

July 2017



Newsletter of the County of Orange Radio Amateur Civil Emergency Service

Inside this issue:

Captain's Corner	1
OCRACES Meeting	3
Ham Jam	3
OCSD Comm's Jobs	3
Matt Luczko	3
Sheriff's Museum	3
Cooperative T-Hunt	4
HAMCON 2017	4
OCSD Family BBQ	4
Field Day	5
RACES/MOU News	6
Events Calendar	7

Captain's Corner

by RACES Captain Ken Bourne, W6HK, Chief Radio Officer

Solving Solar System Interference

I share the following radio-frequency interference (RFI) experience with you, in hopes that it will help you resolve a similar problem at your ham shack. Many months ago, I noticed a strong, raspy signal, about 6 kHz wide, every 200 kHz from below 40 meters (below 7 MHz) to above 6 meters (above 54 MHz). It didn't go away, except at night, but interfered every day. I checked throughout my house for the culprit, such as a wall-wart power supply, but my house was "clean." I thought it might have been from a malfunctioning device in a business a couple of blocks away to the west, which shut down at night. I borrowed a portable scanning receiver and drove around the neighborhood, but couldn't pin-point the source. Some casual direction-finding (DFing) by a visiting ham friend seemed to indicate a restaurant or optometrist two blocks to the west of me. One day I mentioned it during a QSO with a group on 40 meters, and one of the amateurs suggested a neighbor's solar system as the source of the RFI, since the RFI disappeared at night. "Aha," I thought!

Neighbors on both sides of me and in back of me had recently installed solar panels covering their roofs, and I immediately suspected one of them. Now it was time to get serious with DFing! I installed my Icom IC-7100 transceiver in my car and attached a 40-meter MFJ-1640T Ham-tenna 40-meter whip (on a magnetic mount on my trunk) and drove around the neighborhood. I located two sources of a signal with the same peculiar characteristics—one about five blocks away to the west and the

other from the next street to the north of my house. The latter signal appeared to peak as I drove in front of the house that is directly behind my backyard.

Next I borrowed a portable Elecraft KX3 transceiver from Scott Byington, KC6MMF, and attached my Arrow Model FHL-VHF fox-hunt loop antenna, which I use on our cooperative T-hunts. That loop covers 1 MHz to 600 MHz, which included the range of RFI. I then walked to the back of my yard with the KX3 and loop, and picked up the signal, with the loop pointing at my backyard neighbor's solar panels. I used the same equipment to check my next-door neighbors' solar panels, but they were clean. Then I walked with the equipment to the front of my backyard-neighbor's house, and DFed the signal to the side of his house.

To verify his solar system as the source of interference, I asked my neighbor to turn off his two inverters while I checked the RFI on the KX3 and, later, on my IC-7100 in my ham shack. The RFI disappeared until he turned his inverters back on.

My neighbor then registered a complaint with the system dealer, while I registered a complaint with the manufacturer.

The manufacturer eventually scheduled a repair of the system, working with the installer. They replaced all 32 optimizers (which are DC-to-DC converters), twisted the DC cables and the module output cables (twisting cables is a good practice to reduce RFI), and installed three clamp-on chokes for each optimizer, one on the plus

Continued on page 2

**The Next
OCRACES
Meeting Is**

**July 10, 2017
1930 Hours**

**840 N. Eckhoff St.,
Suite 104, in Orange**

**Presentation by
Tony Scalpi, N2VAJ, on
his 40-Meter Magnetic
Loop Antenna**



Orange County Sheriff's Department
Communications & Technology Division

Captain's Corner *Continued from page 1*

and minus input wires, one on the output plus together with the minus line of the string, and one on the output minus together with the minus line of the string. The specified ferrite choke was a mix 75 material, which, unfortunately, is optimized for 100 kHz to 10 MHz. As soon as I found out, I quickly e-mailed the manufacturer and recommended mix 31, which has a common-mode suppression range of 1 to 300 MHz. Granted, mix 75 material is superior to mix 31 for low-frequency suppression, with high impedance at lower frequencies (and it's more expensive!), but the interference did not occur at those lower frequencies!

