April 2024

Newsletter of the County of Orange Radio Amateur Civil Emergency Service

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OCRACES Meeting

Monday, April 1, 2024 at 7:30 p.m.

In-Person OC EOC Loma Ridge

Orange County Sheriff's Department
Emergency Management Division

CRO's Nest

by Ken Bourne, W6HK, OCRACES Chief Radio Officer

Doppler Radio Direction Finding

My favorite activity in my early days (mid-1950s) of amateur radio in Illinois was fox hunting, a radio direction-finding (DF) exercise commonly called T-hunting here in California. Members of DuPage County RACES were avid fox hunters. When I moved to Orange County in 1978 and immediately joined OCRACES, I discovered that T-hunts were very popular in Southern California. I quickly encouraged OCRACES to get involved, and we did! We chose one Monday night per month after our 2-meter net to hold our hunts, which sometimes drew up to 15 hunting teams from OCRACES and City RACES units. The fox always transmitted on the input (146.295 MHz) of the 146.895 MHz repeater, rather than on the common Southern California T-hunt frequency of 146.565 MHz. The hunts were not mileage-based and hunters could start from any location. The first hunter to find the fox was the winner, and usually became the fox the next month. Boundaries were the Orange County borders. Direction-finding equipment consisted mostly of loop antennas and sometimes Yagis and cubical quads on rotatable masts extending up through the roof of an SUV.

During the time I was the Deputy Chief RACES/ACS Officer—South for Cal OES (1998-2003), the hunts died out. After I returned to OCRACES in 2003, I reestablished our hunts, but this time they were designated "Cooperative T-hunts." They were no longer a contest of who finds the fox first. Rather, they were an exercise of working together to locate the fox quickly. We exchanged bearing information for triangulation via one of the OCRACES UHF repeaters. By this time, more sophisticated Doppler DF systems were becoming popular, used by some of the hunters for quick and accurate bearings. These cooperative hunts gave us practice in working together to locate interference to not only our amateur repeaters but also to some public-safety frequencies. However, if we were deployed by an agency to locate signals on a non-amateur frequency, we could not coordinate our DF bearings via amateur radio, according to FCC rules. But we could coordinate via other means such as cell phones.

Unfortunately, when the COVID pandemic came along, our cooperative T-hunts were discontinued. Nevertheless, some of us would like to resume, but we need to be equipped with systems, such as Doppler, to locate short transmissions, in order to be useful to our agencies who might need assistance. Loop antennas, beams,, quads, or any manual DF methods are not very useful for locating the source of short transmissions. Rather, an automatic system, such as Doppler, is required.

Doppler systems are the most common automatic DF systems used by radio amateurs, because of cost, complexity, and availability. Before I focus on Doppler, I will quickly mention some of the other automatic systems, as described in a Rohde & Schwarz white paper.

Watson-Watt is an amplitude-based DF system, whereas Doppler is based on changes in frequency. Watson-Watt is an amplitude comparison system, based on the properties of an Adcock antenna, which consists of four equally spaced vertical elements arranged in pairs. The resulting antenna pattern

(Continued on page 2)

CRO's Nest *Continued from page 1*

consists of two figure-eight-shaped lobes. Each of the two figure-eight shaped patterns has maximum sensitivity along the axis running through both antennas and nulls perpendicular to this axis, resulting in a unique set of magnitudes for every incoming signal. Watson-Watt systems are commonly used on HF, whereas Doppler systems are primarily for VHF and UHF.

Correlative interferometry (CI) is based on changes in the phase of the received signal. It determines bearings by calculating differences in the received signals' phase as seen at multiple collocated antenna elements. CI antennas generally use an odd number of antenna elements arranged in a circular pattern. CI is more accurate than any other DF system (usually 1 degree or less) and is highly immune to multipath. Signal polarization does not affect the accuracy, which is a drawback of Doppler DF.

Time difference of arrival (TDOA) is a time-based system that determines the location of a source based on the time when a signal is received at multiple locations. Three or more receivers at different locations receive a signal. In most cases the distances between the transmitter and each receiver are different, and so the time at which the signal arrives at each receiver will be different. These time differences can be represented as hyperbolae (curves), and the location of the transmitter will be at the intersection of these hyperbolae.

