

September 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

Artificial Intelligence for Hams

During my early days in radio-electronics, I was fascinated with the design of HF, VHF, and UHF transmitters and receivers. Compared with today's designs, RF circuits were relatively simple to design or comprehend. Home-brewing an amateur transmitter or receiver was not beyond the capabilities of many amateurs, back in those "tube days." Transistors made our homebrew radios safer (lower voltage) and lighter. We thought that integrated circuits would make our designs simpler, because complete circuits were on a chip, but the overall system designs actually became more complex as technology advanced. Now, designing a state-of-the-art transceiver is a task for an electronics lab with a team of engineers familiar with highly advanced RF technology and software programming. Pretty soon, radios will kind of design themselves by means of artificial intelligence! That's almost scary!

According to Techtarget, artificial intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using the rules to reach approximate or definite conclusions), and self-correction. Particular applications of AI include expert systems, speech recognition, and machine vision.

Techtarget gives a couple of examples of how AI can be categorized. The first example classifies AI systems as either weak AI or strong AI. Weak AI (or narrow AI) is an AI system that is designed and

trained for a particular task. Virtual personal assistants, such as Apple's Siri, are a form of weak AI. Strong AI (or artificial general intelligence) is an AI system with generalized human cognitive abilities so that, when presented with an unfamiliar task, it has enough intelligence to find a solution. The second example categorizes AI into four types, from the kind of AI systems that exist today to sentient systems, which do not yet exist. The four types include reactive machines (such as some chess programs), limited memory (using past experiences to inform future decisions, not stored permanently), theory of mind (does not yet exist), and self-awareness (does not yet exist).

Machine learning could be applicable to amateur radio. Techtarget defines machine learning as the science of getting a computer to act without programming. Deep learning is a subset of machine learning that, in simple terms, can be thought of as the automation of predictive analytics.

Dan Romanchik, KB6NU, discusses how we can use machine learning in amateur radio on his blog at <http://www.kb6nu.com/can-use-machine-learning-amateur-radio/>. He refers to the book *Machine Learning: The New AI* by Ethem Alpaydin, which got him thinking about AI amateur radio applications. Dan mentions Mauri Niininen, AG1LE, who started a Kaggle competition to use machine learning to copy Morse code. Dan thinks that maybe he can use Amazon's Alexa technology to control his radio, such as saying, "Alexa, QSY to 7035 kHz, mode

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**The Next
OCRACES
Meeting Is**

**September 11, 2017
1930 Hours**

**840 N. Eckhoff St.,
Suite 104, in Orange**

**Severe Fire Weather
Patrol Refresher
Course by Kevin
McArthur, KK6JSG**



Orange County Sheriff's Department
Communications & Technology Division

Captain's Corner *Continued from page 1*

CW.” A little more ambitious project might be to collect data on troubles for a particular radio, or maybe antenna, and then use that database to diagnose problems.

On Dan’s blog, Dave New, N8SBE, said that cognitive radio comes to mind. “This is where a software-defined radio system learns how to receive/decode transmissions of all sorts. Or imagine two or more random stations that wish to find a mutual frequency and mode with good propagation, and use adaptive cognitive techniques.”

Jalil Vaidya, KC2YYY, on Dan’s blog, mentioned an aspect of machine learning that can be very useful to amateur radio, called Independent Component Analysis (ICA). “It can be used to separate out different streams of data that are independent of each other but are combined somehow in the data you get. For ham radio, it can be potentially used to separate out noise from the actual voice that we get in noisy communications. This is commonly illustrated by the ‘cocktail party’ example, where different microphones receive sounds from different sources, outputting combined sound. ICA is then used to separate individual sounds. A small unit made of Raspberry Pi or FPGA (Field Programmable Gate Array) that can take the noisy input from the radio and output only the voice stream can work wonders in ham radio.”

Last November, ARRL said that the dawn of so-called “smart”—or cognitive—radio has presented amateur radio with an opportunity to regain the leading edge in radio technology in the near future. It will also alter our view of spectrum as a limited resource. Those points and others were part of a seminar presentation, “Spectrum (it’s the frequency crunch for real),” by Michelle Thompson, W5NYV, and Bob McGwier, N4HY, at the 2016 ARRL and TAPR Digital Communications Conference in St. Petersburg, Florida. Thompson heads the AMSAT Ground Terminal Team, a component of the Phase 4B geosynchronous satellite project. McGwier is chief scientist at the Hume Center for National Security and Technology at Virginia Tech.

