

July 2025



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Newsletter of the County of Orange Radio Amateur Civil Emergency Service

CRO's Nest

by Ken Bourne, W6HK, Chief Radio Officer Emeritus

Solid-State Batteries

Recently invented solid-state batteries are getting lots of attention for use in electric vehicles (EVs). They use a solid electrolyte instead of the liquid or gel found in traditional lithium-ion or lead-acid batteries. Advantages include higher energy density (more power in a smaller, lighter package), improved safety (less risk of leakage, fire, or thermal runaway), longer lifespan (more charge cycles before degradation), and wider temperature tolerance (useful for field operations in extreme conditions). In addition, solid-state batteries have the potential to be recharged faster than conventional batteries in certain conditions, and could be used in a wide range of applications. But are they practical for amateur radio and RACES applications?

Solid-state batteries are significantly more expensive than lithium-ion (Li-ion) and lithium iron phosphate (LiFePO₄) batteries, which are more expensive than sealed lead acid (SLA) batteries. LiFePO₄ batteries in particular are increasingly preferred because of their light weight, long cycle life, and safety. SLA batteries remain popular with radio amateurs because of their lower cost, although heavier and less safe. Besides high cost, solid-state batteries have mechanical and interfacial instability and dendrite formation.

Solid-state batteries are not widely available in amateur-radio-compatible configurations. They may require DC-DC converters or custom power management. Soon you will be able to experiment with

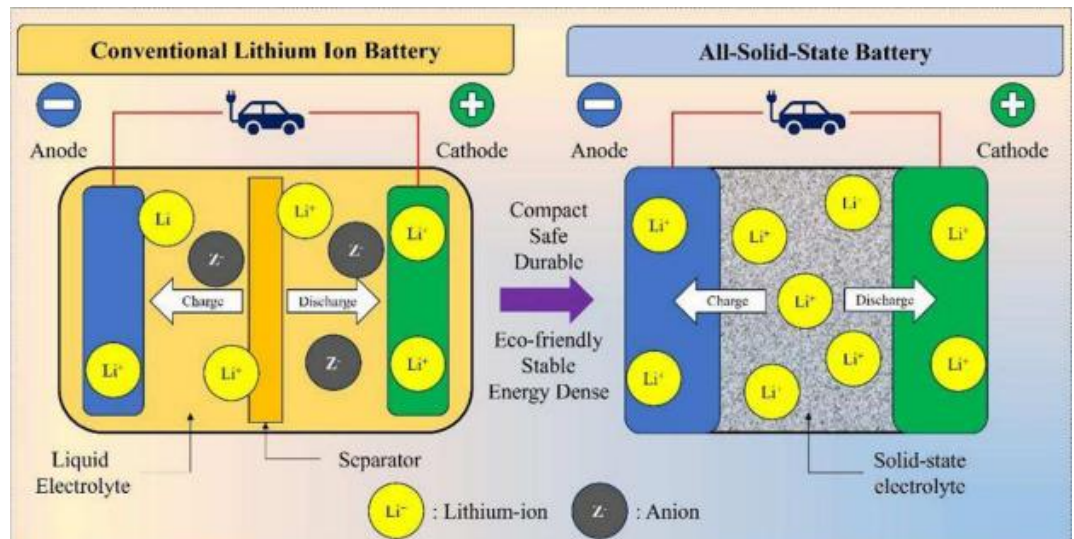
Next OCRACES Meeting

Monday,
July 7 2025,
7:30 p.m.

Online on Zoom

The 2025 Eaton Fire
Incident—Lessons
Learned

Orange County Sheriff's Department
Emergency Management Division



Comparison of conventional lithium-ion and all-solid-state battery. (Courtesy Applied Energy.)

(Continued on page 2)

CRO's Nest *Continued from page 1*

them for portable or emergency setups.

As shown in the figure on the previous page, provided by *Applied Energy*, traditional lithium batteries use liquid electrolytes, which allow the ions to be transported between the electrodes. On the contrary, solid-state batteries do not have any separator layer between the electrodes as they use solid electrolytes that separate the electrodes.

