October 2020


Newsletter of the County of Orange Radio Amateur Civil Emergency Service

Inside this issue:



**OCRACES Online Meeting on Zoom:**

**Monday, October 5, 2020, at 7:30 PM**

Orange County Sheriff's Department
Technology Division

# Captain's Corner

## *by RACES Captain Ken Bourne, W6HK, Chief Radio Officer*

### Isolators and Circulators

RF isolators and circulators are interesting devices. They are constructed of ferrite material and block RF flow. They are particularly useful at microwave frequencies, but some devices are also available for HF applications.

For example, the MFJ-915 RF isolator, which handles 1.5 kW at 1.8 to 30 MHz, prevents reflected RF from traveling back down your coax shield into your transceiver. This unwanted RF can cause painful RF burns when you touch your metal microphone. It can feed back into your transmit audio stage and cause distortion or strange noises. It can mess with your displays or settings, lock up your transceiver, or even turn off your power supply. In a mobile setup, stray RF could interfere with your acceleration, brakes, steering, or other functions, or it could even disable your car's computer system. Inserting an RF isolator, such as the MFJ-915, in your coax between your antenna and transceiver might solve the problem. This device is basically the same construction as the MFJ-918 1:1 balun, but with SO-239 connectors at each end.


**MFJ-915 RF isolator.**

RF isolators and circulators are especially common in microwave applications. The magnetic properties of the ferrite material affect RF current direction. The devices are passive (no active electronic circuitry) and consist of multiple ports (connectors). They steer and suppress RF energy between ports due to their non-reciprocal characteristics (which means they allow a signal to be transmitted in only one direction). The ferrite material phase-shifts, physically displaces, or absorbs RF energy in relation to the difference between a static magnetic bias field and the rotating electromagnetic field of the RF or microwave energy.

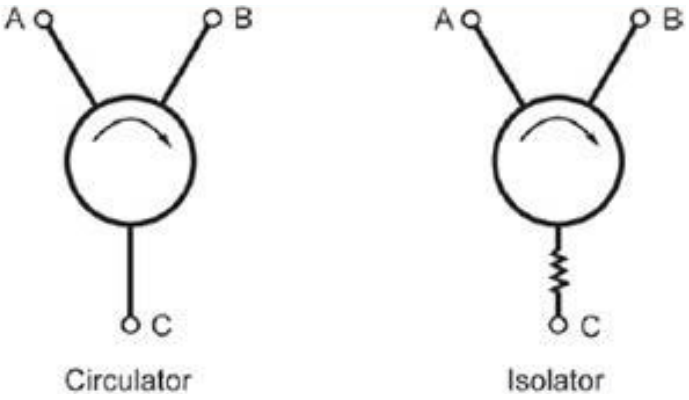
RF isolators are two-port devices that present opposing directions of RF currents with different insertion losses. They isolate by suppressing reflected energy of received signals from the output port returning to the input port. Resonance absorbers dissipate reflected RF energy internally and rely upon good heat sinking to remove energy from the device. Field displacement isolators steer energy into the resistive covering of one surface, which dissipates the heat. This reduces the heating in the ferrite material itself. Isolators are common on a test bench, to separate a device under test (DUT) from sensitive signal sources.

The interaction of the magnetic field to the ferrite material inside isolators and circulators creates very strong rotary magnetic fields, causing any RF/microwave signals in the frequency band of interest at one port to follow the magnetic flow to the adjacent port and not in the opposite direction.

RF circulators are three- or four-port devices that utilize the steering characteristics of statically biased ferrites, directing energy from one port to the clockwise adja-