After reading my e-mail, the manufacturer agreed, but the "technical" representative had already scheduled the all-day "repair" at my neighbor's house and had arranged for the mix 75 material to arrive just in time. They were not able to obtain the mix 31 material, but, just in the nick of time, arranged for delivery of more ferrite chokes of mix 43/44 material. I met the representative and installers and explained that mix 43/44 ferrites would cover a higher range of 25 to 300 MHz, which would suppress the 10-meter and 6-meter interference, but probably not the lower bands. The representative said they could install both chokes—mix 75 and mix 43/44—and asked me if that would help. I said it would, but there would be a "window" in between the low and high suppression ranges where the interference would remain.

I was correct! After the "repair," the interference was gone from below 10 MHz and from above 16 MHz. This surprised me somewhat, since I was expecting the 17-meter, 15-meter, and 12-meter bands to still be clobbered. Only the 20-meter band remained to have interference, but, surprisingly, the interference was worse on that band. Instead of interfering signals every 200 kHz, now the interference was every 12.5 kHz. I suspect the new optimizers of generating the additional interference on 20 meters, and probably would have interfered every 12.5 kHz across the spectrum had it not been for the installation of the low-range and high-range ferrite chokes.

I don't know if the manufacturer will want to schedule another "repair," since the last one took about eight hours to complete. I also expect that, once I put a horizontal beam on my tower, the 20-meter interference will be tolerable, since it is much stronger on my 20-meter quarter-wave vertical antenna than on my horizontal G5RV wire antenna. Nevertheless, to comply with FCC rules, the manufacturer must take care of the problem.

Some excellent information about ferrite chokes may be found on the Palomar Engineers Web site at <http://palomar-engineers.com/>. An informative paper about solving solar system RFI may be found at <http://palomar-engineers.com/rfi-kits/solar-system-rfi>, and I wish my

neighbor's solar-system manufacturer had referred to it! Although I find most of the information in that paper to be technically correct, I question their comment, "The ferrites selected should be effective at the switching frequencies of the charge controller or inverter NOT the harmonic frequency the interference symptom is heard or seen." That appears to be the principle followed by the neighbor's solar system manufacturer as well, when they specified mix 75 material, ignoring the harmonics that fell into the higher HF range. Ferrites do not prevent the *generation* of signals and their harmonics; rather, according to my understanding, they suppress the radiation or propagation of common-mode signals at their effective range.

So far, I have focused mainly on RFI from solar systems, but we radio amateurs often deal with RFI from other systems and devices, or RFI that our radios cause to various systems and devices, such as to our home theater equipment. For solving that type of RFI, I refer you again to the Palomar Engineers Web site. A very useful chart is at <http://palomar-engineers.com/ferrite-products/ferrite-cores/ferrite-mix-selection>, showing applications for various mixes and effective frequency ranges. I purchase Fair-Rite clamp-on ferrite chokes from Mouser, which posts a useful chart at http://www.mouser.com/Passive-Components/EMI-Filters-EMI-Suppression/Ferrites/Ferrite-Clamp-On-Cores/_N-bw7t7/.

The most common ferrite materials are manganese and zinc (MnZn) and nickel and zinc (NiZn). NiZn ferrites, such as mix 43, 44, 52, and 61, have very high resistivity. MnZn ferrites, such as mix 31, 75, and 77, have higher permeability and saturation levels.

A basic but good article on solving home-theater RFI problems with ferrites appears on pages 38 and 39 of the latest issue (July 2017) of *QST*, written by *QST* Editor Steve Ford, WB8IMY. Steve recommends mix 31 ferrite cores for solving RFI from 1 to 30 MHz, although I question his statement about mix 43 also being effective for this frequency range. Mix 43, in my opinion, is more effective at 25 to 300 MHz, although the mix 43 resistivity, which is higher than that of mix 31, might be a better solution in some cases. Steve recommends using circular "donut" cores rather than the more convenient snap-on ferrites. He is correct, although the lesser effective snap-on ferrites are more convenient, especially if the suspect cables or wires cannot be conveniently disconnected for winding through the circular cores, or if they have large connectors that cannot be temporarily removed. If snap-on ferrites are used, however, and the cable is of relatively small diameter, I recommend specifying ferrites with a large inside diameter to permit wrapping at least two or three turns of the cable around the ferrite.