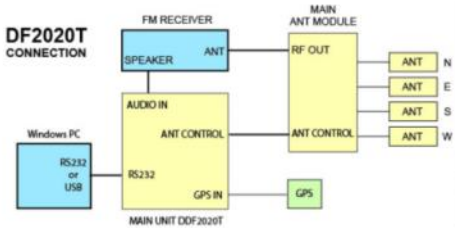
Doppler Systems DDF7001 DF processor can be used with a variety of receivers for either fixed or mobile operation. A provided Windows-based software suite enables the user to display lines of bearing on a map in real time. It is network compatible.

These automatic systems can be combined in a hybrid configuration, such as with an angle of arrival system and a time difference of arrival system.

Doppler radio direction finding is a widely used technique, mostly on VHF and UHF frequencies, and is considerably less costly than the systems mentioned above. It uses the Doppler effect (such as when the perceived audio frequency of a train horn decreases as the train approaches) to determine whether a moving receiver antenna is approaching or receding from the source. Early systems used antennas mounted on spinning disks to create the motion. Modern *pseudo-Doppler DF* (or *sequential phase DF*) systems rapidly switch the antennas electronically to determine the direction of the signal.

If you move towards a signal source, the received frequency of the signal will shift upwards. If you move away from the signal source, the received frequency will move downwards. The system detects and measures this shift, indicating whether you are moving towards or away from the signal source, thus giving a direction. The system antenna needs to be moved so that a measurable Doppler shift is created. The pseudo-Doppler DF technique simulates the movement of the antenna, typically with an array of four antennas and rapidly switching between them. Each of the antennas is used to generate a series of Doppler pulses, and the system uses this information to synthesize the Doppler sine wave. The four (and sometimes much more) pseudo-Doppler DF antennas are equally spaced, with vertical polarization. They should be close to a resonant length on the receive frequency.

Doppler systems have some limitations. They require that the target signal be constant and are not effective with locating intermittent transmissions or short pulses. However, they are often effective in locating fairly short voice transmissions.



Global TSCM Group KN2C DF2020T Doppler DF system. A receiver (such as a scanner) needs to be added. The quarter-wave antennas are optional or may be procured elsewhere.

Doppler radio direction finders consist mainly of a processor and an antenna summing unit. Some systems can be networked for instant triangulation, preferably from three sites. An example of a sophisticated Doppler DF system is the DDF7000 Series, available from Doppler Sytems, LLC.

One of the more affordable systems, especially for radio amateurs, is available from Global TSCM Group, Inc. Their KN2C DF2020T DF "kit" has a GPS input and RS232 output for indicating its location and draw bearings automatically or manually on Google Earth, using a PC or laptop, optional GPS receiver, and the "Navi 2020" plotting program. The main unit has a numeric display and a 36-LED pelorus display. It is compatible with APRS software. It accepts standard $GPRMC NMEA GPS messages. Archive Navi files are also saved. Provided are four antenna modules (antennas are optional or available elsewhere) with bottom magnets for quick mobile installation. It uses any type of FM receiver (such as in an amateur dual-band transceiver) or scanner (such as a Bearcat), covering at least 100 to 1000 MHz. ✸

OCRACES Meeting: April 1st at Loma Ridge

The next OCRACES meeting will be in-person on Monday, April 1, 2024, at 7:30 p.m., at the Orange County EOC at Loma Ridge, east of Orange. Our featured speaker will be Erik Schull, KE6BVI. He is a senior telecom engineer with the Sheriff's Technology Division, Technical Services Unit. He will give us an informative presentation on repeater duplexers, circulators, and combiners. We will also discuss planning for the May 4th City/County RACES & EmComm Drill. The drill scenario is civil unrest. We will mention upcoming console training. Also at this meeting will be a discussion of how we might provide monitoring assistance to the Sheriff's Department. All county and city RACES and EmComm members are welcome to attend. ✸

City/County RACES & EmComm Drill: May 4th

The next City/County RACES & EmComm ACS Drill will be on Saturday, May 4, 2024, from 0900 to 1200 hours. The scenario for this drill will be civil unrest.

