

December 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*

### RF Direct Sampling System

When Elecraft introduced its K3 HF transceiver a few years ago, I was impressed and vowed to purchase one. We actually did acquire one for the EOC RACES Room, and it is indeed an impressive transceiver. Later, Elecraft upgraded their transceiver to the Model K3S, but I still haven't purchased either model, even though the specifications remain impressive and I like the concept of "buy American." The Elecraft design, although not considered obsolete, is getting rather "old" compared to the latest transceiver design technology, especially the latest SDR (software-defined radio) transceivers offered by FlexRadio and others. In spite of my "buy American" philosophy (which might seem somewhat hypocritical, considering that I was once the Marketing Services Manager of Kenwood Communications, an excellent Japanese manufacturer), I am now intrigued by the new IC-7610 SDR HF transceiver just now being launched by Icom (another Japanese manufacturer). What's intriguing to me is the transceiver's RF direct sampling system. As we study this technology, here is some information that might be useful to you if you are considering purchasing a new transceiver for your ham shack.

As the ham bands continue to get more crowded, it becomes increasingly important to eliminate interference from strong stations that are only a couple of kilohertz away from your operating frequency. That kind of selectivity is one of the reasons we acquired the Elecraft K3 for

the EOC RACES Room. The newest FlexRadio transceiver is now considered one of the best, if not the best, transceiver for close-in selectivity. But surprisingly, even the less expensive Icom IC-7300 SDR transceiver ranks near the top in Reciprocal Mixing Dynamic Range (RMDR), partly because of its RF direct sampling system for signal processing. The IC-7610 uses the same system, which converts the analog signal directly to a digital signal and processes it within a Field Programmable Gate Array (FPGA). This provides improved transmission phase noise and supposedly a 105 dB RMDR at 1 kHz detuning.

I suggest that you do not base your purchase strictly on RMDR or other technical measurements. User convenience (such as knob placement) and "fun" features, an attractive appearance, and excellent audio are also important. Nevertheless, it's important to see how RMDR excels in an SDR design using direct conversion, which allows you to pick out weak signals in a noisy and RF-congested environment.

Superheterodyne circuits (as opposed to direct conversion) have been the norm in receiver design over many years, and first appeared in 1917. This type of receiver converts the received signal to a fixed intermediate frequency (IF) by mixing it with a signal from a local oscillator, as seen in the single-conversion diagram on the next page. Direct-conversion receivers are not so new either. They were developed in 1932, and were notoriously bad in regard to selectivity, but had superior audio char-

*Continued on page 2*

**OCRACES  
Holiday Dinner**

**Monday,  
December 4, 2017,  
at 1830 Hours**

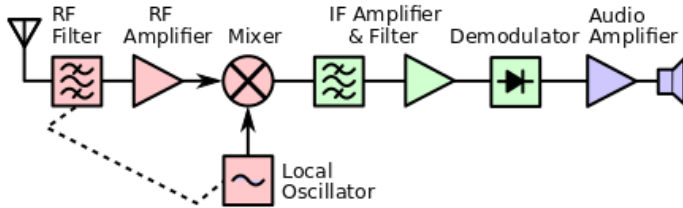
**Moreno's  
Mexican Restaurant**

**4328 E. Chapman  
Avenue, Orange, CA**



Orange County Sheriff's Department  
Communications & Technology Division

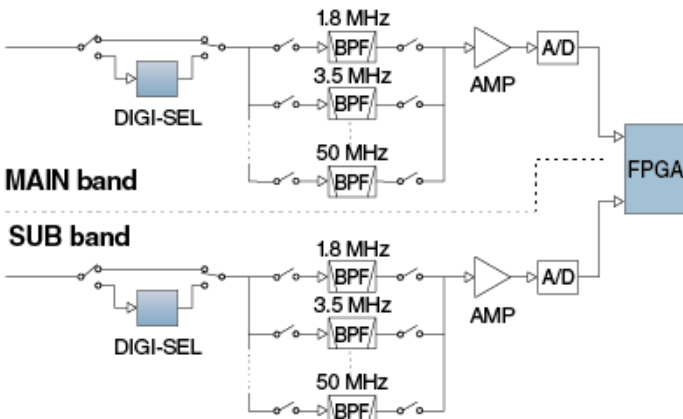
## Captain's Corner *Continued from page 1*



