim AF6N confirmed the PaulW6PNG will be the April guest speaker. Paul will be speaking about SOTA. Jim is also working with DX Engineering to do a Skype presentation for early next year.
- ☐ **Secretary** – Ron W6FPS had no report.
- ☐ **Membership** – Bob AF6C reported we now have 68 2017 payed members and 2 honorary members. A discussion on keeping non-members on the email list.
- ☐ **Technical** – Clem reported that the Wednesday night 10 meter net has had only 2 or 3 check-ins for the last few weeks. The 2 meter net is getting very good participation with 10 to 12 check-ins.
- ☐ **Treasurers Report** – Ken W6HHC provided a current.
- ☐ **Activities** – Tim N6TMT gave Dan N6PEQ the new tri-fold brochures.
- ☐ **Publicity** – Dan N6PEQ is working on getting a Field Day press release to some local papers. Dan said that he will see about getting our brochure into Marvac and Orvac Electronics.
- ☐ **Director at Large** – Nicolas AF6CF gave the large Bioenno battery pack to Tim who will in turn take it to the manufacture to resolve the charger problem.

## OLD BUSINESS:

- ☐ **Newsletter Editors**  
Apr- Tim N6GP, May- Jim AF6N, June Tim N6TMT

- ☐ **Club Historian Report** – Corey KE6YHX wasn't present, but a copy of his report was provided to the secretary. Corey received help from Vijay.
- ☐ **Repeater for Net use** – Bob AF6C is waiting to hear back from WD6AWP and will report back to the board next month. Bob suggested that we have a separate net controller if we start up a repeater net.
- ☐ **June 2017 Field Day** – The next planning meeting be 7:00 pm April 27 at Jim's QTH and will be open to all. Jim said that we have a need for more CW operators. Tim N6GP followed up by saying that he had just recruited two very good CW operators Ron W6ZQ and John KQ6ES. A Field Day budget will be prepared for the Board to review at the next Board meeting. We will look into add 6 meter capability to the GOTA station.
- ☐ **W6NGO** – Ken W6HHC will apply for a second club call sign which will then be replaced with the W6NGO vanity call to honor a long-time member of OCARC.

## NEW BUSINESS:

- ☐ **Club Battery Sale** – The Secretary will compose an email that will be sent the membership offering the 40 ampour battery for sale.
- ☐ **Club Trustee** – Bob has received the paperwork from the ARRL to change the club trustee from Bob AF6C to Tim N6GP.

## GOOD of the CLUB:

- ☐ **NEWLY LICENSED** – Rodger ZL2KK is now KM6IZR and Vijay Anand is now KM6IZO.
- ☐ **DXCC** – KH7 Kure Island and KH4 Midway Island have been removed from The List of ARRL DXCC Countries list of due to the national monument in northern Hawaii being extended further to the north.
- ☐ **Baker to Vegas** – OCARC had nine members working with OC RACES to provide commutation support for the Orange Police Department.

Meeting Adjourned 9:40 am

Submitted by *Ron Mudry W6FPS, Secretary*  
OCARC Secretary





**April Speaker**  
**Paul Gacek W6PNG**  
**W6 Manager for Summits On The Air (SOTA)**

Our speaker for April is Paul Gacek, W6PNG who will speak about Summits on the Air (SOTA), the National Parks on the Air (NPOTA), hiking and photography.

Born and raised in London, Paul has married, lived, and worked in California for the past 40 years. Forty years qualifies him as both a California and USA native. It, however, does not inhibit his passion for travel. We will benefit from his travels by way of his excellent photography. You are encouraged to visit and enjoy Paul's webpages listed below:

Website / Blog: <https://w6png.wordpress.com/>

Photography: <https://paul-gacek-ms0f.squarespace.com/>

## Paul Gacek



In loving life, the world becomes a wonderfully diverse place. I enjoy the interaction with its people, vistas and all the culture it has to offer. Travel is therefore key, offering vast opportunities to pursue my passions of hiking, photography and amateur radio.

I enjoy operating my radio away from home and am active in Summits on the Air (SOTA) and the ARRL National Parks on Air (NPOTA). I'm currently the California (W6) SOTA Association Manager.

Having spent decades in the software industry, I now spend significant time with family, friends and pursuing my interests.

