

March 2017



Newsletter of the County of Orange Radio Amateur Civil Emergency Service

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Captain's Corner

by RACES Captain Ken Bourne, W6HK, Chief Radio Officer

Dealing with RFI to Devices/Systems

Radio amateurs often are confronted with interference from various sources, such as mobile ignition noise, power-line noise, spurious emissions from switching power supplies (including "wall warts"), solar-panel inverters (my neighbor's system produces a raspy S9 signal every 200 kHz from below 7 MHz to above 54 MHz!), plasma TVs, harmonics and other spurious emissions from "dirty" transmitters, etc. But what about the problems that our transmissions cause to systems and devices that are not supposed to function as receivers? Such "interference" is not the fault of our transmitters (unless the transmitter or amplifier is spewing out RF onto the ac power line), but could be the result of common-mode RF coming back down the coax from the antenna and "lighting up" your house.

Affected devices and systems include laptop and desktop computers, Ethernet hubs, automobile electronic systems, home theaters, telephones, pacemakers, circuit breakers, and much more.

Circuit Breakers

Amateur transmissions can trip circuit breakers. ARRL reports that ground-fault circuit interrupters (GFCI) and arc-fault circuit interrupters (AFCI) are occasionally reported to "trip" (open the circuit) when a strong RF signal is present, especially on HF. GFCI circuit-breakers sense unbalanced currents in the hot and neutral conductors of an AC circuit. Such an imbalance indicates the presence of a fault some-

where in the circuit, creating a shock hazard. The breaker then trips to remove the shock hazard.

An AFCI similarly monitors current to watch for a fault condition. Instead of detecting current imbalances, the AFCI detects patterns of current that indicate an arc—a leading cause of home fires. AFCIs are not supposed to trip because of "normal" arcs that occur when a switch is opened or a plug is removed. However, a few years ago ARRL worked with a manufacturer (Eaton) on one of their AFCI breakers that were susceptible especially to strong RF fields on 20, 17, 15, and 12 meters. Ray Grimes, N8RG, recently referred me to an article at <http://hackaday.com/2017/02/06/ham-radio-trips-circuit-breakers/> that talks about AFCI breakers that trip from strong HF radiation. The article points out that AFCIs "listen" for broadband radio noise produced by sparks, which could be caused by arcs from a faulty wire. AFCIs can be so sensitive that they cut out needlessly. The article mentions a ham who moved into a new house and discovered that he could flip the breakers by transmitting on the 20-meter band. "All the lights in the place went out and my rig switched over to battery. I thought it was strange as I was certainly drawing less than 20 A. I reset the breakers and keyed up again. I reset the breakers again and did a [expletive] Google search." He then discovered the ARRL article at <http://www.arrl.org/gfci-and-afci-devices> that mentions the League's contact with

**The Next
OCRACES
Meeting Is**

**March 6, 2017
1930 Hours**

**840 N. Eckhoff Street,
Suite 104, Orange**

**Featured Speaker:
OCSD Search & Res-
cue Reserve Unit Sgt.
Sam Chan, KI6KUM**



Orange County Sheriff's Department
Communications & Technology Division

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Captain's Corner *Continued from page 1*

Eaton.

The ARRL article says that, under current codes, GFCI protection is required for all basement outlets, outdoor outlets, and outlets in kitchens and bathrooms. AFCI protection is also required for all circuits that supply other specified rooms, such as bedrooms.

ARRL says that RF interference to GFCI breakers is caused by RF current or voltage upsetting normal operation of the imbalance detection circuit, resulting in the false detection of a fault. "Similarly, RF current or voltage could upset the arc detection circuitry of an AFCI breaker."

ARRL points out that early GFCI breakers were susceptible to RFI. I must have one of those breakers in my upstairs bathroom, because sometimes in the morning, after an evening of operating on 20 meters, my electric shaver doesn't work! I then notice that the GFCI breaker had tripped. ARRL says that, while it is possible to add filtering or RF suppression to the breaker wiring, it is simpler and less expensive to simply replace the GFCI breaker with a new unit less susceptible to RF.