**Single-conversion superheterodyne receiver (courtesy of Wikipedia).**

acteristics. With modern filtering schemes, analog-to-digital converters, and digital processing, direct-conversion receivers have evolved into much improved RF direct sampling designs. Superheterodyne designs are plagued by cumulative nonlinear effects, which are not present in direct-conversion designs. In this article, we will investigate how direct conversion (or RF direct sampling) differs from superheterodyne designs, and especially why it might be important to you when deciding what kind of transceiver to purchase.

The new Icom IC-7610, just like the less expensive IC-7300, employs an RF direct sampling system, in which received signals directly convert to digital data and are then processed by the FPGA (Field-Programmable Gate Array), as shown in the diagram below. RF direct



**RF direct sampling system used in the Icom IC-7610 transceiver.**

sampling reduces distortion that is inherent in the mixer stage(s) of superheterodyne receivers. The IC-7610's design, which is newer than the IC-7300, produces an even better RMDR for pulling weak signals out of the noise of strong adjacent signals. This is important if you are chasing DX or operating a contest (such as Field Day) in a pileup of signals.

Compared to the IC-7300, the IC-7610 has additional features, such as dual receivers (great for diversity reception or receiving on two different frequencies or bands at once, for example). This includes two separate "DIGI-SEL" preselectors, two separate band-pass filter net-

works, and two separate A/D (analog-to-digital) converters feeding into the FPGA.

So what are DIGI-SEL preselectors? Icom says they have sharp, narrow passband characteristics that prevent A/D converter overflow from out-of-band signals when sampling the RF signals. Additionally, the third and higher order IMD (intermodulation distortion) components are reduced. In other words, interference is reduced from strong signals in a contest pileup or on adjacent frequencies or bands.

The IC-7610 has many other features, including a 7-inch color TFT touch LCD screen and built-in automatic antenna tuner. However, I'm not here to tout the features of the IC-7610 but rather to investigate and discuss the benefits of RF direct sampling, whether offered by Icom, FlexRadio Systems, or other manufacturers.

A superheterodyne receiver is designed for best signal-to-noise ratio and spurious-free dynamic range. A direct RF-sampling receiver, on the other hand, focuses on how the RF A/D converter impacts the receiver noise figure.

Direct-conversion receivers avoid the nonlinear distortion found in superheterodyne receivers that have high dynamic range. Direct-conversion receivers do not employ a mixer stage and therefore have no IF stage with automatic gain control. A wide range of signals can occur at the output of the conversion stage. This output is baseband, corresponding to the same frequencies used for high-end audio.

In direct RF-sampling designs, the A/D converter digitizes a specified range of frequency spectrum directly at RF and passes it to a signal processor, such as an FPGA, to dissect the available information.

Very high dynamic range A/D converters have been used for awhile in FlexRadio's direct-conversion designs. With high dynamic range, they can discern both strong and weak signals simultaneously. Roofing filters, with their inherent nonlinearities, are no longer required.

Image rejection was a problem in early direct-conversion designs. FlexRadio overcame this problem with an I/Q Quadrature Sampling Detector (QSD), which acts like a mixer, but has natural image suppression that is directly related to the balance between the I (in-phase) and Q (quadrature) local oscillator signals. FlexRadio characterizes the QSD dynamically (in real time) and adjusts the I/Q balance, resulting in image suppression that can move any images to the noise floor.

Since there is only a single down conversion from RF to baseband, there is only a single opportunity for phase noise to enter the analog signal processing. Phase-noise control at this point affects the entire receiver.