*Continued on page 2*

# Captain's Corner Continued from page 1

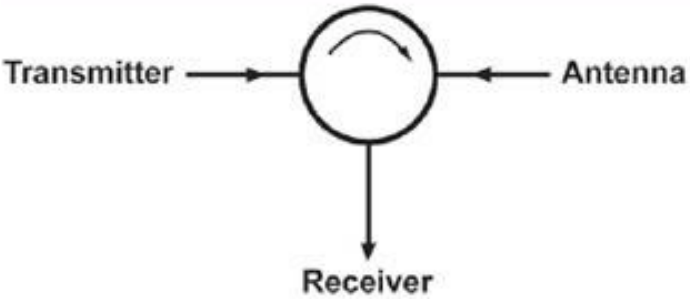



**Schematics for a circulator and an isolator. Notice that an isolator is really a circulator with the third port terminated. (The third isolator port is often not an external connector, but, rather, is an internal load for reflected energy dissipation.) The arrows represent the direction of the magnetic fields and the signal when applied to any port of these devices. For example, if a signal is applied to port A, and port B is well matched, the signal will exit at port B with very little loss (typically 0.4 dB). If there is a mismatch at port B, the reflected signal from port B will be directed to port C. It makes no difference which port is the input of the input of the circulator because the relationship at the outputs remains the same, as these devices are electrically and mechanically symmetrical.**

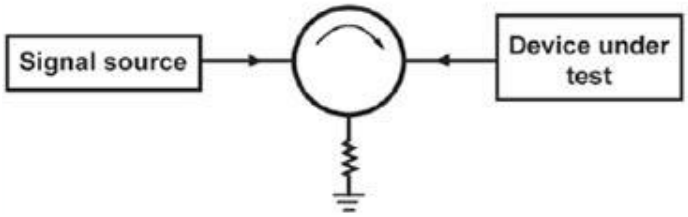
cent port. They work on either "Faraday rotation" of waves propagating through the device or cancellation of waves due to different phase shifts of RF traveling in clockwise and counterclockwise directions combining at each port. RF circulators featuring more than four ports are actually constructed of multiple three- and four-port types.

Insertion loss is a very important characteristic of these devices. Insertion loss is a measure of the RF power dissipated by a circulator in the forward direction, typically 1-2 dB. This causes loss of output power and efficiency in a transmitter, along with additional heating. Insertion loss causes a reduction in the sensitivity in a receiver by affecting the receiver's overall noise figure (NF). The insertion loss of a circulator or isolator becomes more significant at higher frequencies, namely because loss increases with frequency and higher frequency power sources (especially microwave) are considerably more expensive.

Isolation is a measure of the attenuation of signals traveling between ports not associated with the forward direction of the circulator. Ports have different isolation characteristics. This could be energy "leakage" from the input port to ports other than the clockwise adjacent output port, and is a measure of "directivity" of the device. Isolation is important for transmitters because reflected energy due to mismatch (VSWR) of an antenna is shunted away from the power amplifier—usually into a dump load. This reduces the variation of load impedance presented to the transmitter—helping to maintain optimized loading characteristics. This can protect the power amplifier by reducing power dissipation and improving stability.




**A common application for a circulator is as an inexpensive duplexer, with the transmitter and receiver sharing one antenna. When the transmitter sends a signal, the output goes directly to the antenna port and is isolated from the receiver. Good isolation is key to ensure that a high-power transmitter output signal does not get back to the receiver front end, as is governed by the return loss of the antenna. In this configuration, all signals from the antenna go straight to the receiver and not to the transmitter, because of the circular signal flow.**




**A very common application for an isolator is in the measurement path of a test bench between a signal source and the device under test (DUT), so that any reflections caused by mismatches will end up at the termination of the isolator and not back into the signal source. The termination at the isolated port needs to be sufficient to handle 100 percent of the reflected power, should the DUT be disconnected while the signal source is at full power. If the termination is damaged due to excessive power levels, the reflected signals will be directed back to the receiver because of the circular signal flow.**

Circulators are used as duplexers in transceiver systems with shared antennas. They isolate the transmitter and receiver—reducing the transmitter's output signal power level presented to the receiver. They can be a low-cost alternative to expensive cavity duplexers in base stations and mesh networks.

**Pasternack PE8427 150-W circulator for 135-175 MHz.**

# October 5th OCRACES Meeting to Be on Zoom

Due to the COVID-19 pandemic and Sheriff's Department orders to stand down on all RACES activities outside the home, the next OCRACES meeting again will be online, using Zoom, on Monday, October 5, 2020, at 7:30 PM, with the meeting ID and password sent to the mailing lists for OCRACES members and applicants and city RACES and MOU officers, members, and coordinators. Joe Selikov, KB6EID, will once again be the meeting host. Everyone who wishes to participate should access https://zoom.us and download and install the Zoom software.