Home Theater Systems

Audio/video units, amplifiers, etc., in home theater systems are susceptible to RF interference from our HF amateur radio transmitters. Clamp-on ferrite chokes and toroids, typically "mix 31" types, on all leads in and out of all system modules, will typically resolve the problem. Palomar Engineers produces a home theater system RFI kit, consisting of 17 filters, for up to five A/V units plus input/output cables. They also make a five-filter kit only for AC-powered subwoofers. The 17-filter kit contains ferrite toroids for AC power cord protection and "snap on" ferrite beads for HDMI, audio, video, and speaker cables. The ferrites are selected to eliminate RFI from 1 to 1000 MHz. Palomar Engineers claims, "They are easy to install, don't require modification of the protected



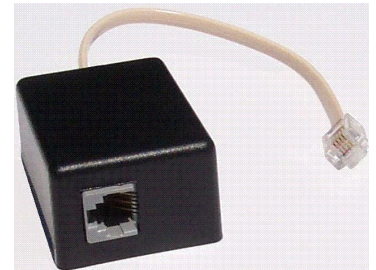
Palomar Engineers home theater system RFI kit consists of 17 filters for up to five A/V units plus I/O cables.

equipment, and work in almost all cases to suppress annoying interference issues.

Palomar Engineers also has a solution for interference to Direct TV systems. Chief Engineer Bob Brehm, AK6R, suggests installing a feed-line choke at each antenna feed point, using their Kit 110 with five snap-on chokes. These chokes will prevent the feed line from radiating and coupling into the AC power line.

Land-Line Telephones

Although many RACES members now use cell-phones exclusively, some of us still have land-line telephones at our homes. During an emergency, if the cellular system is down, we might need to have access to a home telephone system. Furthermore, when dialing 911 on a land-line ("copper") telephone during an emergency, the public-safety person who answers will see a display of your location. However, land-line telephones are susceptible to interference from strong local amateur radio stations. Filters are available to reduce or eliminate this interference, such as the RJ-9 from Hello Direct. Another popular filter is the K-Y Filter Model RF-1 nickel-zinc ferrite choke, plug-in modem/telephone RF filter for DSL and dial-up modems and single-line (two-wire) telephones. It is terminated with an RJ11 modular plug. Effective filter range is 1 to 30 MHz. See <http://www.ky-filters.com/> for more information.



K-Y Filter Model RF-1 nickel-zinc ferrite choke, plug-in, modem/telephone RF filter.

Pacemakers

What about pacemakers and other medical devices? I had a friend in Cottonwood, Arizona, who used to run a kilowatt on 75 meters until he had a pacemaker implanted. It malfunctioned when he transmitted, so he reduced power to 100 watts and his problem disappeared. In general, however, pacemakers do not appear to be susceptible to radio interference, although it's advisable to stay at least 6 inches from a radiating antenna. Using a handheld radio might be a problem, although modern pacemakers are equipped with filters in the megahertz range. Very strong RF fields should also be avoided, such as visiting a TV transmitter site on Mt. Wilson. I also advise caution if contemplating a visit to Santiago Peak. In addition to strong RF fields, pacemaker users are advised to avoid being near producers of magnetic fields, such as arc welders, magnetic mattresses or chairs, etc.

Next OCRACES Meeting: March 6th

The next OCRACES meeting will be on Monday, March 6, 2017, at 7:30 PM, at OCSD Communications & Technology Division, 840 N. Eckhoff Street, Suite 104, in Orange. Our guest speaker will be Sheriff Reserve Sergeant Sam Chan, KI6KUM, who will discuss how RACES and the OCSD Search & Rescue Reserve Unit can work closely together during some call-outs and exercises.