## OCRACES Holiday Dinner: Monday, Dec. 4th

The annual OCRACES Holiday Dinner will be on Monday, December 4, 2017, at 6:30 PM, at Moreno's Mexican Restaurant, 4328 E. Chapman Avenue, in Orange. Please RSVP OCSD Emergency Communications Manager Lee Kaser, KK6VIV, if you are attending, and your number of guests. There will be no regular OCRACES meeting on December 4th, and no net.

## Ray Grimes, N8RG, at January 8th Meeting

Ray Grimes, N8RG, will make a presentation to OCRACES members and guests at the January 8, 2018, meeting on the "State of the Radio Spectrum, 2018." This presentation will discuss the many recent changes in FCC Rules affecting the radio communications spectrum, along with a discussion of the present and future of ham radio, land-mobile radio, and public-safety radio communications.

## Help Prevent Package Theft

Have you ordered a new piece of equipment for your ham shack? When it's delivered, are you in danger of it being stolen off your front porch? Well, here are some useful tips from the OCSD Web site:

With holiday season here, chances are you are ordering presents over the phone, via the Internet, or by mail. Most people have packages delivered straight to their front porch. The majority of deliveries do not require a signature and are generally left at your door, even if no one is home to accept them. This time of year brings out those looking for a crime of opportunity as well as those thieves that actually target your delivery. Thieves will follow or watch for the UPS, Fed Ex or other delivery trucks and then target a home after a delivery is made. Here are some tips you can follow to keep your presents safe from porch pirates:

- Install a security camera on your porch, put thieves on the defense by recording their every move
- Use your workplace as the shipping address
- Track your shipments by phone, on-line, or by carrier app so you know what day they should arrive
- Ask your neighbor to watch for your delivery and then hold the items until you arrive home
- Keep an eye on your neighborhood and report suspicious persons and vehicles sitting or cruising the area – See Something, Say Something!
- Request a signature delivery option, if available
- Have the shipment be held at the shipping facility such as a UPS office or an Amazon Pick Up Point
- Utilize a "mailbox" businesses in your town and see if they will accept shipment of your item for a fee
- If you do not receive your shipment on time, check with the company of origin and confirm the delivery. If the item was delivered and you did not receive it, then report the theft or loss to the original company, the shipping company, and your local police.

## SKYWARN Recognition Day: December 1-2

*by Jim Campbell, WB6ZPB, San Diego County SKYWARN Coordinator*

SKYWARN Recognition Day is December 1 to December 2, 2017, starting at 4:00 PM Friday and lasts until 3:59:59 PM Saturday. It is a ham radio event where we attempt to contact other National Weather Service offices from the one in Rancho Bernardo, as well as contacting other ham radio stations. If you would like to participate, respond to wb6zpb@yahoo.com with preferred times (in 2-hour segments) and we will attempt to get you an operating time slot. Please indicate at least three preferred time slots, and we will try to get you in at least one of them, attempting to get you your preferred time slot, but cannot promise anything. As long as a duly licensed ham radio operator is present, you do NOT need a ham radio license to participate. The NWS is at 11440 W. Bernardo Court, Suite 230, San Diego, California. More details will be provided when I reply to your emailed request.

# Tips for Communicating During an Emergency

The following tips were issued by the FCC and FEMA for communicating during an emergency.