Radio Adventure blog:

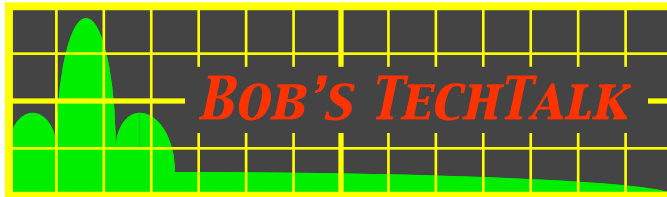
[www.w6png.wordpress.com](http://www.w6png.wordpress.com)

Photography:

<https://paul-gacek-ms0f.squarespace.com>

Contact:

[paul.gacek@gmail.com](mailto:paul.gacek@gmail.com)



## Number 50: AC LINE SAFETY CAPACITORS: (TechTalk #123)

by: Bob Eckweiler - AF6C

### INTRODUCTION:

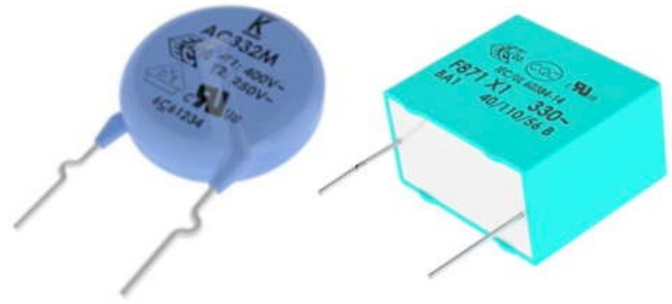
If you repair or recondition ham equipment, test equipment, and other electronics that use 120/240 line voltage for power, you should pay special attention to any capacitors that are connected to the AC line. Typically, capacitors are located from one side, or both sides of the AC line to chassis ground. Sometimes there is also a capacitor across the line. **Figure 1** shows two of the styles of safety capacitors. **Figure 2** shows some of the typical circuit configurations.

These capacitors prevent interference from entering or exiting the electronic device, and when they fail or leak significantly, they can cause problems, some dangerous.

On older equipment that you might be refurbishing, such as a Heathkit, you will find capacitors in the order of  $0.005 \mu\text{f}$  to  $0.05 \mu\text{f}$ . They will be of the paper or disc ceramic type. These capacitors are generally of the high voltage type. The molded tubular paper capacitors are usually rated at 600 VDC and the disc ceramic capacitors are rated at either 1 KV or, in later old equipment, even higher values like 1.6 KV.

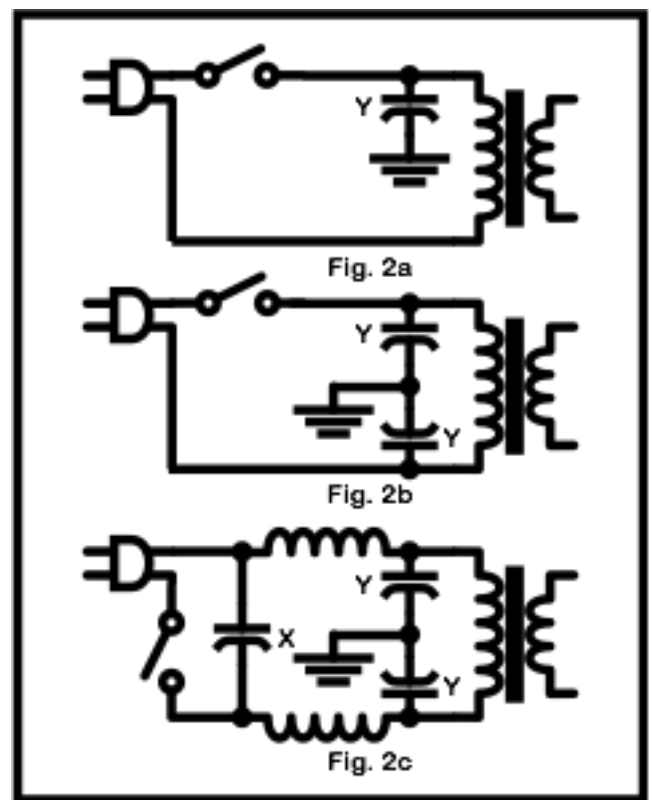
So what happens when one or more of the line capacitors fail? If a capacitor situated across the AC line shorts, a fuse will blow, but the capacitor may catch fire. If a capacitor situated between the line and chassis fails, it will make the chassis "hot" and can result in a shock which could be fatal. If that capacitor is only leaky, it can also result in a hot chassis, shock and injury. If a line capacitor should open, lose capacitance or develop high series resistance, the result is less serious, but receivers may become prone to interference or "hum modulation", and transmitters may produce TVI, unwanted radiation or a chassis hot with RF. Older molded tubular paper capacitors commonly leak after they age and should be replaced no matter.