No Sheriff's Department business will be conducted during OCRACES Zoom meetings, due to security concerns. Zoom meetings are for socializing only, such as discussing amateur radio technical projects and on-the-air activities. We will not discuss activation policies and procedures, EOC RACES equipment, etc. During this meeting, we cover the latest Orange County statistics on the COVID-19 pandemic, including cumulative cases to date (including deaths), positive cases received that day, cumulative deaths to date and deaths reported that day, cumulative tests to date and tests reported that day, cases currently hospitalized and in ICU, and cumulative recovered to date. We will also review the October 3rd City/County RACES & MOU ACS Exercise and seek suggestions on what to incorporate in our next drill. We will also discuss plans for the Great ShakeOut exercise to be held on Thursday, October 15, 2020.

Zoom claims to have substantially increased the security of its system. Nevertheless, we will continue to use Zoom with caution. If you installed the Zoom software on your computer, be sure it is the newest version, currently 5.3.1.

# City/County RACES & MOU Drill: October 3rd

On Saturday, October 5, 2019, we conducted a successful and enjoyable deployment drill as our annual first-Saturday-in-October City/County RACES & MOU ACS Exercise. We were hoping to do something similar this year, but the COVID-19 pandemic currently prevents us from having any RACES activities outside our home property. Consequently, we will have a Portable Drill that is similar to the one we conducted last May 2nd. We will simulate repeater failure and hold the exercise on 2 meters simplex and on 60 meters, taking advantage of Near Vertical Incidence Skywave (NVIS) propagation.

Members will operate portable stations from their own property (such as their backyard), using battery power and portable antennas. From 0900 to 1000 hours, operations will be on the 146.595 MHz OCRACES simplex frequency. Net control will be OCRACES Chief Radio Officer Ken Bourne, W6HK, using his home station and high-gain chimney-mounted antenna, so that he can hear calls from much of Orange County. Alternate net controls and/or relay stations will be appointed throughout the county, so that even low-power handheld radios should be able to check in.

During the first 15 minutes of the exercise (0900-0915 hours), each City and County RACES and MOU unit will conduct a roll call of its members on its primary simplex frequency. OCRACES will call its members on 146.595 MHz. If necessary, agencies (especially OCRACES and MOUs) may need to appoint relay stations for countywide coverage.

From 0915 to 0955 hours, Ken will call the roll of City RACES and MOU units on 146.595 MHz simplex. The Chief Radio Officer or Coordinator (or designated member) of each unit will respond, with a report of the number of stations that checked in on the unit's primary simplex frequency. Relay stations (such as WB6NOA in Costa Mesa and KM6RSY in Seal Beach and others) will assist OCRACES net control in covering Cities in South County and West County on 146.595 MHz.

Ken will begin the drill by calling for check-ins from cities in alphabetical order, then from MOUs, and finally from OCRACES members.

Beginning at 1000 hours, Ken will incorporate the Portable Drill into the normal Saturday morning 60-meter OCRACES ACS net on 5371.5 kHz USB ("channel 4" dial frequency). This net covers the 11 counties in the Cal OES Southern Region plus northern Arizona and southern Nevada. After calling the regular Saturday roll call of Orange County City and County RACES stations, net control will then stand by for additional RACES and MOU stations in Orange County. Relay stations such as WB6NOA in Costa Mesa , W6CAW in Campo, and N6WIX in Ventura will assist net control for covering various areas of Orange County. Net control will then call the normal Saturday roll of RACES/ACS stations outside Orange County, followed by the non-EmComm stations. Home stations may check in, but backyard portable operation is preferred (using battery power and portable antennas such as Hamsticks, end-fed wires, etc.). Ken will also operate from his home station for this net, using a 102-foot G5RV antenna up about 35 feet. At the conclusion of the net, time permitting, Ken will move his operation to a low-power portable station in his backyard, using a Hamstick dipole up about 9½ feet on a tripod mast. The 60-meter net and overall drill will conclude at 1100 hours.