Electrode materials (for the anode, cathode, and interfaces) are being studied and play a vital role in terms of high ionic conductivity and lower electronic conductivities. As pointed out by *Applied Energy*, the cathode/solid electrolyte interface is essential for the electrochemical process of solid-state batteries, as it significantly influences ion transport kinetics. The solid electrolytes in solid-state batteries provide enhanced thermal stability and greater durability relative to liquid electrolytes. The material properties exhibit significant variation due to several environmental variables, including ambient temperature, surrounding pressure, and humidity. The choice of materials primarily hinges on the intended use of the batteries.

Applied Energy says that battery degradation mostly corresponds with the cycling life of the batteries and is influenced by various elements, including internal resistance, C-rates, battery chemistry, and temperature. The driving range and state of health of batteries directly depend on the discharge capacity of the electric vehicle's battery pack, prompting the exploration of several approaches to enhance the cycling life of solid-state batteries. The degradation of solid-state batteries is a complex issue encompassing materials, interfaces, structural integrity, and electrochemical processes. A recent study aims to explain the many degradation mechanisms in solid-state batteries, such as dendrite formation, oxygen vacancy generation, grain boundary movement, electrolyte decomposition, and metal anode deposition. Several researchers have proposed methods to increase the cycling life of the solid-state batteries by reducing the degradation, including using ceramic/polymer electrolytes, lowering electronic conductivity, and using materials with high shear modulus. This increase in the cycling life of solid-state batteries proves them to be a great choice for using them effectively for their secondary life usage, which proves their contribution towards circular economy and sustainability. Some researchers also discussed the recycling methods of solid-state batteries and the positive effect of their increase in cycling life on material recovery. A thorough understanding of the electron and ion transport mechanisms, thermodynamics, and kinetics that take place under various operational situations is necessary for designing and improving these systems. Therefore, a variety of modeling techniques are employed to facilitate the comprehension of defects

and the enhancement of solid-state batteries.

To accelerate the development of solid-state batteries, many electrochemical modeling tools are employed, aiding researchers in examining the impacts of diverse materials and degradation mechanisms.

Although solid-state batteries can be charged at higher C-rates than conventional Li-ion batteries, they still face several challenges, including Li formation and penetration, interfacial resistance, SSE (sum of squares error) decomposition under high over potential, and inhomogeneity in Li-ion diffusion due to significant polarization. Some additional inherent challenges include the control of heat produced during charge, electrode electrochemistry, interface development and stability, ionic transport within solid electrolytes, and temperature variation effects.

Recent breakthroughs have increased the possibility of solid-state batteries to be available for amateur radio use soon. Researchers are making progress on lithium dendrites—one of the biggest safety issues—by engineering multi-layered electrolytes. These designs deflect cracks and prevent short circuits, allowing for higher current densities and safer operation. Faster charging is another breakthrough. Harvard scientists developed a composite anode using micron-scale silicon particles, enabling uniform lithium plating. Their prototype cell recharged in about 10 minutes and sustained over 600 cycles. Solid-state batteries can pair solid electrolytes with lithium metal anodes, packing more energy into smaller volumes. This means longer runtimes for devices and extended range for EVs. Commercial momentum is contributing to the development of solid-state batteries, which eventually might be practical for amateur radio applications. Tesla claims it is launching an aluminum-ion solid-state battery, aiming for better energy density, faster charging, and enhanced safety—potentially leapfrogging competitors like BYD in China. These innovations aren't just for electric vehicles—they could eventually benefit amateur radio and RACES setups, portable electronics, and renewable energy storage.

Huawei in China announced it has a new solid-state battery patent. Its sulfide-based solid-state battery offers driving ranges up to 2,000 miles and ultra-fast charging in just 5 minutes. The patent outlines a solid-state battery architecture with energy densities between 400 and 500 Wh/kg, potentially two to three times that of conventional lithium-ion cells. The filing also details a novel approach to improving electrochemical stability: doping sulfide electrolytes with nitrogen to address side reactions at the lithium interface, a long-standing obstacle to the commercialization of sulfide-based batteries. Ultra-fast charging infrastructure isn't viable yet, and the technology is still in early development. ★

Next OCRACES Meeting: July 7th at 7:30 p.m.