In February of 2000 a new series of capacitors was introduced under the sixth edition of the UL 1414 standard. It introduced X and Y safety capacitors that



**Figure 1:** The two common styles of X, Y and X/Y capacitors are shown. On the left is the common ceramic disc style and on the right is the film style which offers various lead styles. Surface-mount safety capacitors also exist.

were specifically designed for AC line use. Specifications for these capacitors were written with an implementation date of 1 May 2007. This standard was replaced by UL-60384-14 in late 2013 introducing additional classes, and certification methods.



**Figure 2:** Various simple line filtering circuits used in commercial equipment. X and Y designate the type of safety capacitor used at that location.

**Fig. 2a** shows a single filter capacitor to the chassis.

This circuit is also often used in AC-DC radios.

**Fig. 2b** shows capacitors to ground for each leg.

**Fig. 2c** shows an LC filter often used in transmitters.



**TYPE-X SAFETY CAPACITORS:**

X safety capacitors are rated for use across the AC line. There are at least three different classes: X1, X2, and X3. X1, impulse tested 4000V, and X2 impulse tested to 2500V, are the most common, with X1 designed for heavy duty industrial use and the smaller sized X2 for consumer product use. These capacitors are for use where a failure could result in fire. They use flame-proof construction. X3 capacitors are spec'ed not to require an impulse test and are probably, at best, in very limited manufacture.

**TYPE-Y SAFETY CAPACITORS:**

Y safety capacitors are rated for use between the line and ground. There are at least four different classes: Y1 through Y4. Y1, impulse tested 8000V, and Y2 impulse tested to 2500V, are the most common; again, Y1 is designed for industrial use and Y2 for consumer product use. These capacitors are for use where a short could result in electric shock. They are designed towards failing open and protecting against a line to ground (or chassis) short. Like the X3, Y3 and Y4 are safety capacitors you probably won't come across or need.

**MORE ON SAFETY CAPACITORS:**

A typical safety capacitor is rated for use in line circuits up to 250 VAC. This means they can be used in 120 VAC, 240 VAC and even 208 3-phase powered equipment. Don't think a 630 VDC, 1 KVDC or 1.6 KVDC capacitor is a better choice. They will not provide the added protection of a safety capacitor. The safety capacitor is not only less likely to fail under the same abuse, it is designed to fail in the safest manner possible.

Safety capacitors typically come in two styles, disc ceramic and metallized film. The disc ceramic capacitors have the advantage of small size and low price, but are limited in capacitance to around 0.1  $\mu\text{f}$  and below. Metallized film capacitors are larger, and made with self-healing polyester, paper or polypropylene. They are more expensive, but not excessively so. They usually come in an elongated box shape with radial leads (figure 1). They are also available in larger capacitances, often to more than 1.0  $\mu\text{F}$ .

**INTERCHANGING X and Y CAPACITORS:**

Since the X2 and Y2 safety capacitors are the types most likely to be used restoring older ham equipment, we'll limit our discussion to these two and another

type to be introduced in a future paragraph. A Y2 capacitor may be substituted for an X2 but not the reverse. Generally the Y2 capacitor has a higher capability for survival from large impulses, but it is also more expensive than an X2 capacitor. This might not mean a lot to a ham buying one, but it does to someone manufacturing a million or more consumer devices. The Y2 capacitor is generally larger than the X2, so you also need to consider the space you have to work in.

**THE X/Y SAFETY CAPACITOR:**

There is a third type of safety capacitor that can be used across the line as well as from line to ground. It is the X/Y safety capacitor. It can function either as across the line (X-type) or line to ground (Y-type). Typically, it comes in two versions: X1/Y1 and X1/Y2. For general consumer use the X1/Y2 is quite acceptable and less expensive than the X1/Y1 type. These capacitors are commonly found only in the disc ceramic style in capacitances up to 0.01  $\mu\text{f}$ . The X1/Y2 type can be found for around 50¢ each in single quantities.

**DISC CERAMIC SAFETY CAPACITORS:**

Disc ceramic safety capacitors are mostly of the X/Y type with capacitances up to around 0.01  $\mu\text{F}$ . They are in the type II ceramic class usually with an EIA code<sup>2</sup> of Y5U or Y5V. One manufacturer does make X2 disc capacitors with a limited number of values between 0.009  $\mu\text{f}$  and 0.10  $\mu\text{f}$ .