Next OCRACES Meeting: July 10th

The next County of Orange RACES meeting will be on Monday, July, 2017, at 7:30 PM, at OCS D Communications & Technology Division, 840 N. Eckhoff Street, Suite 104, in Orange. This meeting will not be on the usual first Monday of the month, due to the proximity to the July 4th holiday. Tony Scalpi, N2VAJ, will give a presentation on the design and construction of his 40-meter magnetic loop antenna.

Tony's 40-m magnetic loop antenna.



OCRACES to Exhibit at Ham Jam on July 8th

Ham Radio Outlet in Anaheim is holding its 6th Annual Ham Jam on Saturday, July 8, 2017. Store hours are 10:00 AM to 5:30 PM. HRO will be hosting local clubs, RACES units, HDSCS, and communications specialists in the store parking lot. Because OCRACES won't have a van to display this year, HRO has set aside space in the middle of the parking lot for a canopy that Fran Needham, KJ6UJS, has agreed to bring. OCRACES members are urged to attend in uniform, to distribute our literature, explain our capabilities, and recruit new members—and to enjoy the festivities!

Eagle Scouts will be providing a hotdog lunch, and manufacturers' representatives will be available for questions. Seminars will be scheduled on various subjects, including D-STAR, C4FM System Fusion, etc. License testing will be available most of the day. Two prize drawings will be held at 12:00 noon and 3:00 PM. Winners will need to be present to win the valuable prizes from many suppliers.

OCSD/Communications Job Opportunities

The June 30, 2017, edition of *The Bulletin* from the Orange County Sheriff's Department lists the following Job Opportunities within the OCSD Communications & Technology Division:

- Sr. Communications Technician / Radio Microwave Unit – Public.
- Sr. Communications Technician / Sound Video Security Unit – Public.
- Telecommunications Engineer II / Sound Video Security Unit – Public.
- Telecommunications Engineer III – Public.

Recruitment for each of these positions is currently open on a continuous basis until the needs of the department are met. Only on-line applications will be accepted at <http://www.ocgov.com/jobs>.

KM6CAO Passes General Exam

Congratulations to OCRACES Member Matt Luczko, KM6CAO, who passed his General Class license exam on Sunday, July 2, 2017. We hope he will soon be working the world on HF, and checking in on our 40-meter ACS net most Saturdays at 10:00 AM on 7250 kHz lower sideband.

OC Sheriff's Museum Restructures

The Orange County Sheriff's Museum & Education Center was restructured on June 6, 2017, to include a new Executive Director position and nominations to the Board of Directors and Executive Staff. The Museum Committee moved at the June 6th meeting to create the Executive Director position and to nominate and elect committee members to these open positions. Ray Grimes, N8RG, was nominated and unanimously elected to the position of Executive Director. Connie Rimmer, Ken Bourne, W6HK, and Ali Amani were unanimously nominated and elected to the positions of Directors. Ken also remains as the Museum's Webmaster, and the Web site is <http://www.ocsheriffmuseum.com>.



KC6NVX Hides in Costa Mesa

Dennis Brunning, KC6NVX, was the fox on Monday, June 19, 2017, on the monthly cooperative T-hunt. He turned on the fox box immediately following the 2-meter OCRACES ACS net, hiding in Westminster at the Springdale Self Serve Car Wash, near Garden Grove Boulevard and Springdale Street. Hiding with Dennis was Matt Curtis, KC6NVN.

First to find the fox was Ron Allerdice, WA6CYY, from Costa Mesa. Second place was taken by Ken Bourne, W6HK, with his son Bob, K6RBI.

The next cooperative T-hunt will be held on Monday, July, 2017, immediately following the OCRACES 2-meter net (approximately 7:20 PM). The fox will hide on paved, publicly accessible property in a city or sector of Orange County to be announced a few days before the hunt. No fees will be required to drive directly to the fox. He will transmit on the input (146.295 MHz) of the 146.895 MHz repeater. Hunters will compare bearings via the 448.320 MHz repeater (while the 449.100 MHz repeater is down), and are encouraged to beacon their positions via APRS throughout the hunt.