The next County of Orange RACES meeting will be on Monday, July 7, 2025, at 7:30 p.m., on Zoom. This is in accordance with the new OCRACES schedule of meetings, whereby every three months an online (Zoom) meeting will be open to everyone, with special invited guest speakers presenting various topics of interest to EmComm operators.

The meeting title for the July 7th Zoom meeting will be ***“The 2025 Eaton Fire Incident—Lessons learned from two amateur radio operators.”***

The presenters include:

- Oliver Duffy, K6OLI, ARES LAX District Emergency Coordinator for the Northeast District
- John Pollard, KM6TKJ, ARES LAX Assistant District

Emergency Coordinator for the Northeast District (John lost his house in the fire)

Key topics include:

- The LAXNORTHEAST response and emergency communications during the event.
- The challenges the Eaton Fire posed, and the response of the amateur radio community.
- Lessons learned about preparedness and community cooperation in emergencies.
- Plus much more.

This meeting is open to all radio amateurs. The Zoom link will be emailed to everyone on the OCRACES main Groups.io list. ★

Welcome Bill Griffin, KO6JHY, to OCRACES

We are pleased to welcome William “Bill” Griffin, KO6JHY, as our newest OCRACES member. Bill is a new ham—he got his Technician Class amateur radio license on May 16, 2025—and became an OCRACES member on June 2nd. He has participated in OCRACES activities for a couple of years, including meetings and drills, where he worked as a scribe while the RACES operator was receiving drill messages. He has wanted to be a member for quite a while, and now that he has his ham license, he is already showing his enthusiasm in serving and participating in our activities.

Bill is not new to the Orange County Sheriff’s Department. He has been a Professional Services Responder (PSR) for 24 years and is a member of the OCSD Aero Squadron Reserve Unit. He is also a Director/Treasurer of the Orange County Sheriff’s Museum & Education Center.

Bill is busy programming his radios for all OCRACES 2-meter and UHF repeaters and simplex frequencies. Give KO6JHY a call when you hear him on the air, and you will enjoy communicating with him.

Bill has lived in Orange County since the mid 1970s, attending Ball Junior High, then Loara High School, and graduating with a Business Administration, Finance, degree from California State University Fullerton (CSUF).

Bill has been married to his wonderful wife Pilar for 28 years. They have raised two sons Fernando and Frank, and have three grandchildren, James, Bradley, and Elizabeth.

Bill has been in the banking industry for over 25 years, and has managed several offices and personnel. He currently works for Hanmi Bank, a national bank. Bill is a commercial banker specializing in large complicated commercial real estate and business financing and VIP client

relations nationwide.

Besides his OCSD activities, Bill has been involved in many organizations. He volunteers with the Friendly Center of Orange County for events and Financial Literacy Training. He was previously on the Advisory Committee/Board of Directors for the Center for the Study of Emerging Markets, CSUF. He is a former Executive Board Member/Director of the Orange Chamber of Commerce and is a member of the Chamber’s Legislative Action Committee. He is a former member of the Irvine Chamber of Commerce, Newport Beach Chamber of Commerce, Tustin Chamber of Commerce, and South Coast Metro Alliance. He is a previous member of several related committees. He is also a former member of the California Association of Community Managers and is a former Director of the CSUF Finance Association.

Bill contributes to several charities, including the Friendly Center as a volunteer, Shoes That Fit, and the Down Syndrome Association of Orange County (DSAOC).

Bill’s life is centered on serving and loving others. He has a warm and enthusiastic personality, and will be a great morale booster in OCRACES. Welcome aboard, Bill! ★



Bill Griffin, KO6JHY.

Hams Support Thunderbird & Whale Exercise

*by Westminster RACES Member Dong Ha, KJ6MBC,
and OCRACES Member Chi Nguyen, KE6MVS*

On June 7, 2025, the United States Volunteers-Joint Services Command (USV-JSC) executed a large exercise called “Thunderbird & Whale Emergency Exercise 2025” to test the groups’ capability. Base operations is headquartered in Washington State. Those who reside closer to headquarters were asked to test out many means of communication. USV-JSC was tapped to expand the capabilities. Over a half dozen regional command (RC) groups were activated, each with their own capacity. The 9th RC in Southern California was able to communicate via amateur radio using Winlink and Digital Mobile Radio (DMR) technology. The activation was a great test as some weak points were found by headquarters and 9th RC. Basic amateur radio communication was radio to radio on a matching frequency and limited in distance. The DMR radio reached out via a repeater that tied into the internet. User IDs and group IDs matched up end to end. Similar to traditional radio, the frequencies from radio to repeater matched but that only applies to that individual station. Other stations may be on different frequencies pairing with the goal of reaching the internet. The added complexity allows communication to reach nationwide and worldwide but every piece of the