## Preparing for an Emergency

1. **Know what type of telephone service you have.** Some newer forms of telephone service will not work without electric power. Understand whether you have this newer type of service, such as Voice over IP (VoIP), which is provided over broadband connections, or more traditional telephone service, which typically is powered over copper telephone lines. Ask your service provider if you are unsure.
  - **If you have newer telephone service** that works with battery backup equipment during power outages, test the battery periodically, understanding how long it should last, learn how to replace it, and consider having a spare battery that you can charge before a storm. If you do not have battery backup equipment, ask your provider if they can supply it or if it is available elsewhere.
    - If your electricity goes out and you don't need to use the phone right away, you can disconnect the battery to prevent it from draining and plug it back in when you need to receive or make calls. Once power is restored, plug the battery back in so it can recharge.
  - **If you have traditional telephone service**, it may work during electric power outages—but you may need to use a “corded” phone. Remember that many cordless home phones rely on electric power to operate.
2. **Charge your wireless phone if a storm is coming.** Also consider keeping an extra battery and a car charger on hand.
3. **Charge your laptop or tablet computer if a storm is coming.** If your electricity goes out but secure Wi-Fi is available in your community, you may be able to use your computer or tablet to go online and send emails. You may also be able to use the battery power in these devices to recharge your wireless phone using a USB cable, but be careful not to drain the battery power of your computer or tablet if you need to go online.
4. **Broadcasters are an important source of news during emergencies, so consider keeping a battery-operated, solar-powered, or hand-crank-operated radio or digital portable television** for use during power outages. Make sure you have charged or fresh batteries if needed. Some hand-cranked radios can also be used to charge cell phones, but check the instruction manual before assuming this is the case.

## During an Emergency

1. **Limit non-emergency phone calls.** This will minimize network congestion, free up "space" on the network for emergency communications, and conserve battery power if you are using a wireless phone. If you do need to make a call, try to keep it brief and only convey vital information to emergency personnel and/or family.
2. **For non-emergencies, try text messaging from your wireless phone.** In many cases, text messages to other wireless devices will go through when your call may not, though there may be a delivery delay during times of network congestion. (In most locations you cannot send a text message to 911, however.)
3. **Adjust your wireless phone.** Check your wireless device or manual for ways to conserve battery power, such as dimming the brightness of your display screen and disabling certain applications. If you have difficulty accessing your wireless network, consider connecting to Wi-Fi service if your phone is Wi-Fi-capable. If the wireless network in your area is damaged and you do not see any signal bars on your phone, consider turning your phone off to prevent the battery from draining as your phone seeks a usable wireless signal.
4. **Call 911 only for emergencies.** Learn and use the designated number in your state for highway accidents or other non-life-threatening incidents.
5. **Wait 10 seconds before redialing a call.** Redialing a wireless call multiple times in quick succession can increase network congestion, further limiting the ability of all users to place calls. If you must make a call, space out your call attempts.
6. **If you have call forwarding on a landline phone at home, consider forwarding those calls to your wireless number**, particularly in the event of an evacuation, so that you can continue to receive incoming calls to your home telephone number; and
7. **If you do not have electric power in your home and are using your car to charge wireless phones or listen to news on the car radio, be careful.** Don't try to reach your car if it is not safe to do so, and remain vigilant about carbon monoxide emissions from your car, especially if it is in a closed space.

## Latest Information on Outages

The FCC is working with service providers to get as much information as possible on the status of wireless and wireline phone, cable TV and Internet service outages and restoration following Hurricane Maria. The latest communications status reports and information updates are available at <https://fcc.gov/maria>.

## What You Can Do

We encourage you to contact your provider to resolve any service-related issues. If you are unable to resolve this matter with your provider, you can file a complaint or share your story with the FCC through the Consumer Complaint Center (<https://consumercomplaints.fcc.gov/hc/en-us>).

You'll find instructions there for filing a complaint, along with more information about what happens after a complaint is filed. The FCC is currently working with phone companies to expedite complaints regarding hurricane-related service outages.

## KC6MMF Hides in Cedar Grove Park in Tustin

Scott Byington, KC6MMF, was the fox on Monday, November 20, 2017, on the monthly cooperative T-hunt. He turned on the fox box immediately following the 2-meter OCRACES ACS net, hiding in Cedar Grove Park north of Tustin Ranch Road and west of Jamboree Road in the eastern part of Tustin. He hid the fox box a few hundred feet from the parking lot, requiring the hunters to



At the fox's den in Cedar Grove Park are (left to right) Roger Kepner, W6SQQ, Anthony Mascola, KJ6OKV and his daughter and son, Richard Saunders, K6RBS, Ron Allerdice, WA6CYY, Pete Bergstrom, K6PB, Peter Gonzalez, KC6TWS, Ken Bourne, W6HK, and Jack Barth, AB6VC. After Scott Byington, KC6MMF, the fox, took this photo with his Android cellphone camera, Dennis Brunning, KC6NVX, arrived at the park.

search on foot, after taking a careful bearing. Those with portable direction-finding equipment had an advantage, but everyone eventually found the fox.