**FILM SAFETY CAPACITORS:**

The X and Y capacitors are mostly of the film type. They tend to be more expensive than the disc type but also more stable over temperature and most are self-healing. This occurs when a breakdown of the dielectric occurs; the heat created burns away a small metallic area around the breakdown eliminating any short. The penalty is a tiny loss of capacitance. Film capacitors come in capacitance values up to 10  $\mu\text{f}$  (and possibly higher). They come with either rigid or flexible leads that may be short or long. Most series have options for the different leads and usually a selection is offered by distributors such as DigiKey and Mouser.

**SOURCES:**

Safety capacitors have become quite easy to obtain. All the major parts outlets, such as Allied Electronics, DigiKey, Mouser, Newark carry an assortment of safety line capacitors. If you work on audio, ham receivers and transmitters, or test equipment you may want to keep a small inventory on hand. Anytime you

open a piece of older equipment that uses an “across the line” and/or a “line to ground” capacitor or capacitors you should replace them with the appropriate safety capacitor.

Another source of safety capacitors (as well as hard-to-find axial lead high-voltage capacitors) is Just Radios. (Keep away from their ridiculously expensive line of capacitors that are for the elite audio market.)

The most common line to ground (type Y) capacitors use on equipment like Heathkits are 0.001  $\mu\text{f}$  (1000 pf), 0.005  $\mu\text{f}$ , 0.01  $\mu\text{f}$ , 0.02  $\mu\text{f}$  and occasionally 0.05  $\mu\text{f}$ . Table 3 shows some Heathkit models and what size and quantity they use. Note that all these capacitors are between the line and chassis (ground) and should be replaced with either Y2 or X1/Y2 safety capacitors. On the Heathkit schematics examined so far none have used any “across the line” capacitors.

Some common types of safety capacitors are made by Kemet and Vishay. Here are some readily available series:

### X2 TYPE (Across the line):

#### Kemet R46 Series:

0.01  $\mu\text{f}$  to 10  $\mu\text{f}$  metallized polypropylene film

#### Vishay MKP339 X2 Series:

0.001 to 4.7  $\mu\text{f}$  metallized polypropylene film

### Y2 TYPE (Line to chassis ground):

#### Kemet R41 Series:

0.01  $\mu\text{f}$  up to 1  $\mu\text{f}$  metallized polypropylene film

#### Vishay MKP338 6 X2 Series:

0.001 to 0.47  $\mu\text{f}$  metallized polypropylene film

### X1/Y2 TYPE (Across the line):

**Kemet 900 Series:** up to 0.047  $\mu\text{f}$  disc ceramic.

**Vishay WKO Series:** 33 pf to 0.047  $\mu\text{f}$  disc ceramic.

**Vishay WYO Series:** 0.001  $\mu\text{f}$  to 0.12  $\mu\text{f}$  disc ceramic.

**Vishay VY2 Series:** up to 0.1  $\mu\text{f}$  disc ceramic.

**Vishay 30LVS Series:** 0.001  $\mu\text{f}$  to 0.1  $\mu\text{f}$  disc ceramic.

[Just Radios](#) also sells their own branded capacitors:

#### X2 Type:

0.001  $\mu\text{f}$  to 0.25  $\mu\text{f}$  metallized polypropylene film

#### Y2 Type:

0.001  $\mu\text{f}$  to 0.25  $\mu\text{f}$  metallized polypropylene film

**X1/Y2 Type:** 0.001  $\mu\text{f}$  to 0.047  $\mu\text{f}$  disc ceramic

### Conclusion:

The addition of modern safety capacitors in older radios and other electronic devices that use line ca-

KIT MODEL	VALUE ( $\mu\text{f}$ )	Qty	KIT TYPE	CKT.
AR-1	0.005	2	Receiver	LTG
AR-2	0.05	1	Receiver	LTG
AR-3	0.02	2	Receiver	LTG
AT-1	0.001	2	Transmitter	LTG
DX-20	0.005	2	Transmitter	LTG
DX-35	0.005	2	Transmitter	LTG
DX-40	0.002	5	Transmitter	LTG
DX-60B	0.005	2	Transmitter	LTG
DX-100 DX-100B	0.005	2	Transmitter	LTG
RX-1	0.01	2	Receiver	LTG
SB-200 SB-201	0.005	2	RF Amplifier	LTG
SB-220	0.01	2	RF Amplifier	LTG
SB-221	0.005	2	RF Amplifier	LTG
SB-300 SB-301 SB-303	0.005	2	Receiver	LTG
SB-400 SB-401	0.005	2	Transmitter	LTG
TX-1	0.01 0.005	2 3	Transmitter	LTG

**TABLE 1:** This Table shows various Heathkit receivers, transmitters and amplifiers, and the size of line to ground (LTG) capacitors they use.

pacitors, whenever they are serviced or restored, will add to the safety of these devices and protect them for decades to come.