Chi Nguyen, KE6MVS, OCRACES (left), and Dong Ha, KJ6MBC, Westminster RACES (right), provide Winlink and DMR communications to 9th Regional Command in Hemet during the United States Volunteers-Joint Services Command Thunderbird & Whale Emergency Exercise 2025.

puzzle was supposed to work. The 9th RC was activated to work out of a new location in Hemet, bringing challenges of finding reachable repeaters. This was a struggle with unfavorable terrain. As backup, DMR hotspots were used. While voices were heard, it was not as clear and reliable compared to working within a well-established location with more solid network infrastructure.

Winlink played an important role in the exercise by enabling the rapid and accurate transmission of email messages to multiple recipients within the group. Due to the remote location

of the 9th RC this year, we were unable to find a usable local packet RMS gateway and instead relied on telnet as a planned backup method. Several built-in Winlink forms were utilized, including ICS-213, Check-In, Check-Out, and SITREP. A total of 9 Winlink messages were sent, and 13 messages were received.

One key takeaway from the debrief was the importance of selecting a well-positioned Emergency Operations Center (EOC) to greatly enhance transportation, logistical support, and communication capabilities.

★

SAM Improves Clarity and Signal Stability

SAM (synchronous amplitude modulation) is a radio model often used in software-defined radios (SDRs) and high-end communications receivers. It is a refinement of traditional AM, designed to improve audio clarity and signal stability. In standard AM, the receiver uses the original carrier signal to demodulate the audio. If that carrier is distorted or fades due to propagation, the audio suffers. SAM generates a new, stable carrier that is synchronized with the original. This synthetic carrier helps the receiver lock onto the signal more reliably, reducing distortion and fading effects.

SAM improves clarity, which is especially useful when the original AM signal is weak or distorted. It also improves selectivity. Some SAM implementations let you choose between upper sideband (USB), lower sideband (LSB), or both, helping reduce adjacent channel interference. Enhanced intelligibility makes received transmission more clear.

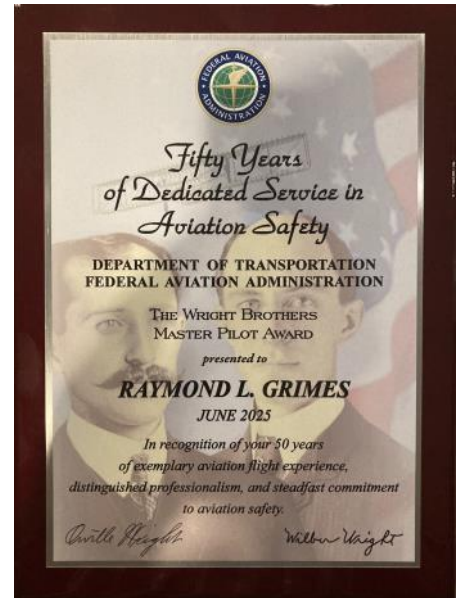
SDR software like SDR Console or SDR# often includes SAM as a selectable demodulation mode. ★

Ray Grimes, N8RG, Receives FAA Award

On June 18, 2025, Ray Grimes, N8RG, was presented with the FAA's prestigious Wright Brothers "Master Pilot Award" for 50 years of continuous safe airplane flight without any accidents or violations. Ray has accrued almost 6,800 flight hours in airplanes and maintains an FAA Commercial Pilot license. Ray served in the Orange County Sheriff's Aero Squadron for 28 years and as the unit captain for 13 years, retiring in September, 2024. Ray is now a member of the Yavapai County Sheriff's Air Group (Prescott, Arizona) and serves as a volunteer pilot. Ray is a former member and Chief Radio Officer of OCRA-CES. He is also a Founder/Director of the OC Sheriff's Museum & Education Center. ★



Ray Grimes, N8RG (left), receives FAA 50-year "Master Pilot Award."