# OCRACES ShakeOut Drill: October 15th

International ShakeOut Day is always the third Thursday of October (October 15th this year). The Great California ShakeOut will be on that day as well, although some agencies will be moving their ShakeOut exercises to other dates in October. OCRACES plans to conduct a short communications drill on October 15th, from 1000 to 1030 hours, to practice reporting observed earthquake intensity using the Modified Mercalli Earthquake Intensity Scale. Net control will ask participants to give their "Mike-Mike" reports on the 146.895 MHz repeater or on 60 meters channel 4, which is 5371.5 kHz USB (dial frequency). The Modified Mercalli scale may be downloaded from the "Forms" page on the OCRACES website at https://ocraces.org/forms.html. When transmitting your report, begin and end it with "This is a drill."

During the drill, while not reporting earthquake intensity, we recommend practicing "Drop, Cover, and Hold On." This is our opportunity to practice how to protect ourselves during earthquakes. Our past experience with earthquakes may give us a false sense of safety. The last noticeable one was a magnitude 4.5 near South El Monte at 11.39 PM on September 19, 2020, felt in much of Orange County. A few OCRACES members jumped on the 146.895 MHz repeater and gave "Mike-Mike 4" reports, but nobody said they got under their desks. Most of us have never experienced the kind of strong earthquake shaking that is possible in much larger earthquakes, where sudden and intense back and forth motions of several feet per second will cause the floor or ground to jerk sideways out from under you, and every unsecured object around you could topple, fall, or become airborne, potentially causing serious injury. This is why you must learn to immediately protect yourself after the first jolt. Don't wait to see if earthquake shaking will be strong.

In most situations, you will reduce your chance of injury if you:

**DROP** where you are, onto your hands and knees. This position protects you from being knocked down and also allows you to stay low and crawl to shelter if nearby.

**COVER** your head and neck with one arm and hand

- If a sturdy table or desk is nearby, crawl underneath it for shelter
- If no shelter is nearby, crawl next to an interior wall (away from windows)
- Stay on your knees; bend over to protect vital organs

**HOLD ON** until shaking stops

- Under shelter: hold on to it with one hand; be ready to move with your shelter if it shifts
- No shelter: hold on to your head and neck with both arms and hands.

# MARS Drill to Test Interoperability with Hams

Military Auxiliary Radio System (MARS) volunteers will take part in the Department of Defense (DOD) Communications Exercise 20-4, starting on October 3, 2020, and concluding on October 26. The MARS focus is interoperability with the amateur radio community.

"Throughout the month of October, MARS members will interoperate with various amateur radio organizations that will be conducting their annual simulated emergency tests with state, county, and local emergency management personnel," said MARS Chief Paul English, WD8DBY. "MARS members will send a DOD-approved message to the amateur radio organizations recognizing this cooperative interoperability effort."

MARS members will also train with the ARRL National Traffic System (NTS) and Radio Relay International (RRI) to send ICS 213 general messages to numerous amateur radio leaders across the US.

"This exercise will culminate with MARS Auxiliarists sending a number of summary messages in support of a larger DOD communications exercise taking place October 20-26," English added. Throughout the month of October, MARS stations will operate on 60 meters, and WWV/WWVH will broadcast messages to the amateur radio community. English assures no disruption to communications throughout the month-long series of training events.

OCRACES and City RACES units in Orange County have increased their activities on 60 meters and are encouraged to watch for MARS activities on that band during October, when interoperability policies allow communications between MARS and RACES members. Because the DOD exercise begins on October 3rd, we hope that MARS will make contact with us on 60 meters during the City/County RACES & MOU ACS Exercise, with the 60-meter component occurring between 1000 and 1100 hours on October 3rd, on 5371.5 kHz USB (dial frequency).

# WSJT-X Beta Released with LF & MF Protocols

The latest beta release of the WSJT-X digital software suite includes digital protocols particularly designed for communications on LF and MF bands, such as 2200 meters and 630 meters, and its developers say that, during its first few months of testing, contacts have spanned intercontinental paths "many times" on those bands. New protocols FST4 and FST4W are included in WSJT-X version 2.3.0-rc1 (release candidate 1). FST4 is for two-way contacts, while FST4W is for "quasi-beacon" style WSPR transmissions. Both modes offer a range of options for T/R-sequence lengths and threshold decoding sensitivities extending well into the –40 dB range, developers said.