73, from AF6C



#### Notes:

<sup>1</sup> Have you ever used a radio that had hum receiving a strong signal, but no hum once you tuned off the signal? This is hum modulation. Perhaps a future topic.

<sup>2</sup> For information on ceramic capacitor classes and EIA codes see Bob's TechTalk in the June 2015 issue of *RF*.

<sup>3</sup> <http://www.justradios.com>





# Field Day Planning Meeting

**Everyone is invited!**  
**Thursday April 27<sup>th</sup> 7PM**

**At the home of  
Jim Schultz AF6N**

**13722 Malena Dr  
Tustin, CA 92780**

**See you there!**

## California Cell Phone Law Update

**From the ARRL Southwest Division e-Communicator, March 16, 2017**

*Here's an update on California's new hands-free driving law with a little background for reference.*

The prior version of Vehicle Code Section 23123.5, while it contained no specific exemption for Amateur radio, effectively excluded Hams by virtue of the relatively narrow definitions of what that law covered. Assembly Bill 1785 was introduced in February 2016 by Hayward Assembly Member Bill Quirk, whose district lies in the Pacific Division. In its initial form, there was no adverse impact to Amateur Radio, as it applied only to reading, writing and sending text-based communications.

Over the ensuing six months, however, the language was amended five times, with the end result being much broader in scope and including a prohibition of "specialized mobile radio device[s]" that were not hands-free. This opened the door to widely varying interpretations of what might fall under the umbrella of "specialized mobile radio device[s]".

We were first alerted to this bill by San Diego Section Manager Dave Kaltenborn, N8KBC, in September, by which time it had been passed by both houses in its final form and was less than a week from being signed into law by the governor. Vice Director Woll tried direct outreach to Quirk's office and to other potentially interested parties such as the California Trucking Association, but he received no responses. As this newsworthy change in the law began getting broadcast airtime, ARRL Division and Section officials started receiving many inquiries from concerned members. Woll contacted several of our local Volunteer Counsel attorneys, who did some research. In addition to getting the complete legislative his-

tory of the bill, we eventually obtained a statement from a staff member of the Assembly Transportation Committee that the intent was not to include Amateur Radio and the absence of some exclusionary language was an oversight. Meanwhile, private and public statements from members of both law enforcement and the judiciary were coming out with adverse interpretations for Amateur Radio, adding to the level of member consternation and validating our initial concerns.

State government officials will generally not engage in communication with voters outside their respective districts. An exception may be made, however, if the voter's own representative makes an "introduction". Now-retired Volunteer Counsel Len Shaffer, WA6QHD (Palmdale case attorney), requested and received such an introduction and was then able to schedule a meeting in Sacramento for himself and Vice Director Woll with Quirk's legislative deputy. That meeting took place on Tuesday, March 14, 2017, and future action looks promising.

Woll and Shaffer came armed with specific documentation of inconsistent interpretations, including names, dates and contact information, and the deputy appreciated this level of detail. She advised us that her office had already been approached by lobbyists for several non-Amateur interests which also saw the new law as a threat to mobile radio communications. Their proposed solutions, however, were industry-specific or employment-based, none of which would protect Amateur Radio. We discussed the kinds of public service work Hams do that would be adversely impacted without some form of exemption, and she agreed that broader exclusionary language would be more appropriate than individual carve-outs.

As to the mechanics, we suggested a letter from Quirk to the state

**(continued)**



**Cell Phone Law Continued** ...government's Legislative Journal clarifying the legislative intent. That would provide more immediate defense for mobile radio users than would an amending bill, which is in the works (AB-1222) but would not take effect until 2018. She told us that such a letter is being developed and agreed to advise us when it is ready to go. We also suggested adding clarifying language to the Committee's omnibus bill. The deputy said they would consider doing so but that some procedural pitfalls could eliminate that route.