Next City/County/MOU ACS Exercise: May 6th

The next City/County RACES & MOU ACS Exercise will be on Saturday, May 6, 2017, from 9:00 AM until 11:00 AM. The scenario for this exercise will be civil disorder, also known as civil unrest. Civil disorder can include a form of protest against major socio-political problems. It is essentially the breakdown of orderly society. Examples include illegal parades, sit-ins, riots, sabotage, and other forms of crime—even terrorism. The role of RACES would be to observe and report, and to provide backup communications. Pre-incident indicators to terrorism will be a topic at the April 3rd OCRACES meeting, presented by the Orange County Intelligence Assessment Center (OCIAAC). The April 3rd meeting will be at 7:30 PM at OCSD Communications & Technology Division, 840 N. Eckhoff Street, Suite 104, in Orange.

Antenna Physics: An Introduction

Radio amateurs are familiar with antennas and use them every day to communicate on the air. We learned some basic antenna theory while studying for license exams, and most of us have built an antenna or two. We know the basics and turn to the *ARRL Handbook*, *ARRL Antenna Book*, and other general texts when thinking about our next antenna project.

We know how long to make a dipole or vertical antenna for a particular frequency, but do we know how the antenna really works? *Antenna Physics: An Introduction* is written to bridge the gap between basic theory and graduate-level engineering texts. Robert J. Zavrel, Jr, W7SX, a well-known author and professional antenna engineer, explains many of the underlying principles of antennas and antenna physics and introduces the reader to the mathematics behind these principles. Note that this is not a book of “how-to” projects, but rather a theoretical and mathematical approach to the topic.

Although some competence in mathematics is required to get the most from this book, readers may follow along and understand the concepts without needing to solve the complex equations presented. In later chapters, examples tie the concepts learned in earlier chapters to a number of antenna types familiar to radio amateurs.

The book includes:

- Antenna Physics
 - ◇ Development of Antenna Physics
 - ◇ Fundamentals
 - ◇ Radiation of Radio Waves
 - ◇ Transmission Lines
 - ◇ Antennas Using Multiple Sources
- Applied Antenna Physics
 - ◇ Dielectric Effects Upon Radio Waves
 - ◇ Vertical Antennas
 - ◇ Yagi-Uda and Cubical Quad Antennas
 - ◇ Specialized Antenna Configurations
 - ◇ Noise, Temperature, and Signals

Antenna Physics: An Introduction

ARRL Item No. 0499

Price: \$29.95

Order: <http://www.arrl.org/shop/Antenna-Physics-An-Introduction/>

\$5 shipping with Coupon Code AP5

160 pages. ISBN: 978-1-62595-049-9

KC6TWS Hides in Orange

IDEC Operations Captain Peter Gonzalez, KC6TWS, was the fox on Monday, February 20, 2017, on the monthly cooperative T-hunt. He turned on the fox box immediately following the 2-meter OCRACES ACS net, hiding in a parking lot behind Ristorante Genovese in Orange (near Tustin Street and Chapman Avenue).

First to find the fox was Ron Allerdice, WA6CYY, from Mission Viejo. Next was the team of Ken Bourne, W6HK, Jack Barth, AB6VC, and OCS Reserve Sgt. Sam Chan, KI6KUM. They started in Ken's driveway only three blocks away, but did not trust their initial correct bearing. Coming in shortly after that was Tony Scalpi, N2VAJ. After the hunt, the fox and all hunters met at nearby Ostoneria Bahia Mexican & Seafood for an enjoyable conversation and snack.

The next cooperative T-hunt will be held on Monday, March 20, 2017, immediately following the OCRACES 2-meter net (approximately 7:20 PM). The fox 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 fox will be hiding in a city or sector of Orange County (to be announced a few days prior to the hunt) on paved, publicly accessible property. No fees will be required to drive directly to the fox. We are looking for a volunteer to be the fox, and a "fox box" will be available.

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>). A very similar system is the MFJ-5005 Doppler direction finder. Other useful tools are the Fox-hunt app for iPhones and the Triangulate app for Android phones. For some excellent information on T-hunting, see <http://www.homingin.com>.



At the fox's den in Orange are (left to right) Sam Chan, KI6KUM, Ron Allerdice, WA6CYY, Tony Scalpi, N2VAJ, Peter Gonzalez, KC6TWS (the fox), and Jack Barth, AB6VC.