"On these bands, their fundamental sensitivities are better than other WSJT-X modes with the same sequence lengths, approaching the theoretical limits for their rates of information throughput," the WSJT-X development team said in releasing version 2.3.0-rc1. The developers said, "FST4 and FST4W do not require the strict, independent time-synchronization and phase-locking of modes like EbNaut," a protocol for VLF and LF communications.

The WSJT-X development team said operators familiar with the software suite will find using FST4 and FST4W straightforward. "Most on-screen controls, auto-sequencing, and other features behave as in other modes," the developers said. "Operating conventions on the LF and MF bands make it useful to have additional user controls to set the active frequency range used by the decoder."

The new modes use 4-GFSK modulation and share common software for encoding and decoding messages. FST4 offers T/R sequence lengths of 15, 30, 60, 120, 300, 900, and 1,800 seconds, while FST4W omits the lengths shorter than 120 seconds. Sub-mode names, such as FST4-60 and FST4W-300, indicate sequence length in seconds.

Message payloads contain either 77 bits—as in FT4, FT8, and MSK144—or 50 bits for the WSPR-like messages of FST4W. Message formats displayed to the user are like those in the other 77-bit and 50-bit modes in WSJT-X. Forward error correction uses a low-density parity check (LDPC) code with 240 information and parity bits. Transmissions consist of 160 symbols: 120 information-carrying symbols of two bits each, interspersed with five groups of eight predefined synchronization symbols.

Threshold sensitivity (SNR in a 2500 Hz bandwidth, yielding a 50% probability of decode) was measured for each sub-mode using simulations over the additive white Gaussian noise (AWGN) channel. As with other recently developed modes in WSJT-X, a feature called a priori (AP) decoding can improve sensitivity by several additional decibels as information is accumulated during a standard minimal contact or FST4W operating session.

"Keep in mind that these are very narrow-band modes; achieving the sensitivities listed in the table requires that oscillator drifts and path-induced Doppler shifts must be less than the tone spacing, over the full sequence length," the developers said.

WSJT-X version 2.3 offers 12 different protocols: FST4, FT4, FT8, JT4, JT9, JT65, QRA64, ISCAT, MSK144, WSPR, FST4W, and Echo. The first seven are designed for making reliable contacts under weak-signal conditions and use nearly identical message structure and source encoding.

The *WSJT-X 2.3 User Guide* (http://physics.princeton.edu/pulsar/k1jt/wsjtx-doc/wsjtx-main-2.3.0-rc1_en.html#NEW_FEATURES) and the Release Notes (http://physics.princeton.edu/pulsar/k1jt/Release_Notes.txt) include additional information.

# OCRACES Winlink System Remains Down

The OCRACES Winlink system went down on July 21, 2020, due to a server failure. Apparently, the server has been restored. However, other network issues still need to be resolved, including installation of equipment for network compatibility. At this time, the three OCRACES UHF RMS sites are not operational. Meanwhile, we encourage City RACES units to set up their own RMS gateways, either on one of the 2-meter packet frequencies (such as 145.05 MHz) or on one of the OCRACES UHF RMS frequencies.

All RMS (Radio Mail Server) programs require a full-time Internet connection. The speed of this connection is not critical. RMS programs are all designed to sense loss of connectivity and recover or reconfigure automatically.

As a minimum, the computer should be a modern 500-MHz or greater processor running Windows 8, Windows Server 2003 or later, or Windows 10, with .NET 3.5 installed. The computer and TNCs should be powered from a smart uninterruptible power supply (UPS) that has a reserve battery and signals Windows to begin an orderly shutdown via an interface when battery power is low. A shortcut to the RMS program should be installed and the computer configured to auto-boot on power applied and start the program automatically when power is applied.

# 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 and supportive amateur radio clubs in Orange County.**

**Please send your news to *NetControl* Editor Ken Bourne, W6HK, at:**

**kbourne.ocsd@earthlink.net**

## Westminster RACES

Robert Acosta, Westminster Police Department, reported that he is now the Emergency Services Coordinator for Westminster. On September 18, 2020, Adam Valek, N6HVC, was appointed to the Chief Radio Officer position.