Wright Brothers Master Pilot Award for 50 years of aviation safety.

FlexRadio Introduces Aurora Series

FlexRadio has introduced the Aurora Series—a new family of HF/6-meter transceivers featuring an integrated 500-watt SDR transmitter, automatic antenna tuner, and AC/DC power supply (80-264 VAC, 47-63 Hz, PF > 0.94) and standard IEC plug. Modes include SSB, CW, AM, SAM, FM, RTTY, and digital. Models include the AU-510 (\$6,199.00 MSRP), AU-510M (\$7349.00), AU-520 (\$8,599.00), and AU-520M (\$9,599.00).

The 500-watt transmitter module (200 watts on 6 meters) achieves up to 90% efficiency, surpassing conventional MOSFET and LDMOS designs, which typically operate at 40-50%. The entire 500-watt transmitter fits in the same physical envelope as traditional 100-watt power amplifier systems and runs as cool.

The AU-510/520 models rely on a laptop or PC, iPad, or iPhone for display and controls. The AU-510M/520M models have a Maestro display/control panel with an 8-inch 1920



FlexRadio AU-520M 500-watt SDR transceiver with Maestro display/control panel.

× 1200 IPS display and external monitor port.

The 510 Series has two independent band/mode receivers, and four in the 520 Series. The radios have full-duplex crossband operation. The 510 Series has one receive-only port, and two ports in the 520 Series for true diversity reception. The 510 Series has one transverter/exciter port, and two in the 520 Series. The 520 Series has integrated SO2R Solution (QTRSP) support in one radio and contest band filters >50 dB rejection band-to-band.

The 510 Series has a direct sampling SDR of 122.88 Msp/s, 16 bit, and 245.76 Msp/s in the 520 Series. Dynamic range in the 510 is >145 dB and >155 dB in the 520. All models feature 115 dB 2 kHz RMDR, 10 MHz reference signal, integrated GNSS receiver with antenna to maintain radio frequency with no adjustments, and optional GPSDO to output 10 MHz for external equipment. ★



FlexRadio AU-510M 500-watt SDR transceiver.

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



Orange County Sheriff's Department Mutual Aid Bureau

Sgt. Nate Beyer, who has administered the PSR Program (including OCRACES) from within the Sheriff's Mutual Aid Bureau, Special Operations Division, was transferred to the Field Training Bureau, Southeast Operations, on May 30, 2025. From that date, Deputy Myles Taylor was the temporary point of contact for the PSR Program-related matters until Sgt. Mike Evans became the new PSR Coordinator on June 13, 2025, including the administration of OCRACES PSRs. Sgt. Beyer said that Sgt. Evans “has consistently demonstrated exceptional leadership, dedication, and a deep commitment to public safety. Sgt. Evans has developed extensive expertise in law enforcement operations, community relations, and team management. His ability to handle high-pressure situations with calm professionalism and sound judgment were some of the reasons he was the best person for this position.”

Hiking Hams Report Fire Just in Time *by John Ross, KD8IDJ*

With the help of amateur radio operators, a potential wildfire was averted in California on June 12, 2025. Hams often operate from remote locations, and several of them wound up in the right place at the right time while preparing to participate in the 2025 ARRL June VHF Contest.

Robert "Bobby" Debevec, W6IWN, and Jacob T. "Jake" Graham, KC7WDX, both ARRL members from the Reno, Nevada, area, were hiking on the Grouse Ridge Trail in California, a section of the Tahoe National Forest. In addition to getting ready for the contest, they had hoped to also activate several Summits on the Air (SOTA) locations. Their day of using the Amateur Radio Service for recreation was going well until they saw smoke near the Black Buttes area and had to use it for its utility value.

Debevec captured the event on video, and posted it to his YouTube channel.

“I was surprised to see smoke ahead of us,” said Graham. “As we got closer, it was clear there had been a lightning hit several days ago and we could also see flames.”

Wireless service is spotty in portions of

the eastern Sierra, and they didn't have a cell signal, so Debevec used his handheld ham radio to report the fire on a nearby repeater. In just seconds, Dan Patterson, W6AI, responded back. He was monitoring the Nevada County Amateur Radio Club linked repeater system in Grass Valley, California, and heard the call. He took the GPS coordinates from Graham and notified the U.S. Forest Service.