“If you put the smarts in the radio, what can possibly go wrong?” quipped Thompson, pointing to an example that demonstrated how sufficiently complicated technology is also more likely to fail. Thompson said cognitive radio technology will alter the paradigm of treating spectrum as if it were land. “Spectrum is immediately reusable,” she said, “and land is not.” Regulation and spectrum allocation have been necessary to manage interference among services, but smart radios can avoid collisions among users, she said.

“It hasn’t been until fairly recently that we’ve been able to inexpensively and quickly reconfigure a radio,” she said. Thompson’s Phase 4B project will take ad-

vantage of cognitive radio technology, which can—among other things—determine an optimal clear frequency, mode, and path on the fly, transparently, and without human intervention.

McGwier called the computer “the tidal wave that has swept over amateur radio.” He predicted, “It is going to bring us back to becoming technical innovators.” He said radio amateurs “are uniquely situated to be the leading edge in radio again.”

McGwier said the innovation needed in amateur radio will come about through what he called “amateur radio freedom,” which encourages experimentation and thinking outside the box. “It’s the ultimate democratic assignment of frequencies in the world,” he said. He painted a picture of intelligent radio technology that will operate like the human brain. “It’s going to design the radio on the fly, from scratch, without a subject-matter expert involved,” he said. “The radio will be done by AI from beginning to end. The object becomes not the radio, but the activity it allows.”

However, are we creating a monster? Will AI-centered radios become more intelligent than us hams and RACES members? Will AI-controlled radios eventually communicate with each other, exchanging “rule the world” information, without human involvement? Is AI a threat?

“AI-phobes” argue that, if AI surpasses humanity in general intelligence, this new superintelligence could become powerful and difficult to control. They fear that a sudden and unexpected “intelligence explosion” might take an unprepared human race by surprise, and that controlling a superintelligent machine (or even instilling it with human-compatible values) may be an even harder problem than naively supposed.

Elon Musk, the CEO of Tesla and SpaceX, suggests that AI is a far greater threat than North Korea. He made that comment after President Donald Trump issued his “fire and fury” comments against North Korea. Musk has invested in a project that focuses on making AI technology open-source, to prevent control of AI by one company. He suggests that governments should understand and regulate the technology to protect the public’s safety. “I’m not advocating for that we stop the development of AI, or any of the sort of straw man, hyperbole things that have been written. I do think there are great benefits to AI. We just need to make sure that they’re indeed benefits and we don’t do something really dumb,” Musk said.

Warnings aside, I believe that banning AI research, whether in radio design or any other endeavor, would be a mistake. A thousand years from now, I might change my mind, not because AI kept me alive that long, but because my radio will be much smarter than me!

Next OCRACES Meeting: September 11th

The next County of Orange RACES meeting will be on Monday, September 11, 2017, at 7:30 PM, at OCSD Communications & Technology Division, 840 N. Eckhoff Street, Suite 104, in Orange. (This meeting is not on the usual first Monday of the month, due to the Labor Day holiday.) OCSD Senior Emergency Management Program Coordinator Kevin McArthur, KK6JSG, will refresh our annual Severe Fire Weather Patrol training at this meeting. Also at this meeting we will begin planning for the October 7th City/County RACES & MOU ACS Exercise.

Depiction Shuts Down

Depiction Inc., which produced the Depiction mapping, simulation, and collaboration software that was installed several years ago on all computers distributed to County and City RACES units for Winlink operations, has closed their Web store and will be shutting down their business soon.

The depiction owners are currently in negotiations with a company to take their IP and develop it into a new product. If this partnership comes to fruition, this new product might be compatible with existing Depiction files and might be available for existing Depiction users to purchase.

Because the Depiction owners do not know how well or if the other company would be able to support existing customers, it has been decided to create a new build of Depiction. This new build will be made freely available and will remove the licensing activation function. Depiction also hopes to add most of the add-ons into the main build. Depiction also currently hosts a few of the quick-start data sources on their server. Those quick-start sources will be removed. They are trying to make Depiction a standalone product that will continue to run independent of any external sources. However, Depiction does rely on external Web sites for geocoding, background tiling, quick-start sources, and other functions. These are accessed within Depiction via APIs (application program interfaces). These external Web sites from time to time change their API or stop providing the service. When this occurs, that function within Depiction will cease to work.