Finally, the California Highway Patrol is expected to disseminate guidance within a month or two. Through a Ham contact at the Los Angeles County Sheriff's office, Vice Director Woll had already received a preliminary version of that guidance. It states that using wired radio microphones would not be considered a violation but that using hand-held radios would be cause for a citation. If the final CHP guidance comes to a similar conclusion, it will be a less-than-perfect but, in our judgment, somewhat acceptable conclusion. The deputy also promised to advise us when that interpretation is issued in final form. Of course, CHP guidance will not filter down to all law enforcement agencies in the state, so citations by local police may still occur, and authoritative evidence of legislative intent will still be important for any Amateur who has to challenge a citation in court.

From the above, it appears that no grass-roots action is needed at this time. However, until and unless we receive authoritative guidance to the contrary, we advise against using handheld radios while driving unless they are equipped with external, corded microphones. As always, avoid any radio usage or other activity whenever you feel it detracts from your ability to control your vehicle fully or to maintain awareness of surrounding traffic.

ARRL Southwestern Division  
Director: Richard J Norton, N6AA  
[n6aa@arrl.org](mailto:n6aa@arrl.org)

## Puzzler Update

In the February 2017 issue of RF, on page 28, a Puzzler was presented. It was a simple one that asked:

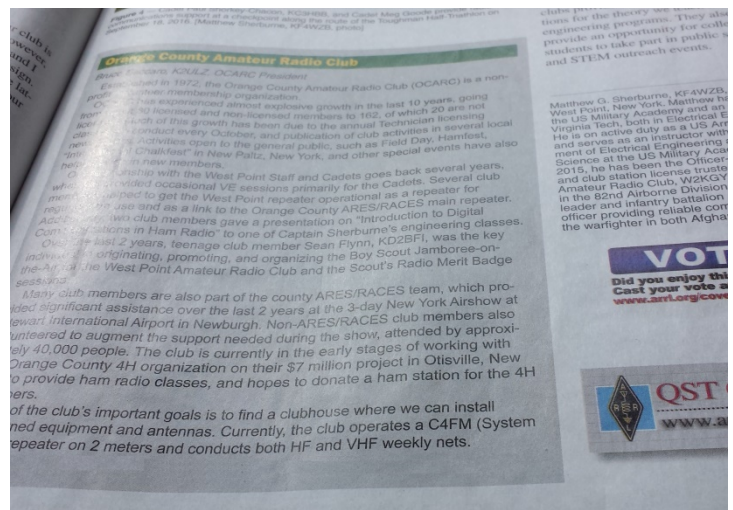
***If a CW operator and-a-half can make a QSO and-a-half in a-minute-and-a-half, how long would it take two CW operators to make a hundred QSOs?***

No responses were received at either [puzzler@w6ze.org](mailto:puzzler@w6ze.org) or [rf\\_feedback@w6ze.org](mailto:rf_feedback@w6ze.org) which was a surprise. Perhaps because the puzzler was buried on the back page it was missed by our puzzle masters?

So again I propose this simple problem to our readers. The first five correct answers will have their names and calls forever enshrined on the pages of a future issue of RF along with a explanation of the answer.

de AF6C

## Nice Article About Orange County ARC (OCARC) in Feb 2017 QST Page 81



**OCARC Cash Flow - Year To Date**

1/1/2017 through 3/31/2017

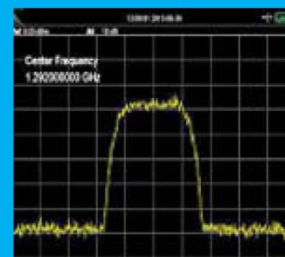
Category	1/1/2017- 3/31/2017
<b>INFLOWS</b>	
Dues, Family	90.00
Dues, Family (PayPal)	173.56
Dues, Future (PayPal)	28.83
Dues, Membership	630.00
Dues, Membership (PayPal)	634.26
Refreshments Income	25.00
Sale Of Equipment	650.00
<b>TOTAL INFLOWS</b>	<b>2,231.65</b>
<b>OUTFLOWS</b>	
Refreshments Expense	59.13
Storage Locker	152.00
Supplies	46.62
Trifold Brochure Printing	231.12
Web Site Hosting	44.97
<b>TOTAL OUTFLOWS</b>	<b>533.84</b>
<b>OVERALL TOTAL</b>	<b>1,697.81</b>

#1,556.65



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