With only three days before Thanksgiving, a surprising number of hunters (seven teams) participated in this hunt, and had an enjoyable time. Bearings were compared on the 448.320 MHz repeater.

The fox-box antenna was horizontal, which presented a challenge to hunters using loops and Doppler systems. Jack Barth, AB6VC, and Ron Allerdice, WA6CYY, were the first and second hunters to find the fox. Jack used an Arrow loop and Ron used a foldup beam and a VK3YNG foxhunt sniffer. Third was Richard Saunders, K6RBS. Next were Ken Bourne, W6HK, with Roger Kepner, W6SQQ, using Roger's sniffing equipment and tape-measure beam to home in on the fox. Coming in next was Anthony Mascola, KJ6OKV, with his son and daughter. This was their first OCRACES hunt, and they had a great time. Next were Peter Gonzalez, KC6TWS, with Pete Bergstrom, K6PB. Peter has been the fox many times, and he and Pete enjoyed hunting. Seventh place was taken by Dennis Brunning, KC6NVX, sporting a new homebrew loop antenna.

A survey was taken of the hunters, and most said they would be available for the next hunt on December 18, 2017, even though the hunt will be only a week before Christmas. The hunters had such a good time that they didn't want to skip a month until the next hunt. The hunt will immediately follow 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 and are encouraged to beacon their positions via APRS throughout the hunt. We are looking for a volunteer to be the fox.

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. For on-foot hunting, the BC-146.565 three-element, hand-held, foldup, yagi antenna is available from Bob Miller Enterprises (<http://www.rdfantennas.com>), along with the VK3YNG MK4 sniffer. 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 Foxhunt app for iPhones and the Tri-angulate app for Android phones. For some excellent information on T-hunting, see <http://www.homingin.com>.

# 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**

## Costa Mesa RACES (MESAC)

MESAC will not hold an open meeting in December. However, they will have their Annual Christmas Party at the Chicken Coop on December 13, 2017, for MESAC members and a guest.

## Fountain Valley RACES

Fountain Valley RACES members will participate in the Tree Lighting at the Park on Saturday, December 9, 2017. On subsequent Mondays, they will have their Volunteer Luncheon and Annual Dinner Meeting.

## Laguna Woods RACES

On Saturday October 7, 2017, Laguna Woods RACES participated in The City/County RACES & MOU ACS Exercise. Members manned The Laguna Woods Emergency Operations Center at City Hall. Practice messages were sent and received from the Orange County EOC and Orange County Cities. Members sent and received nine messages via UHF/VHF frequencies, sent and received nine messages via Winlink, established contact with W6ACS via HF (40 meters), and contacted Laguna Woods Village Security Dispatch via



their repeater. Participants were (left to right in the photo) Dave Southworth, KS6RFI, Jim Riedel, K6EEE, Don Schwab, K6IAA, Gayle Gomez, W9GCG, and Lloyd Gomez, W9LEG. Jim, K6EEE, and Ernie Senser, W6ETS, coordinated the drill.

On October 19, 2017, members of The Laguna Woods Amateur Radio Club assisted The Village's Disaster Task Force with radio communications during The Great Shakeout. This nationwide earthquake drill is held to bet-

ter prepare citizens to function effectively during an earthquake. Emergency messages were passed from The Disaster Task Force Report Center Coordinators via the ham operator assigned to them to the VMS Incident Command Center. Members who participated were Alan Clark, KJ6TXY, Dave St. Clair, KI6CJL, Don, K6IAA, Ernie, W6ETS, Gabi Senser, KG6YWU, Gayle W9GCG, Ian Craig, N6RLT, Jim Jorgensen, AA6JJ, Jim, K6EEE, Lloyd, W9LEG, Marty Kruizenga, KM6KHK, Ron Phillips, AE6QU, Street Reeves, KK6KUG, and Tom Soule, K6ZMS. Jim, K6EEE, coordinated the drill and acted as net control.