Hopefully, the new developer will have a new working version sometime in the near future that will keep things up to date. If the new developer does not create a new version in a timely manner or if the Depiction owners are not able to come to an agreement with them, then they will make the code open source and hopefully developers in the community would take on maintaining the software.

Depiction Inc. will be keeping their Web site up for a few more months and will be maintaining the e-mail addresses (richards@depiction.com) for a while longer, to answer questions. On the short term, you will be able to download the new build from <http://www.depiction.com/finalbuild> once it is available, which might be awhile.

As long as Depiction Inc. is able to maintain their servers, which may only be for a month or so longer, they will continue to be able to add activations to customers' licenses if they move to a new computer or have a hard-disk crash. However, once Depiction Inc. shuts down their servers, they will no longer be able to add activations nor will you be able to activate the software. When that happens, which may be soon, you will have to wait until the unlicensed version is available.

Depiction President Richard Smith has created a blog at <http://depictionmtm.blogspot.com>. He will try to keep this up for as long as necessary to provide the latest news on the status of the free version or other news of interest.

OCSD Family and Reserve BBQs: October 22

The Reserve Bureau BBQ will be merged into the OCSD Family BBQ, which was previously announced for October 1st. The revised date for the merged BBQ is October 22, 2017. Reserve Deputies, PSRs, Explorers, and Chaplains and their families will be free. Other OCSD personnel, such as sworn and professional staff (full or part-time and retirees), OCRACES members, and OC Sheriff's Advisory Council and immediate families (who are not reserves) will be charged \$10 per person, including children (immediate family only). The event will be held from 11:00 AM to 4:00 PM at Lakeview Park, 5305 Santiago Canyon Road, Silverado. Cash or check is acceptable. Make your check payable to "OC Sheriff Advisory Council" and mail to PO Box 28, Santa Ana, CA 92702, or pay in person at OCSD Headquarters, Community Programs, Marilyn MacDougall. Reserve Deputies, PSRs, Explorers, and Chaplains are to register (noting number of guests) on the Event Calendar on the Reserve Tracker Web site. Free parking is available. Food and drinks are provided (no alcohol allowed). Fun activities will be provided for all ages. Reservations must be made in advance by September 18, 2017.

KR6AFT Hides in Aliso Viejo

Delia Kraft, KR6AFT, was the fox on Monday, August 21, 2017, on the monthly cooperative T-hunt. She turned on the fox box immediately following the 2-meter OCRACES ACS net, hiding in the back patio room of Peppino's Italian Family Restaurant in the shopping center north of Pacific Park Drive and east of La Paz Road in Aliso Viejo. Delia is the Program Support Manager with OCSD's Communications & Technology Division. Hiding with Delia was Bob McFadden, KK6CUS.

Several days before the hunt, Delia announced she would hide in one of four cities in south county—Aliso Viejo, Lake Forest, Laguna Hills, or Mission Viejo. On her way to her hiding spot, she passed an accident on the I-5 Freeway, which delayed her drive.

However, she made it on time. Later, on their way to Alicia Parkway, where they wanted to start hunting, Ken Bourne, W6HK, and Dennis Brunning, KC6NVX, passed the same accident and ran over some accident debris. As they pulled off onto Alicia Parkway, Ken's front left tire went flat as a result of the debris. They immediately pulled into a gas station to assess the situation. Fortunately, Dennis had lots of experience in changing tires, and quickly got them ready to hunt. At that gas station, they took a bearing on the fox, which pointed straight down Alicia Parkway to the southwest. It was a good bearing, and after checking out an area north of Pacific Park Drive and west of La Paz Road, they crossed La Paz to the east and were the first to find the fox. Bearings were compared on the 448.320 MHz repeater, and Ron Allerdice, WA6CYY, who was in the vicinity, came in next. He was followed by the team of Patrick Williams, KJ6PFW, Eric Bowen, W6RTR, and Bill Rose, KA6HMS. It didn't take long for the fourth team to come in—Peter Gonzalez, KC6TWS, and Pete Bergstrom, K6PB. This was their first real experience with hunting, although Peter has been the fox on several previous cooperative T-hunts.