"openSPOT" Is a Digital Gateway/Hotspot

The SharkRF "openSPOT" is gaining popularity with radio amateurs operating on DMR, as well as D-STAR and System Fusion. It is a standalone digital-radio IP gateway/hotspot, allowing you to link to DMR, D-STAR, and C4FM/System Fusion networks worldwide, without going through a repeater. If you do have local repeater coverage, you can still make use of an openSPOT to avoid interrupting local repeater traffic. You can reach any reflector or talkgroup with it, so you don't have to "disconnect" the local repeater (or "hijack" the time slot on DMR) and disturb other local users. It supports cross-modem modes. For example, you can talk with your C4FM radio on DMR, and with your DMR radio on System Fusion networks. Once set up, it works without a computer. It connects to your local area network with an Ethernet cable. It has a Web interface for configuration and monitoring. Two linked openSPOTs can be linked together directly. It is USB powered (low energy consumption), with 20 mW RF output for local coverage to your handheld digital radio. For more information, see <https://www.sharkrf.com/products/openspot/>.



SharkRF openSPOT.

FCC Invites Comments on 5 MHz Petition

The FCC has invited comments on the ARRL's January 12th Petition for Rule Making to allocate a new, contiguous secondary band at 5 MHz to the Amateur Service. The League also asked the Commission to keep four of the current five 60-meter channels—one would be within the new band—as well as the current operating rules, including the 100 W PEP effective radiated power (ERP) limit. The federal government is the primary user of the 5 MHz spectrum. The FCC has designated the League's Petition as RM-11785 and put it on public notice. Comments are due Monday, March 20, 2017. ARRL plans to file comments in support of its petition.

The proposed ARRL action would implement a portion of the Final Acts of World Radiocommunication Conference 2015 (WRC-15) that provided for a secondary international allocation of 5,351.5 to 5,366.5 kHz to the Amateur Service; that band includes 5,358.5 kHz, one of the existing 5 MHz channels in the US. The FCC has not yet acted to implement other portions of the WRC-15 Final Acts.

“Such implementation will allow radio amateurs engaged in emergency and disaster relief communications, and especially those between the United States and the Caribbean basin, to more reliably, more flexibly, and more capably conduct those communications [and preparedness exercises], before the next hurricane season in the summer of 2017,” ARRL said in its petition.

The League said that 14 years of amateur radio experience using the five discrete 5-MHz channels have shown that hams can get along well with primary users at 5 MHz, while complying with the regulations established for their use. “Neither ARRL, nor, apparently, NTIA is aware of a single reported instance of interference to a federal user by a radio amateur operating at 5 MHz to date,” ARRL said in its petition. NTIA—the National Telecommunications and Information Administration, which regulates federal spectrum—initially proposed the five channels for amateur radio use. In recent years, amateur radio has cooperated with federal users such as FEMA in conducting communication interoperability exercises.

The League said in its petition that while the amateur radio community is grateful to the FCC and NTIA for providing some access to the 5-MHz band, “the five channels are, simply stated, completely inadequate to accommodate the emergency preparedness needs of the Amateur Service in this HF frequency range,” ARRL said. Access even to the tiny 15-kHz wide band adopted at WRC-15 would “radically improve the current, very limited capacity of the Amateur Service in the United States to address emergencies and disaster relief,” ARRL said.

The WRC-15 Final Acts stipulated a power limit of 15 W effective isotropic radiated power (EIRP), which the League said “completely defeats the entire premise for the allocation in the first place.” ARRL said the FCC should permit a power level of 100 W PEP ERP, assuming use of a 0 dBd gain antenna, in the contiguous 60-meter band. “To impose the power limit adopted at WRC-15 for the contiguous band would render the band unsuitable for emergency and public service communications,” the League said.

The ITU Radio Regulations permit assignments at variance with the International Table of Allocations, provided a non-interference condition is attached.

Interested parties may comment on RM-11785 using the FCC's Electronic Comment Filing System (ECFS) at <https://www.fcc.gov/ecfs/>.