The cooperative T-hunts are usually held on the third Monday of each month. The hunts provide excellent practice in working together to find sources of interference quickly. The hunts are not official RACES events, so DSW (Disaster Service Worker) coverage does not apply. Please drive carefully!

Fox-hunt loops and beams are available from Arrow Antenna and HRO, including the Arrow Model FHL-VHF fox-hunt loop (covers 1 MHz to 600 MHz) and the Arrow Model 146-3 three-element portable hand-held yagi. The Arrow OFHA 4-MHz offset attenuator can be useful when close to the fox, to prevent receiver overload. An all-mode transceiver is quite useful, allowing hunters to switch to the SSB or CW mode for detecting extremely weak signals, or to switch in a built-in attenuator, reduce RF gain, or tune slightly off frequency when dealing with extremely strong signals. Some hunters use the DF2020T radio direction finder kit, which is a Doppler system available from Global TSCM Group, Inc. (<http://www.kn2c.us>).



At the fox's den are (left to right) Matt Curtis, KC6NVN, Ron Allerdice, WA6CYY, Bob Bourne, K6RBI, and Dennis Brunning, KC6NVX (the fox). Dennis pulled his truck, with the fox box, into this car-wash bay in Westminster.

HAMCON 2017: September 15-17

The 2017 ARRL Southwestern Division Convention (HAMCON 2017) will be held on September 15-17, 2017, at the Torrance Marriott Redondo Beach Hotel, 3635 Fashion Way, in Torrance. "Ham Radio for Everyone" is the theme, with much to see and do, including a full range of talks by experts on radio equipment, operating techniques, public service, DXing, technical subjects, and more. The 10,300-square-foot exhibit hall will include 63 booths. Also included are extensive prize drawings, ARRL forums, and a Sunday Swap Meet. For more info, go to <http://www.hamconinc.org/>.

OCSD Family BBQ: October 1st at Irvine Lake

Along with all sworn and professional staff (full or part-time and retirees), Explorers, Reserves, and OC Sheriff's Advisory Council, OCRACES members and immediate families are invited to the OCSD Family BBQ on Sunday, October 1, 2017. The event will be held from 11:00 AM to 3:00 PM at Lakeside, 5305 Santiago Canyon Road, Silverado. Food and drinks are provided (no alcohol allowed). The price is \$10 per person including children (immediate family only). Cash or check is acceptable. Make your check payable to "OC Sheriff Advisory Council" and mail to PO Box 28, Santa Ana, CA 92702, or pay in person at OCSD Headquarters, Community Programs, Marilyn MacDougall. Free parking is available. Fun activities will be provided for all ages. Reservations must be made in advance by September 18, 2017. For more information, contact Marilyn MacDougall at 714-647-4135 or e-mail mmacdougall@ocsd.org.

OCRACES Teams Up with OCARC at Field Day

County of Orange RACES members teamed up with members of the Orange County Amateur Radio Club (OCARC) during Field Day, to set up and operate HF and VHF/UHF stations at the Walter Knott Education Center in Buena Park. OCRACES members showing up for setup at 9:00 AM on Friday, June 23, 2017, included Walter Kroy, KC6HAM, Tom Wright, KJ6SPE, and Chief Radio Officer Ken Bourne, W6HK. They helped to set up OCARC's HF antennas and stations. Tony Scalpi, N2VAJ, set up his satellite station. The VHF/UHF station was provided by City of Orange RACES (COAR) members Robbie Robinson, KB6CJZ, and Don Poysa, KØVNJ, and was operated by several OCRACES members. Robbie was the OCARC VHF/UHF band captain. A transmit hum problem caused by RF feedback into a switching power supply had to be overcome before the VHF/UHF station was fully operational. The power supply was eventually replaced with a transformer type supply, and the problem went away.



Martin La Rocque, N6NTH, logs contacts at VHF/UHF station.



VHF and UHF antennas erected by Tony Scalpi, N2VAJ, at the Field Day satellite station.