The next cooperative T-hunt will be held on Monday, September 18, 2017, immediately following 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 (while the 449.100 MHz repeater is down), 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 (second Monday in October). The hunts provide excellent practice in working together to find sources of interference quickly. The hunts are not official RACES events, so DSW (Disaster Service Worker) coverage does not apply. Please drive carefully!

Fox-hunt loops and beams are available from Arrow Antenna and HRO, including the Arrow Model FHL-VHF fox-hunt loop (covers 1 MHz to 600 MHz) and the Arrow Model 146-3 three-element portable hand-held yagi. The Arrow OFHA 4-MHz offset attenuator can be useful when close to the fox, to prevent receiver overload. An all-mode transceiver is quite useful, allowing hunters to switch to the SSB or CW mode for detecting extremely weak signals, or to switch in a built-in attenuator, reduce RF gain, or tune slightly off frequency when dealing with extremely strong signals. Some hunters use the DF2020T radio direction finder kit, which is a Doppler system available from Global TSCM Group, Inc. (<http://www.kn2c.us>). A very similar system is the MFJ-5005 Doppler direction finder. Other useful tools are the Fox-hunt app for iPhones and the Triangulate app for Android phones. For some excellent information on T-hunting, see <http://www.homingin.com>.



Gathered at Peppino's in Aliso Viejo to exchange "war stories" about the August 21st cooperative T-hunt were (left to right) Pete Bergstrom, K6PB, Dennis Brunning, KC6NVX, Peter Gonzalez, KC6TWS, Eric Bowen, W6RTR, Bill Rose, KA6HMS, Ron Allerdice, WA6CYY, Patrick Williams, KJ6PFW, Bob McFadden, KK6CUS, and Delia Kraft, KR6AFT (the fox).

City/County RACES & MOU Drill: October 7th

The next City/County RACES & MOU ACS Exercise will be on Saturday, October 7, 2017, from 9:00 AM until 11:00 AM. The scenario will be announced sometime in September, at the time of distribution of the exercise plan. As with the last exercise, OCRACES plans to deploy a field crew. We are considering whether to incorporate WebEOC into this exercise. Senior Emergency Management Program Coordinator Pricilla Cotton, KK6ULH, OCSO Emergency Management Division, provided WebEOC training at the August 7th OCRACES meeting, but has not yet provided a password to the system in order for us to explore and practice using it. Several City RACES members have also recently taken a WebEOC class at the Orange County EOC. Pricilla has asked for a list of at least two members from each City RACES unit, who are to be provided with the WebEOC password. Those listed must be approved by each City RACES Program Coordinator and submitted to OCRACES Chief Radio Officer Ken Bourne, W6HK, at w6hk@ocraces.org, with a copy to OCSO Emergency Communications Manager Lee Kaser, KK6VIV, at lee.kaser@comm.ocgov.com.

We are also considering whether to incorporate DMR into this exercise again. It was not successfully utilized during the last two exercises, and might be more of a distraction than a benefit, unless we can justify its use during an actual emergency.

Hams Respond to Hurricane Harvey

At least three dozen ARES volunteers pitched in to support communications at some Red Cross shelters in South Texas in the aftermath of catastrophic and unprecedented flooding resulting from Hurricane Harvey. Another dozen ARES members were on tap to serve as net control liaisons to the Harris County Office of Emergency Management.

A variety of emergency, health-and-welfare, traffic, and tactical nets in South Texas were active on HF as well as on a wide array of VHF and UHF repeaters. The Salvation Army Team Emergency Radio Network (SATERN) was active on 14.265 MHz, while the Military Auxiliary Radio Service (MARS) used the 5.3305 MHz USB interoperability channel on 60 meters.

ARRL South Texas Public Information Officer Mike Urich, KA5CVH, said that “hardening” of the telecommunications infrastructure to make it more immune to storm damage has diminished the need for amateur radio communications support and altered hams’ traditional role there. Urich pointed out, however, that the amateur radio telecommunications infrastructure in South Texas has remained analog, as “the lowest common denominator” of technology—VHF/UHF FM, and HF—and has the highest degree of interoperability. As of August 30th, Urich spent more than 40 hours alternating shifts at the Harris County EOC. He said the area’s extensive system of repeaters makes it possible for local radio amateurs to serve as “another set of eyes and ears” in spotting and reporting problems that require official attention.