## Orange County Hospital Emergency Amateur Radio Team (OCHEART)

OCHEART/ARES District Emergency Coordinator David Gorin, KB6BXD, reported that Art Remnet, KM6RSY, is now the Assistant District Emergency Coordinator. Chi Nguyen, KE6MVS, is the Zone Emergency Coordinator. The Operations, Training, & Exercising Emergency Coordinator is Bob McCord, K6IWA.

## Orange County Amateur Radio Club (OCARC)

The next OCARC general meeting will be on Friday, October 16, 2020, at 7:00 PM, online via Zoom. Club members will receive Zoom sign-in information prior to the meeting. Interested visitors can receive Zoom sign-on information on the day of the meeting by an email link that will be provided on the OCARC website (http://www.w6ze.org) after 9:00 AM. Normally, the OCARC Annual Radio & Electronics Auction is held at the October meeting. Due to the COVID-19 pandemic, the tentative date has been moved to February 19, 2021.

OCARC holds club nets every Wednesday at 7:30 PM on 28.375 MHz USB, 8:30 PM on 146.550 MHz FM simplex, and 9:15 PM on 3.883 MHz LSB. Net control is W6ZE, operated by KE6YHX. During the COVID-19 pandemic, additional nets have been added on 146.550 MHz FM simplex, at 8:30 every Monday and Friday.

## Mission Viejo RACES

Mission Viejo RACES Radio Officer & ARES Emergency Coordinator Charley Speelman, WA6RUZ, reported that Mission Viejo RACES-ARES will participate in the October 3rd City/County RACES & MOU ACS Exercise with about 10 operating on 2 meters simplex and maybe three on 60 meters.

## Costa Mesa RACES (MESAC)

MESAC Chief Radio Officer Patrick Williams, KJ6PFW, reported that Costa Mesa will participate in the October 3rd countywide ACS exercise. Assistant Radio Officer Ashley Fisher, KM6UJD, will handle the 2-meter coordination. Gordon West, WB6NOA, will be available for relay, and will handle MESAC's 60-meter portion of the drill. He will also coordinate a concurrent internal simplex drill for MESAC members on a separate frequency.

## Laguna Woods RACES

Laguna Woods RACES Chief Radio Officer Bruce Bonbright, NH7WG, reported that his RACES team will participate in the October 3rd countywide ACS exercise. They will initially have a local simplex exercise on 146.580 MHz. Bruce will then switch to 146.595 MHz to report into the OCRACES simplex net. Laguna Woods RACES will also participate in the 60-meter exercise. In all cases, they will use battery power and portable stations.

## Orange RACES (COAR)

COAR Chief Radio Officer Will Stoddard, KJ6IA, reported that the City of Orange will participate in the October 3rd ACS exercise on 2 meters and 60 meters.

## Huntington Beach RACES

Huntington Beach RACES Assistant Chief Radio Officer Greg Turlis, K6GAT, reported that HBRACES will participate in the October 3rd countywide ACS exercise on 2 meters and 60 meters.

## Laguna Niguel ACS

Laguna Niguel ACS Chief Radio Officer Russ Lange, KK6URR, reported that LNACS will participate in the October 3rd countywide ACS exercise on 2 meters.

## Newport Beach RACES

Newport Beach RACES Chief Radio Officer Steve Livingston, KM6JON, reported that NBRACES will participate in the October 3rd countywide ACS exercise on 2 meters and 60 meters. Locally, they will also test UHF, Winlink, and APRS.

## Other City RACES and MOU Units

In addition to the above City RACES/ACS units that plan to participate in the October 3rd countywide ACS exercise, we have also received reports of planned participation from Brea Radio Officer Dick Bremer, WB6DNX, Fullerton Radio Officer Gene Thorpe, KB6CMO, Irvine Radio Officer Pete Bergstrom, K6PB, Placentia Radio Officer Mark Garrett, KG6CAV, Westminster Chief Radio Officer Adam Valek, N6HVC, and American Red Cross Communications Lead Bill Rose, K6HMS.