As in recent drills, we will assume that our repeaters are not operational. All operations will be at field locations, using simplex frequencies for FM voice and peer-to-peer Winlink. Operations at home locations will be limited to battery or generator power. EOC operations will assume using backup generators.

The first part of the drill will be for city and county net controls to call their own members on their primary simplex frequencies and receive short simulated reports of civil unrest. The last part of the drill will be for OCRACES net control to call each city and EmComm unit on 146.595 MHz simplex and ask for a report on the number of members who checked in on their simplex frequency and for city requests for resources that are not locally available. OCRACES net control will also be active on 60 meters to take requests for resources and to communicate with Cal OES and surrounding counties to request resources that are not available in Orange County. The exact time schedule for these segments and other details will be announced in the drill plan, to be released in April.

The Winlink portion of the drill will utilize the peer-to-peer (P2P) mode, and may extend to about 1500 hours. Cities may report their check-in results using the Field Situation Report form, and may request resources from the county via Winlink rather than via voice simplex. ✸

Ameritron Introduces LDMOS 1.2 kW Amplifier

Replacing the ALS-1306, Ameritron now offers the ALS-1406 LDMOS amplifier, covering all ham bands from 1.5 to 54 MHz with 1,200 watts PEP output. It provides automatic band switching with no tuning, no warmup, no tubes, and quiet operation. Just 100 watts drive gives the full rated 1200 watts output.

Two NXP M/RFE6VP5600 H LDMOS transistors are mounted on dual heavy-duty heat sinks arranged to spread heat out over a large surface. The RF deck operates at 50 volts for efficient, low-distortion linear RF power service. The speed of its quiet fan is regulated by temperature sensors.

SWR protection prevents amplifier damage if you switch to a wrong band, use the wrong antenna, or have high SWR. If forward or reflected output power exceeds a safe level, then output power is automatically reduced to prevent amplifier damage by controlling ALC to the exciter.

Automatic band switching reads band data from your transceiver (with optional interface cable) and automatically changes bands with the transceiver.

Its LED-illuminated meters include a cross-needle SWR/wattmeter and a meter that indicates SWR, PA balance, and current.

Front-panel ALC control enables adjusting of output power.

The amplifier has band switch, ALC, SWR, PA and TX LED indicators.

Amplifier dimensions are 10 inches wide by 6½ inches high by 18½ inches deep. Weight is 22 pounds. It is powered by a separate

Ameritron ALS-1306 LDMOS 1.2 kW amplifier.

regulated switching power supply, with a pre-wired cable to plug into the amplifier. The supply measures 10 inches wide by 6½ inches high by 9½ inches deep. It weighs 12 pounds. Output is 50 VDC at 50 amperes to the ALS-1406. It is wired for 220 VAC, selectable to 110 VAC. It draws less than 25 amperes at 110 VAC or 12 amperes at 220 VAC. ✸

Bob Heil, K9EID, Silent Key

The popular Heil microphones are used in ham shacks worldwide, including many home stations of RACES members. The founder of Heil Sound, Bob Heil, K9EID, has become a silent key at the age of 83. He was an ARRL Life Member and in the ARRL Maxim Society. A Facebook post from Heil Ham Radio paid tribute to their founder: "Bob fought a valiant, yearlong battle with cancer, and passed peacefully surrounded by his family."

Bob Heil, K9EID, silent key.

Heil founded Heil Sound in 1966, through which he created the template for modern concert sound systems for musicians like the Grateful Dead, The Who, Joe Walsh, and Peter Frampton. The talk box used on iconic live record *Frampton Comes Alive!* was of Heil's design. His audio engineering products have been featured in the Rock & Roll Hall of Fame, and he was honored in 2007 with the Parnelli Audio Innovator Award for his impact on the live sound industry. "My life has been about achieving great sound, whether on the concert stage or in the amateur radio world," Bob Heil recounted in 2022. "I've watched Heil Sound go from a regional sound company to a world-class microphone manufacturer. This company has been my passion," he said.