Farewell to Nancee, N6ZRB, and Jim, KC6RFC

Jim Dorris, KC6RFC, has tendered his resignation to OCRACES. He said, “Between work and Nancee, I no longer have time to dedicate and it’s not fair to those that work so hard diligently supporting OCRACES. I truly regret that things have worked out like this. During the time I was able to be active with the group, it was one of the best experiences of my life. Best of luck to everyone going forward.”

Jim has been one of our most valued members, and we are very sad to see him go. He is extremely knowledgeable in computer technology, and was eager to help whenever and wherever he could. Many years ago, during our more aggressive T-hunts, he and his wife Nancee Graff, N6ZRB, were very active on the hunts and enjoyed the competition. Nancee was a member before Jim, and brought him aboard. She is one of the most dedicated and loyal members we have ever had. Unfortunately, her health deteriorated and she is no longer able to drive to our meetings, especially over the long distance from their home in Jurupa Valley.



Nancee Graff, N6ZRB, and Jim Dorris, KC6RFC.

We wish Jim and Nancee the very best, and we thank them for their many years of service to OCRACES.

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

Buena Park RACES

Bill Lovelace, K6MET, is now the Buena Park RACES Chief Radio Officer. John Eng, KI6BWU, is the Assistant Chief Radio Officer, and Jason Ho, KJ6VSV, is the Alternate Radio Officer.

Irvine RACES (IDEC)

Leo Keefe, N6YH, is now the IDEC (Irvine Disaster Emergency Communications) Operations Captain.

Hospital Disaster Support Communications System (HDSCS)

HDSCS has confirmation of a speaker spot at 2:00 PM on Saturday, September 16, 2017, at the ARRL Southwest Division Convention (HAMCON 2017). The presenter will be Dr. Sam Stratton, W5AGX, the EMS Medical Director for Orange County. He will discuss what medical and EMS staff want amateur radio operators to know and understand when in command centers and on patient care units. Dr. Stratton will also be with HDSCS members at their booth in the exhibit hall to answer questions about amateur radio support for hospitals. Those who provide or plan to provide backup communications to hospitals and any hospital disaster preparedness managers are encouraged to attend, and to check when arriving at the convention to verify the presentation time (which has been rescheduled twice). Dr. Stratton often provides education to HDSCS members to help them better understand various aspects of EMS response and specialized treatment issues.

HDSCS members are again participating in another "Out of the Woodwork" exercise. This periodic activity helps to encourage monitoring, become familiar with the different repeaters used by HDSCS, practice roundtable procedures, learn to match names with call signs, and develop skills in moving to different bands and using tactical frequencies.

HDSCS provided leadership attendance at the monthly Orange County Multi-Agency Disaster Meeting. Continued planning took place for the Statewide Medical and Health Exercise along with development

of some specifics for a National Defense Medical System (NDMS) drill to take place near the end of the year. After the meeting, the NDMS representatives from Camp Pendleton spent some time with HDSCS Coordinator April Moell, WA6OPS, to become familiarized with how HDSCS supports the Orange County hospitals and EMS so they better understand how they might best back up communications in the drill.

Orange County SKYWARN

Orange County SKYWARN Coordinator Scott O'Donnell, WX6STO, sent an e-mail at noon on Wednesday, August 2, 2017, advising that SKYWARN activation was requested for all counties. Ingredients were in place for a potentially high-impact day with flash-flood and downburst wind concerns.

Alex Tardy, who coordinates SKYWARN weather spotters from the National Weather Service in San Diego, advised them of WeatherReady Fest 2017 at the Discovery Cube in Santa Ana on Saturday, September 16th, just 3.5 miles from the location of the National Weather Association Annual Meeting in Garden Grove on the same day. Alex advised SKYWARN that they could have a free booth at WeatherReady Fest 2017, to join in the extremely gratifying process of sharing weather and preparedness information to families and children through games, activities, and exhibits. SKYWARN weather spotters could also volunteer to greet visitors and assist with vendor booth setup, assist aspiring meteorologists with the completion of the WeatherReady Fest Passport, or distribute information about weather safety and products. Go to <http://weatherreadyfest.com/> for information about WeatherReady Fest 2017.