OCRACES members showing up Saturday morning, June 24th, for remaining setup and operations included Jack Barth, AB6VC, Scott Byington, KC6MMF, Ken Bourne, W6HK, Matt Luczko, KM6CAO, Bob McFadden, KK6CUS, Fran Needham, KJ6UJS, and Tony Scalpi, N2VAJ. Ken Tucker, WF6F, signed up to operate Saturday night. David Corsiglia, WA6TWF, and other OCRACES members also visited the site. Walter Kroy, KC6HAM, helped with teardown on Sunday, June 25th, and OCSD Emergency Communications Manager Lee Kaser, KK6VIV, visited the site.

The OCARC Field Day co-chairmen were Tim Goepfinger, N6GP, Jim Schultz, AF6N, and Ron Mudry, W6FPS. The station setups, especially the antennas, were impressive, and everyone worked hard for a successful Field Day. OCRACES appreciates the warm welcome given to our members by the OCARC members, and the tasty food provided by the Boy Scout troop.



Tom Wright, KJ6SPE, and Walter Kroy, KC6HAM, assemble an HF antenna.



Matt Luczko, KM6CAO, Jack Barth, AB6VC, Scott Byington, KC6MMF, and Fran Needham, KJ6UJS (left to right) at Field Day.



Bob McFadden, KK6CUS (left) and Tony Scalpi, N2VAJ, at the satellite station.



COAR Member Don Poysa, KØVNJ (blue shirt), explains amateur radio operations to Boy Scouts at Field Day.

RACES/MOU News from Around the County

"RACES/MOU News" provides an opportunity to share information from all City & County RACES/ACS units and MOU organizations in Orange County.

Please send your news to NetControl Editor Ken Bourne, W6HK, at: w6hk@ocraces.org

Newport Beach RACES



Newport Beach RACES Chief Radio Officer Peter Putnam, NI6E, provided his news van for the unit's Field Day operation on Signal Peak. Atop his 56-foot pneumatic mast was a 20-meter yagi, which weighed only 35 pounds but was unwieldy to mount at 16 feet long by 37 feet wide. The van was equipped with a FlexRadio 6500. Also at the site was the Newport Beach Emergency Services Volunteer Management trailer.

Huntington Beach RACES

Wayne Yoshida, KH6WZ, Huntington Beach RACES PIO, will speak about "Out of Box Projects for Maker Faire" at the next meeting of the San Bernardino Microwave Society (SBMS) on Thursday, July 6, 2017,

at 7:00 PM, at the American Legion Hall, 1024 Main Street, in Corona. Wayne will cover the Maker Faire mission statement and will show some of the projects exhibited. Wayne recognized early on that the Maker Faire was reaching young amateur technology innovators.

Along with Wayne, Dennis Kidder, W6DQ, Brian Yee, W6BY, Marty Woll, N6VI, and other SBMS members have been redefining the concept of "Demonstration Station" and exhibiting at Maker Faire events in Southern and Northern California over the past six years.

Wayne is a professional communicator who has served on ARRL staff and in the corporate world, and is a columnist for *CQ Magazine*.

His best DX on 10 GHz was 1,448 km (899.7 miles) while roving with N6CA in the 2007 10 GHz and Up contest.

Hospital Disaster Support Communications System (HDSCS)

For the 16th year, HDSCS members participated in Field Day at the Huntington Beach Hospital in Huntington Beach. Hospital staff deployed three surge capacity tents and a small decon tent to become station locations. In addition, hospital portable emergency generators were rolled out, and then it was up to HDSCS folks to figure out where antennas could be located on and around the buildings. The HDSCS satellite station made more than double the contacts from 2016, which had been a record year. Orange County EMS Medical Director Sam Stratton, W5AGX, operated one of the stations. Practical nursing students from Concorde Career College in Garden Grove did some operating from the GOTA tent and had in-service training on using amateur radio as backup communications in the event of an emergency.

ARRL Orange Section ARES

ARRL Orange Section Emergency Coordinator Bob Turner, W6RHK, advised that an ARES Seminar will be held on Saturday, August 5, 2017, at 9:00 AM to 3:00 PM, at Alford Unified School District, Board Room, 9 KPC Parkway, in Corona. Lunch will be provided. RSVP to W6RHK@yahoo.com.