Parallel to his commercial and artistic success in live music was his passion for amateur radio. He was active in ham radio from a young age and merged his expertise in audio engineering with his love for radio. Heil Ham Radio was founded to produce microphones, headsets, and other gear for radio amateurs, focusing on high-quality audio.

Heil was known as a mentor who enjoyed helping others find success in ham radio. Recently, his grandson Charlie Hartley, KF0OOP, became a licensed ham to surprise Heil for his birthday. The pair attended the ARRL Midwest Convention/Winterfest in St. Louis, Missouri, on January 27, 2024.

Heil was a generous donor to amateur radio organizations, including ARRL. Recently, he donated a host of new audio gear to the Hiram Percy Maxim Memorial Station, W1AW.

Heil was known for his passion for AM operations. He served for many years as an on-camera host of the Ham Nation podcast. ✸

Hams to Operate on International Marconi Day

April 27, 2024, is International Marconi Day (IMD). Italian inventor and electrical engineer Guglielmo Giovanni Maria Marconi was born on April 25, 1874, and is credited for inventing the radiotelegraph system, creating Marconi's law, and sending the first wireless transmission over the open sea.

IMD was created to honor Marconi and is hosted annually by the Cornish Radio Amateur Club, GX4CRC, in Cornwall, England. The purpose of the day is for amateur radio enthusiasts around the world to contact historic Marconi sites using communication techniques similar to those that he would have used.

The 24-hour event will operate from 0000 UTC to 2359 UTC, and registration is required. Participants can register at GX4CRC's registration web page.

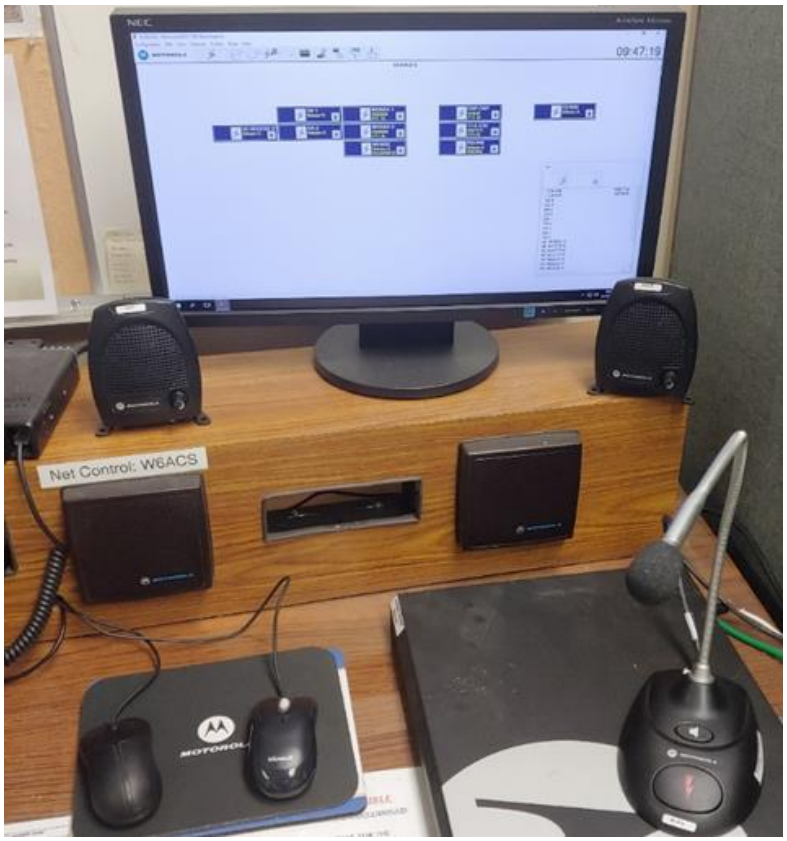
Stations in the United States, including Marconi Cape Cod Radio Club, KM1CC, in Massachusetts, are already registering for the event. KM1CC hosts several on-air events each year to keep the accomplishments and story of Marconi and his wireless station site in South Wellfleet alive. In 1975, the Wellfleet station was listed as a National Historic Landmark on the National Register of Historic Places and is now part of Cape Cod National Seashore, a unit of the National Park Service. When possible, KM1CC sets up a temporary radio station inside the park. More information about KM1CC is available on their Facebook page.