Orange County Amateur Radio Club

The next OCARC general meeting will be on September 15, 2017, at 7:00 PM at the American Red Cross (George M. Chitty Building), 600 Parkcenter Drive, in Santa Ana. Michael Rickey, AF6FB, will talk on both the PAPA repeater system and D-STAR equipment and technology.

September 2017

Upcoming Events:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2 Weekly 40 m ACS Net
3	4 Labor Day (no meeting, no net)	5	6	7	8	9 Weekly 40 m ACS Net
10	11 Weekly 2 m ACS Net & OCRACES Meeting	12	13	14	15 HAMCON 2017	16 HAMCON 2017
17 HAMCON 2017	18 Weekly 2 m ACS Net & Cooperative T-Hunt	19	20	21	22	23 Weekly 40 m ACS Net
24	25 ACS Nets on Five Bands & Cal OES Nets	26	27	28	29	30 Weekly 40 m ACS Net

- **September 4:** Labor Day (no meeting, no net)
- **September 11:** OCRACES Meeting (Severe Fire Weather Patrol Training), 840 N. Eckhoff Street, Suite 104, Orange, 1930 hours
- **September 15:** Orange County Amateur Radio Club Meeting, American Red Cross (George M. Chitty Building), 600 Park-center Drive, Santa Ana; 1900 hours
- **September 15-17:** HAMCON 2017, Torrance Marriott Redondo Beach Hotel, 3635 Fashion Way, Torrance
- **September 18:** Cooperative T-Hunt on input of 2-meter repeater, 1920 hours
- **September 25:** ACS Nets on five bands and Cal OES Nets from OC EOC
- **October 7:** City/County RACES & MOU ACS Exercise, 0900-1100 hours
- **October 19:** Great Shakeout
- **October 22:** OCS D Family BBQ and Reserve Bureau BBQ, Lakeview Park, 5305 Santiago Canyon Road, Silverado, 1100-1600 hours
- **November 14:** Radio Rodeo (no RACES/ACS track)



www.ocraces.org



Mission Statement

County of Orange RACES has made a commitment to provide all Public Safety departments in Orange County with the most efficient response possible to supplement emergency/disaster and routine Public Safety communications events and activities. We will provide the highest level of service using Amateur and Public Safety radio resources coupled with technology, teamwork, safety, and excellence. We will do so in an efficient, professional, and courteous manner, accepting accountability for all actions. We dedicate ourselves to working in partnership with the Public Safety community to professionally excel in the ability to provide emergency communications resources and services.

County of Orange RACES Frequencies

- 40 m: 7250 kHz SSB (City/County/MOU Net—Saturdays, 1000 hours)
 - 10 m: 29.640 MHz output, 29.540 MHz input, 107.2 Hz PL
 - 6 m: 52.620 MHz output, 52.120 MHz input, 103.5 Hz PL
 - 2 m: 146.895 MHz output, 146.295 MHz input, 136.5 Hz PL*
 - 2 m: 146.595 MHz simplex
 - 1.25 m: 223.760 MHz output, 222.160 MHz input, 110.9 Hz PL
 - 70 cm: 446.000 MHz simplex
 - 70 cm: 448.320 MHz output, 443.320 MHz input, 141.3 Hz PL (private)
 - 70 cm: 449.100 MHz output, 444.100 MHz input, 110.9 Hz PL (out of service)
 - 70 cm: 449.180 MHz output, 444.180 MHz input, 107.2 Hz PL (private)
 - 23 cm: 1287.650 MHz, 1287.675 MHz, 1287.700 MHz, 1287.725 MHz, 1287.750 MHz, and 1287.775 MHz outputs, -12 MHz inputs, 88.5 Hz PL
- *Primary Net—Mondays, 1900 hours

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Scott Byington, KC6MMF

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Jack Barth, AB6VC
Ernest Fierheller, KG6LXT
Bob McFadden, KK6CUS
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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



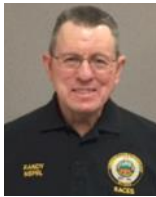
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KM6CAO



Fran Needham
KJ6UJS



Harvey Packard
KM6BV



Tom Riley
K6TPR



Brad Russo
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