“We were monitoring the U.S. Forest Service and it only took about 10 minutes for them to dispatch a helicopter to the area,” said Graham. “We watched four firefighters rappel down followed by a pack of equipment. The pair then walked closer to the area and started talking to the crew, who thanked them for the report.”

“They put out the fires but radioed for a helicopter water drop, before they left on foot, with the gear, to a nearby pickup site,” added Debevec.

CHIRP Radio Programming Software

Several OCRACES and city RACES and EmComm members use CHIRP for programming their radios, but some are finding that CHIRP often triggers false positives in antivirus software, especially with newer releases or certain USB cable drivers.

CHIRP is a volunteer-driven project that releases updates often. Antivirus tools may flag these as “unrecognized” or “low reputation” files. Many programming cables use unsigned drivers that antivirus software sees as suspicious, even though they are safe. If you didn't get CHIRP from the [official site](https://www.chirpmyradio.com), your antivirus might be reacting to a modified or bundled version. The official CHIRP site tells you how to work around an antivirus installation prevention.

You are urged to use the official CHIRP site. Always download from chirpmyradio.com to avoid tampered versions. Report false positives. Most antivirus programs let you mark a file as safe—doing this helps improve CHIRP's reputation. On Windows, click “More Info” and then “Run Anyway” if SmartScreen flags the installer. Check the publisher. Make sure it says “CHIRP Software LLC” when you run the installer. Anything else might be a red flag.

July 2025

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3 San Bernardino Microwave Society Mtg	4 Independence Day	5 Weekly 60 m ACS Net
6	7 Weekly 2 m ACS Net & OCRACES Meeting	8	9	10	11	12 Weekly 60 m ACS
13	14 Weekly 2 m ACS Net	15	16	17	18 Orange County Amateur Radio Club Meeting	19 Weekly 60 m ACS Net
20	21 Weekly 2 m ACS Net	22	23	24	25	26 OCRA-CES-Only Exercise
27	28 Weekly ACS Net on 3 Bands	29	30	31		

Upcoming Events:

- **July 3, 1900 hours:** San Bernardino Microwave Society Meeting, American Legion Post #216, 1024 S. Main Street, Suite B, in Corona
- **July 4:** Independence Day
- **July 7, 1930-2130 hours:** OCRA-CES Meeting on Zoom
- **July 18, 1900 hours:** Orange County Amateur Radio Club meeting, American Red Cross (George M. Chitty Building), 600 Parkcenter Drive, Santa Ana
- **July 26, morning:** OCRACES-Only Exercise

Mission Statement

- To provide emergency communication services for the County of Orange under the guidance of the Orange County Emergency Manager and Emergency Management Division Personnel



- These services include, but are not limited to:

- Support to the County of Orange Emergency Management Division with auxiliary communications capabilities from County Emergency Operations Center radio room and field locations to and from:
 - The general population,
 - Orange County city RACES, EmComm, and Public Service organizations,
 - Adjacent counties, and
 - State and Federal Government organizations
- Provide voice and digital communication services in the event of the loss of existing communications infrastructure including public service radio services, cellphone service, internet service, conventional power, and any combination of these services

County of Orange RACES Frequencies

60 m: 5371.5 kHz USB (dial) (Channel 4) (OC ACS Net—Saturdays, 1000 hours)
 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 (down for repair)
 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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<https://ocraces.org>
It's Where It's @!

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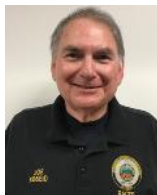
**"W6ACS ...
Serving
Orange County"**

Meet Your County of Orange RACES Members!

Officers ➡



Scott MacGillivray
KM6RTE



Joe Selikov
KB6EID



Scott Byington
KC6MMF



Randy Benicky
N6PRL

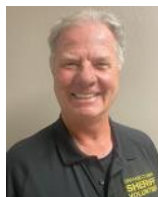
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Joel Bishop
AJ6ZP



Ken Bourne
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Eric Bowen
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KM6ZHO



Bill Griffin
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K0PGE



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