✸

OCRACES Members to Get Console Training

by Robert Stoffel, KD6DAQ

Long-time OCRACES members recall staffing the RACES radio room at the Orange County EOC during EOC activations, and, in more recent years, after a public-safety radio console was added to the room, RACES personnel were tasked with monitoring and transmitting messages over both public-safety and RACES amateur radio channels. This operation was paused during the pandemic, but is now returning, and, soon, interested OCRACES members will be provided training on the operation of the radio console, as well as protocols and procedures for the various public-safety radio systems. While optional, this training is required for any RACES member that would like to fill this role during an EOC activation.



Public-safety radio console inside the RACES radio room.

The radio console is a computer, and members will receive training on how to power it on, log in, and operate the many functions and features of the console system. We will also learn about the various public-safety radio channels that are routinely monitored by OCRACES during an EOC activation, including OA-1 (a simplex, VHF low-band channel, installed in most City and County EOCs), OA-2 (a simplex, VHF low-band channel, installed in many school and special district EOCs), WEROC-1 (a trunked 800-MHz channel, installed in most municipal water and water district EOCs), OC ACCESS V (a repeated, VHF high-band channel, used for the sending of alert and warning messages, interoperability, and installed in a small number of EOCs where reliable coverage is not possible on the OA1 and OA2 channels), 11A EOC (a trunked 800-MHz channel, used by personnel to communicate with their EOC), CESRS (a repeated, VHF high-band channel, used as a backup to communicate with the State Regional EOC in Los Alamitos), and other channels based on the type of incident. The training will start in May, and more information will be provided at the April 1, 2024, OCRACES meeting. ✸

FCC Requires Two-Factor Authentication

The Federal Communications Commission (FCC) has announced an upcoming change to the Commission Registration System (CORES) that licensees use to pay any application or regulatory fees, manage or reset a password on an existing FCC Registration Number (FRN), or request a new FRN. Implementation of multifactor authentication began on March 29, 2024. Users are prompted to request a six-digit secondary verification code, which will be sent to the email address(es) associated with each username. The user will then need to enter the code into CORES before they can continue.

In a public notice, the FCC said this change will make the system more secure. “This additional layer of security will further safeguard against unauthorized access, thereby enhancing the overall integrity of information contained within the CORES system and improving the security of user data,” it read.

The FCC recommends that users confirm they have access to their username account email and to add a secondary email address, if need be.

Resources are available for those who need assistance with the system. For inquiries or assistance regarding the implementation of multifactor authentication on CORES, submit a help request at https://www.fcc.gov/wtbhelp, or call the FCC at 877-480-3201 (Monday through Friday, 8 a.m. to 6 p.m. ET).

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Countywide RACES/EmComm News

"RACES/ EmComm News" provides an opportunity to share information from all City & County RACES/ACS units and EmComm organizations and supportive amateur radio clubs in and near Orange County, as well as from Cal OES and federal agencies.

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

kbourne.ocsd@earthlink.net

Sam Bernardino Microwave Society

On March 21, 2024, Doug McCommins, WA6RLR, and Dwayne Sinclair, AB6A, made contact on 10 GHz between San Clemente and San Pedro, using Icom IC-905 portable microwave transceivers at both ends, Down East Microwave 3-watt amplifiers, and the same dishes and mounts. Each were 59 on both USB and FM. They coordinated via logger.hb9.ch 10 GHz Terrestrial Channel.

Eclipse Operations

In the last issue of *NetControl*, we mentioned the Ham Radio Science Citizen Investigation (HamSCI) experiments that will occur on April 8, 2024, during the total solar eclipse stretching over 14 states from South Texas to Northeastern Maine. California will not experience the total eclipse, but we find what will occur to be quite interesting.

HamSCI is leading the Solar Eclipse QSO Party that will allow radio amateurs to participate in propagation research by operating during the eclipse and submitting their logs. Much of that activity will be focused on the FT8 frequencies of the non-World Administrative Radio Conference (WARC) HF bands, but all modes will be welcome during the event.