July 2017

Upcoming Events:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1 Weekly 40 m ACS Net
	3 Weekly 2 m ACS Net (no meeting)	4 Independence Day	5	6 San Bernardino Microwave Society Meeting	7	8 HRO Ham Jam
9	10 Weekly 2 m ACS Net & OCRACES Meeting	11	12	13	14	15 Weekly 40 m ACS Net
16	17 Weekly 2 m ACS Net & Cooperative T-Hunt	18	19	20	21 Orange County Amateur Radio Club Meeting	22 Weekly 40 m ACS Net
23	24 ACS Nets on Five Bands & Cal OES Nets	25	26	27	28	29 Weekly 40 m ACS Net
30	31 Weekly 2 m ACS Net					

- **July 3:** Nets, but no meeting
- **July 4:** Independence Day
- **July 6:** San Bernardino Microwave Society Meeting, American Legion Hall, 1024 Main Street, Corona, 1900 hours
- **July 8:** Ham Jam, Ham Radio Outlet, 933 N. Euclid Street, Anaheim, 1000-1730 hours
- **July 10:** OCRACES Meeting, 840 N. Eckhoff Street, Suite 104, Orange, 1930 hours
- **July 17:** Cooperative T-Hunt on input of 2-meter repeater, 1920 hours
- **July 21:** Orange County Amateur Radio Club Meeting, American Red Cross (George M. Chitty Building), 600 Parkcenter Drive, Santa Ana; 1900 hours
- **July 24:** ACS Nets on five bands and Cal OES Nets from OC EOC
- **August 5:** ARES Seminar, Alvard Unified School District, Board Room, 9 KPC Parkway, Corona; 0900-1500 hours; RSVP W6RHK@yahoo.com



www.ocraces.org



Mission Statement

County of Orange RACES has made a commitment to provide all Public Safety departments in Orange County with the most efficient response possible to supplement emergency/disaster and routine Public Safety communications events and activities. We will provide the highest level of service using Amateur and Public Safety radio resources coupled with technology, teamwork, safety, and excellence. We will do so in an efficient, professional, and courteous manner, accepting accountability for all actions. We dedicate ourselves to working in partnership with the Public Safety community to professionally excel in the ability to provide emergency communications resources and services.

County of Orange RACES Frequencies

40 m: 7250 kHz SSB (City/County/MOU Net—Saturdays, 1000 hours)
 10 m: 29.640 MHz output, 29.540 MHz input, 107.2 Hz PL
 6 m: 52.620 MHz output, 52.120 MHz input, 103.5 Hz PL
 2 m: 146.895 MHz output, 146.295 MHz input, 136.5 Hz PL*
 2 m: 146.595 MHz simplex
 1.25 m: 223.760 MHz output, 222.160 MHz input, 110.9 Hz PL
 70 cm: 446.000 MHz simplex
 70 cm: 448.320 MHz output, 443.320 MHz input, 141.3 Hz PL (private)
 70 cm: 449.100 MHz output, 444.100 MHz input, 110.9 Hz PL (out of service)
 70 cm: 449.180 MHz output, 444.180 MHz input, 107.2 Hz PL (private)
 23 cm: 1287.650 MHz, 1287.675 MHz, 1287.700 MHz, 1287.725 MHz, 1287.750 MHz, and 1287.775 MHz outputs, -12 MHz inputs, 88.5 Hz PL
 *Primary Net—Mondays, 1900 hours

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[Assistant Radio Officers \(Sergeants\)](#)
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Questions or Comments?
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**“W6ACS ...
Serving
Orange County”**

Meet Your County of Orange RACES Members!



Ken Bourne
W6HK



Scott Byington
KC6MMF



Harvey Packard
KM6BV



Jack Barth
AB6VC



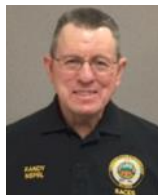
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David Corsiglia
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N6ZRB



Ray Grimes
N8RG



Walter Kroy
KC6HAM



Martin La Rocque
N6NTH



Matt Luczko
KM6CAO



Fran Needham
KJ6UJS



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Tom Riley
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Brad Russo
KB6GPM



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