# October 2020

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 City/County RACES & MOU ACS Exercise |
| 4 | 5 Weekly 2 m ACS Net & OCRACES Zoom Mtg | 6 | 7 | 8 | 9 | 10 Cal OES Southwest ACS Leadership Meeting |
| 11 | 12 Weekly 2 m ACS Net | 13 | 14 | 15 Great California ShakeOut Drill | 16 Orange County Amateur Radio Club Meeting | 17 Weekly 60 m ACS Net |
| 18 | 19 Weekly 2 m ACS Net | 20 | 21 | 22 | 23 | 24 Weekly 60 m ACS Net |
| 25 | 26 ACS Net on 4 Bands | 27 | 28 | 29 | 30 | 31 Weekly 60 m ACS Net |

## Upcoming Events:

- **October 3**: City/County RACES & MOU ACS Exercise, 0900-1100 hours
- **October 5:** OCRACES Meeting on Zoom, 1930 hours
- **October 10:** Cal OES Southwest ACS Leadership Online Meeting, 1000 hours
- **October 15:** Great California ShakeOut Drill, 146.895 MHz repeater and 5371.5 kHz USB, 1000-1030 hours
- **October 16:** Orange County Amateur Radio Club (OCARC) Meeting, 1900 hours, on Zoom


https://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

60 m: 5371.5 kHz USB (dial) (Channel 4) (OC ACS Net—Saturdays, 1000 hours)
40 m: 7250 kHz LSB
10 m: 29.640 MHz output, 29.540 MHz input, 107.2 Hz PL (out of service)
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

OCSD Emerg. Comm's Coordinator
Pete Jimenez, KI6UTE, 714-704-8080

OCSD Sr. Telecommunications Engr.
Erik Schull, KE6BVI, 714-704-7937

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**

**Orange County Sheriff's Department, Technology Division**
**840 N. Eckhoff Street, Suite 104, Orange, CA 92868-1021**
**Telephone: 714-704-8080 or 714-704-7937 ● Fax: 714-704-7902**
**E-mail: pjimenez@ocsd.org or eschull@ocsd.org**

# County of Orange RACES

*OCSD Technology Division*
*840 N. Eckhoff Street, Suite 104*
*Orange, CA 92868-1021*

Telephone – 714-704-8080 or 714-704-7937
Fax – 714-704-7902
E-mail – pjimenez@ocsd.org or eschull@ocsd.org

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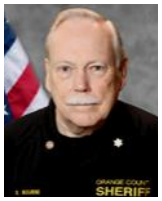
Questions or Comments?
Contact *NetControl* Editor Ken Bourne, W6HK
kbourne.ocsd@earthlink.net

***"W6ACS ... Serving Orange County"***

# *Meet Your County of Orange RACES Members!*

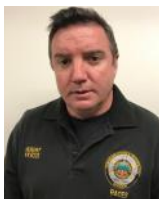
***Officers***


Ken Bourne
W6HK


Scott Byington
KC6MMF


Jack Barth
AB6VC


Ernest Fierheller
KG6LXT


Bob McFadden
KK6CUS

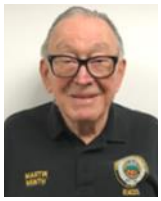

Tom Tracey
KC6FIC


Randy Benicky
N6PRL


Ray Grimes
N8RG


Lee Kaser
KK6VIV

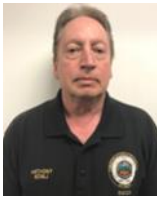

Walter Kroy
KC6HAM

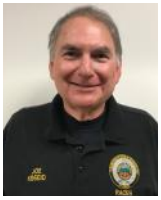

Martin La Rocque
N6NTH


Don Mikami
N6ELD


Fran Needham
KJ6UJS


Harvey Packard
KM6BV


Tony Scalpi
N2VAJ


Joe Selikov
KB6EID


Robert Stoffel
KD6DAQ


Ken Tucker
WF6F


Tom Wright
KJ6SPE

***OCSD RACES Coordinators***


Peter Jimenez
KI6UTE


Erik Schull
KE6BVI