In preparation for the event, many state emergency management agencies are adding staff and have called on local hams to provide communication services via HF nets and locally on VHF/UHF frequencies. Numerous planning meetings, exercises, and preparations are occurring across the country. The ARRL Emergency Management department has worked with ARRL Section Emergency Coordinators and Section Managers in the directly affected areas to collect the frequencies each Section plans to utilize, and to assist in any frequency conflicts. Hams across multiple states and ARRL Sections have been practicing their communications capabilities via Winlink, SSB, and CW.

Orange County Amateur Radio Club (OCARC)

The next meeting of the Orange County Amateur Radio Club will be on Friday, April 19, 2024, at 7:00 p.m., at the American Red Cross (George M. Chitty Building), 600 Parkcenter Drive, in Santa Ana. The guest speaker will be Dick Norton, N6AA, ARRL Southwestern Division Director. Dick will bring everyone up to date on ARRL news. Interested on-line visitors can receive Zoom sign-on information on the day of the meeting by an email link that will be provided at https://www.w6ze.org after 9:00 a.m.

OCRACES 60-Meter ACS Net

Phil Wahl, W6YLD, Silent Key

Phil Wahl, W6YLD, SK.

Phil Wahl, W6YLD, was an active and valued member of the OCRACES 60-meter ACS net, which occurs every Saturday at 1000 hours, covering the Cal OES Southern Region, with an average of more than 25 weekly check-ins on 5371.5 kHz upper sideband. We were wondering what happened to Phil, since he had not been checking in from Santa Maria since December 23, 2023. Stan Bailey, WA6NFE, who is also an active net member from north of Escondido, checked online and sadly discovered that Phil had become a silent key on January 9, 2024, at the age of 99. Even at that age, Phil stayed sharp with a clear voice and made many friends on our net and with other radio amateurs in Santa Maria. He was always happy to share his vast knowledge of radio-electronics.

Phil was born on April 30, 1924, in Los Angeles. He joined the U.S. Army Air Force and served in Adak, Alaska, during World War II, before his honorable discharge as a Sergeant in the 23rd Air Service Group. He was a graduate of UCSB and earned his Master's degree at USC. He was a professor of electronics at Allan Hancock College from 1949 to 1989.

Phil's lifelong passion was amateur radio, from the time he was a teenager. He held an Extra Class license. He communicated all over the world twice a day into his last week of life, and practiced his Morse code daily. We miss Phil on our 60-meter nets.

April 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 Weekly 2 m ACS Net & OCRACES Meeting	2	3	4	5	6 Weekly 60 m ACS Net
7	8 Weekly 2 m ACS Net	9	10	11	12	13 Weekly 60 m ACS Net
14	15 Weekly 2 m ACS Net	16	17	18	19 Orange County Amateur Radio Club Meeting	20 Weekly 60 m ACS Net
21	22 ACS Nets on 4 Bands	23	24	25	26	27 Weekly 60 m ACS Net
28	29 Weekly 2 m ACS Net	30				

Upcoming Events:

- **April 1, 1930-2130 hours:** OCRACES meeting, in-person at OC EOC, Loma Ridge
- **April 8, 1400-2400 UTC:** HamSCI Festivals of Eclipse Ionospheric Science
- **April 19, 1900 hours:** Orange County Amateur Radio Club meeting, American Red Cross (George M. Chitty Building), 600 Parkcenter Drive, Santa Ana
- **May 4: 0900-1200 hours:** City/County RACES & EmComm ACS Drill
- **May 8, 1830 hours:** Orientation for PSR Applicants, Sheriff's Regional Training Academy, Tustin

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 (down for repair)
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)
*Primary Net—Mondays, 1900 hours

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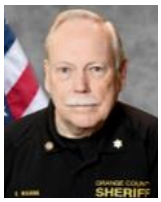
"W6ACS ... Serving Orange County"

Meet Your County of Orange RACES Members!

Officers



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NJ6R

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KM6RTE

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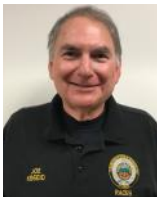
KW6B

Ryan Moore
KN6WSJ

Ron Mosher
K0PGE

Fran Needham
KJ6UJS

Chi Nguyen
KE6MVS



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