## Hospital Disaster Support Communications System (HDSCS)

During the annual California Statewide Medical Health Exercise on Thursday, November 16, 2017, HDSCS members communicated from numerous hospitals plus the Health Emergency Operations Center. The drill scenario involved numerous acts of terrorism disrupting transportation in the county, overloading or damaging communications systems, causing damage at medical facilities, prompting lockdowns, and leading to a surge of patients at the hospitals. HDSCS members received assignments the night before the event and then staged nearby the next morning to await activation. Once pager or phone-call activation was received by HDSCS, could the communicators proceed into the hospitals. The HDSCS objective was a realistic response using established call-up procedures. This reminds hospitals that members don't just "appear." Members must be in their plans. This also helps members learn what it is like to enter, have IDs checked, get to command centers, and get on the air quickly with their equipment under stressful conditions. With this scenario there was even more stress, and, in numerous situations, the communicators had to move with the command staff to alternate locations. In the Hospital command centers, HDSCS members were shoulder-to-shoulder with the various staff. The city of Orange activated its EOC and its hams, which allowed for hospitals in that city to initiate needs through HDSCS. Hospitals throughout the county, simulating overload and/or damaged communications systems, challenged all of the HDSCS hams with messages for everything from wheelchairs, to medications, and ultimately even to the coroner.

# December 2017

## Upcoming Events:

- **December 4:** OCRACES Holiday Dinner, Moreno's Mexican Restaurant, 4328 E. Chapman Avenue, in Orange, 1830 hours
- **December 13:** OCSD Communications & Technology Division Holiday Luncheon, Tustin Ranch Golf Club, 12442 Tustin Ranch Road, in Tustin, 1130-1330 hours
- **December 18:** Cooperative T-Hunt on input of 2-meter repeater, 1920 hours
- **December 25:** Christmas (no nets)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2 Weekly 40 m ACS Net
3	4 OCRACES Holiday Dinner (no net)	5	6	7	8	9 Weekly 40 m ACS Net
10	11 Weekly 2 m ACS Net	12	13 OCSD/Communications Holiday Luncheon	14	15	16 Weekly 40 m ACS Net
17	18 Weekly 2 m ACS Net & Cooperative T-Hunt	19	20	21	22	23 Weekly 40 m ACS Net
24	25 	26	27	28	29	30 Weekly 40 m ACS Net
31 <b>NEW YEAR'S EVE</b>						



[www.ocraces.org](http://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 (private)  
 70 cm: 449.180 MHz output, 444.180 MHz input, 107.2 Hz PL (private)  
 70 cm: 449.680 MHz output, 444.680 MHz input, 131.8 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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 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  
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## County of Orange RACES

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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



Jack Barth  
AB6VC



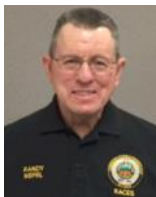
Ernest Fierheller  
KG6LXT



Bob McFadden  
KK6CUS



Tom Tracey  
KC6FIC



Randy Benicky  
N6PRL



Roger Berchtold  
WB6HMW



David Corsiglia  
WA6TWF



Ray Grimes  
N8RG



Walter Kroy  
KC6HAM



Martin La Rocque  
N6NTH



Matt Luczko  
KM6CAO



Fran Needham  
KJ6UJS



Harvey Packard  
KM6BV



Tom Riley  
K6TPR



Brad Russo  
KB6GPM



Tony Scalpi  
N2VAJ



Joe Selikov  
KB6EID



Robert Stoffel  
KD6DAQ



Ken Tucker  
WF6F



Tom Wright  
KJ6SPE



Lee Kaser  
KK6VIV