Correcting CVC 23123.5

by Jim Aspinwall, NO1PC

By now most everyone is aware of the negative impact CVC 23123.5 has on any and all mobile communications activity. A group of us are working our way through options and direct contact with the Assembly to get this corrected. We have the opportunity/have been asked to solicit supporting statements of non-risk relative to mobile radio use from public safety officials.

We can provide a document that may serve as discussion points or direct survey of your served agencies, those who will be most affected by this prohibition of mobile communications at any time—emergency or not. This should be an urgent concern of the public, of anyone using two-way radio of any kind—CB, GMRS, business, amateur—and creates a significant gap, effectively “blinding” served agencies from timely and essential situation awareness.

Even if we cannot get direct named statements from public safety, we'd like to collect off-record anecdotal statements about this. Beyond this we are working on specific citizen petitions to appropriate Assembly members. We have a lot of ground and few legal/political options.

Your help and support would be appreciated. Go to <https://groups.yahoo.com/neo/groups/CVC23123/info> or contact me at no1pc@yahoo.com, or send comments to me at 329 Dallas Drive, Campbell, CA 95008.

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**

Hospital Disaster Support Communications System (HDSCS)

HDSCS communicators have been getting "night owl" duty as the year has gotten underway. Three standby operations have been conducted, with two in one week at different facilities. Hospital disaster coordinators often ask HDSCS to provide communicators when phone and/or power upgrades or repairs are done. Sometimes phones are down during the work but other times it's the potential for the phones to go down that concerns hospital staff. Hospitals do have several resources for alternate communications but our amateur radio operators can provide both internal and external communications, making it a valuable resource as a result. In addition, the HDSCS radio operator is a "dedicated communicator," which means we can transmit information and we can also listen for information. Busy patient care staff appreciate that aspect as they often can't listen to radios given to them.

All of the standby operations have been conducted during the overnight hours and have lasted from about four hours to eight hours. Members are deployed to such locations as the emergency department, ICU, pharmacy, lab, and even engineering, to have a quick link for updates as to work status for the upgrades. Not only are the standbys of value to the hospitals in providing an extra layer of backup, but they are also excellent training opportunities for members.

On March 4th, HDSCS will start a 5-week Technician Class license course. This is a customized class designed for staff from Care Ambulance and OCHCA Health Disaster Management. The students will go through an online course as their homework. Classroom time will be devoted to discussing the homework and then spending time on practical applications of the material and exposing students to different aspects of amateur radio along with learning about how amateur radio emergency groups function in Orange County.

HDSCS will host an amateur radio Testing Session on April 8 starting a 9 AM. Lo-

cation will be Care Ambulance in Orange. To register, please contact Ken Simpson, W6KOS, at 714-651-6535.

Orange County SKYWARN

On Thursday, February 16, 2017, Orange County SKYWARN Coordinator Scott O'Donnell, WX6STO, e-mailed weather spotters about a high-impact storm expected to hit Southern California. High-wind warnings and flash-flood watches had been issued for Orange County. NWS San Diego was expecting to activate on Friday. OCRA-CES Chief Radio Officer Ken Bourne, W6HK, asked members to notify him of availability, in case of activation. Some City RACES units were also planning to activate.

On Friday, Scott notified spotters that SKYWARN activation was requested to begin at 2:00 PM for Orange and San Bernardino Counties, and at 4:00 PM for Riverside and San Diego Counties. The main concerns for that afternoon through evening were damaging winds, heavy rain and flooding, and heavy snow in the mountains. All spotter volunteers were requested to submit reports of severe weather via normal channels. NWS was confident that major impacts would occur with this storm system—possibly the strongest storm seen this winter. Predicted rainfall for Orange County through Friday night was 2.5 to 5 inches (highest totals in the Santa Ana Mountains). With high atmospheric moisture in place, rainfall rates of 0.5 to up to 1 inch per hour were possible during the height of the rain event, with highest rates along favorable SSW facing slopes. NWS said this amount of short-duration rainfall was likely to lead to significant flooding issues in urbanized areas and flash flooding in the mountains. Thunderstorms were remotely possible and could bring briefly intense bursts of rain.

When SKYWARN was activated at 2:00 PM on February 17th, Scott asked spotters to send reports of wind damage, rain totals with time periods, urban and small stream flooding, lightning damage, and other significant weather. SKYWARN was deactivated at 2215 hours Friday night.

March 2017

Upcoming Events:

- **March 6:** OCRACES Meeting, 840 N. Eckhoff Street, Suite 104, Orange; 1930 hours
- **March 17:** Orange County Amateur Radio Club Meeting, American Red Cross (George M. Chitty Building), 600 Parkcenter Drive, Santa Ana; 1900 hours
- **March 20:** Cooperative T-Hunt on input of 2-meter repeater, 1920 hours
- **March 27:** ACS Nets on five bands and Cal OES Nets from OC EOC

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4 <i>Weekly 40 m ACS Net</i>
5	6 <i>Weekly 2 m ACS Net & OCRACES Meeting</i>	7	8	9	10	11 <i>Weekly 40 m ACS Net</i>
12	13 <i>Weekly 2 m ACS Net</i>	14	15	16	17 <i>OCARC Meeting</i>	18 <i>Weekly 40 m ACS Net</i>
19	20 <i>Weekly 2 m ACS Net & Cooperative T-Hunt</i>	21	22	23	24	25 <i>Weekly 40 m ACS Net</i>
26	27 <i>Weekly Nets on Five Bands & Cal OES Nets</i>	28	29	30	31	



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

[RACES Program Coordinator \(Emergency Comm's Manager\)](#)
 Lee Kaser, KK6VIV
 714-704-8080

[Chief Radio Officer \(Captain\)](#)
 Ken Bourne, W6HK
 714-997-0073

[Radio Officer \(Lieutenant\)](#)
 Scott Byington, KC6MMF

[Assistant Radio Officers \(Sergeants\)](#)
 Jack Barth, AB6VC
 Ernest Fierheller, KG6LXT
 Bob McFadden, KK6CUS
 Tom Tracey, KC6FIC

County of Orange RACES

OCSD/Communications & Technology
 840 N. Eckhoff St., Suite 104, Orange, CA 92868-1021
 Telephone: 714-704-8080 • Fax: 714-704-7902
 E-mail: ocraces@comm.ocgov.com

County of Orange RACES

OCSD/Communications & Technology
840 N. Eckhoff St., Suite 104,
Orange, CA 92868-1021

Telephone – 714-704-8080
Fax – 714-704-7902
E-mail – ocraces@comm.ocgov.com

Visit Our Web Site
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Questions or Comments?
Contact *NetControl* Editor Ken Bourne, W6HK
w6hk@ocraces.org



**“W6ACS ...
Serving
Orange County”**

Meet Your County of Orange RACES Members!



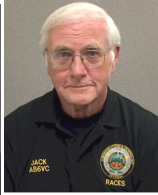
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W6HK



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KK6CUS



Tom Tracey
KC6FIC



Randy Benicky
N6PRL



Roger Berchtold
WB6HMW



David Corsiglia
WA6TWF



Jim Dorris
KC6RFC



Nancee Graff
N6ZRB



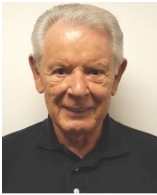
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N8RG



Walter Kroy
KC6HAM



Martin La Rocque
N6NTH



Matt Luczko
KM6CAO



Fran Needham
KJ6UJS



Kenan Reilly
KR6J



Tom Riley
K6TPR



Brad Russo
KB6GPM



Tony Scalpi
N2VAJ



Joe Selikov
KB6EID



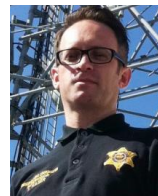
Robert Stoffel
KD6DAQ



Ken Tucker
WF6F



Tom Wright
KJ6SPE



Lee Kaser
KK6VIV