

August 2024



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OCRACES Meeting
Monday,
August 5th,
at 7:30 p.m.,
on Zoom
Discussion of
Cell Phone Apps

Orange County Sheriff's Department
Emergency Management Division



Newsletter of the County of Orange Radio Amateur Civil Emergency Service

CRO's Nest

by Ken Bourne, W6HK, OCRACES Chief Radio Officer

M17 Digital Radio Protocol for Data and Voice

Connect Systems, known for its DMR radios, is about to launch the CS7000 M17 UHF handheld, the first amateur digital radio designed for the M17 protocol. Radio amateurs who like to experiment are also getting involved. But what is M17?

M17 is a community of open-source developers, consisting of hams who are hackers and experimenters. They are developing open-source hardware and software and offer a complete digital radio protocol for data and voice, made by and for amateur radio operators.

The M17 protocol voice mode uses the free and open Codec2 voice encoder. That's the same codec used in FreeDV, which is growing in popularity for digital voice on HF single sideband. By using the Codec2, there are no patents, no royalties, and no licensing or legal barriers to scratch-building your own radio or modifying one you already own.

The M17 digital radio modulation mode was developed by Polish radio amateur Wojciech Kaczmarek, SP5WWP. The protocol is primarily for voice communications on VHF and above amateur radio bands.

M17 uses Frequency Division Multiple Access (FDMA) technology, in which different communication streams are separated by frequency and run concurrently. (Thanks to *Wikipedia* for summarizing this information.) It utilizes 4,800 symbols per second, 4-level frequency-shift keying (4FSK) with a root Nyquist filter applied to

the bitstream. Signal bandwidth is 9 kHz, with channel spacing of 12.5 kHz. The gross data rate is 9,600 bits per second, with data transferred at 3,200 bits per second. The transmission stream is divided into 40-millisecond long frames, each prepended with a 16-bit long synchronization word. A superframe is formed from a group of 6 frames, needed to decode the link information data. Protocol allows for low-speed data transfer (along with voice), e.g., GNSS (global navigation satellite system) position data.

The Codec2 low-bitrate voice codec used by M17 is based on linear predictive coding with mixed-harmonic sinusoidal excitation. The protocol supports both 3200 (full-rate) and 1600 bits per second (half-rate) modes, according to the information posted on *Wikipedia*.

Three methods are used for error control: binary Golay code; punctured convolutional code; and bit interleaving. Additionally, exclusive-or operation is performed between data bits and a predefined decorrelating pseudorandom stream before transmission. This ensures that there are as many symbol transitions in the baseband as possible, according to *Wikipedia*.

The M17 protocol, which was primarily designed for amateur radio use, has the following application functions:

- Call sign encoding: 48-bit field holding up to 9 alphanumeric characters eliminates the need of a centralized user-ID database.

(Continued on page 2)

CRO's Nest *Continued from page 1*

- Encryption:
 - Bit scrambler encryption: a pseudorandom binary sequence created by combining an exclusive-or bitwise operation on the audio or data stream and a linear-feedback shift register using one of 3 feedback polynomials with 255-, 65,535-, and 16,777,215-bit repeat periods.
 - AES encryption: 128-bit block encryption cipher operating in CTR (counter) mode with user-selectable 128-, 192-, or 256-bit key.
- Slow-speed side channel for short and repeated data transfers, e.g., GNSS position data or telemetry.
- Text messaging.

Wikipedia mentions that, with a small hardware modification, TYT MD-380, MD-390, and MD-UV380 handheld transceivers can be flashed with a custom, free, open-source firmware to enable M17 support.

Links between M17 and other digital voice modes and several existing networks bridge DMR, P25, System Fusion (Yaesu's C4FM), D-STAR, NXDN, AllStarLink, EchoLink, and IRLP.

Schematics and a parts list will be provided by the M17 project, so a ham can make his own M17 radio. Instead, Connect Systems has developed two radios for the M17 project, based on an existing radio from their manufacturer. One will be a modified CS780. However, as part of the design, the CS7000 M17 will allow the user to load either the M17 firmware or the DMR software. The second radio, the CS7000 M17 PLUS, will double the amount of code memory, have about three times the amount of internal RAM, and will run about three times faster. It will be the first true multi-protocol digital radio on the market.

The CS7000 M17 is based on the CS780 commercial radio, with a receiver that is a double-conversion superheterodyne design with front-end varactor tuning. It is Part 90 certified and covers 400 to 512 MHz. It can have only a single protocol (M17 or DMR) at a time. The DMR protocol takes between 500,000 and 1,000,000 bytes of code, depending on features. The M17 protocol takes about 400,000 bytes of code. Combining the two protocols in the PLUS version takes less code than the sum of the two. In the more powerful radio, Connect Systems says it can change the modulation from 4FSK to 16FSK. That will allow them to reduce the bandwidth in half. They can change the vocoder to work at half the data rate. With these two features, they can have four channels in a bandwidth of 6.25 kHz. If they use the bandwidth of the old analog channel, they can have 16 channels of voice, compared to the previous single channel of voice. If they use it for data, they could double the transmission speed. Connect Systems surmises that if they incorporate AGC for the

voice, the voice level will sound the same, no matter how softly the other person is speaking.

The Connect Systems CS7000 M17 is ready to ship. Earlier buyers were able to reserve the first units for \$249, to subsidize production, but the final price will be \$299. The CS7000 M17 PLUS is in final design and testing. Currently, the manufacturer needs to confirm that the DVSI vocoder will work on the M7 version of the ARM microprocessor. The current microprocessor is the M4 version.

Another way to get involved with these early stages of M17 is the Android Codec2 walkie-talkie. This app is part of a complete system, which includes an Android device, an M17 modem, and an FM transceiver to do M17 digital voice communication. It is a half-duplex transceiver. The app is a digital voice frontend for your radio. It connects to your M17 KISS Bluetooth/USB modem and sends and receives M17 link setup and audio frames, which are encapsulated inside KISS frames. It does not deal with radio management, modulation, etc. The modem and the radio handle the M17 data link layer and physical layer. Its features include:

- PTT button, push and talk. An M17 digital voice stream will be initiated and maintained with the modem.
- USB serial connectivity (38,400 bps, 8 data bits, 1 stop bit, no parity). Just select this app after connecting to USB and it will use given connection.
- BluetoothLE connectivity. Use the Connect/Disconnect button to connect/disconnect BLE devices. It will attempt to connect to the last connected device. Otherwise it will scan for devices.
- Call-sign identification. Enter your call sign once connected, to be able to transmit.
- Caller identification. Received call sign is clearly displayed when an M17 DV call is received.
- User preferences. BLE device preference and user call sign will be saved for later.



Connect Systems CS7000 M17 radio.

OCSD Opens Technology Center

The Orange County Sheriff's Department on Thursday, June 27, 2024, hosted the grand opening of the new OC Sheriff's Technology Center, which will bring three divisions under one roof for enhanced operational efficiency and effectiveness.

The 120,000-square-foot facility located in Tustin will be home to the department's Technology Division, Operations Support and Intelligence Division, and components of the Special Operations Division.

The Sheriff's Technology Center grand opening also marked the launch of the OC Sheriff's Real Time Operations Center, which leverages technology to improve public safety and response to critical incidents.

The Sheriff's Technology Center is a state-of-the-art facility that addresses a variety of incidents by combining real-time crime analysis with public-safety resources, such as emergency communications, federal partnerships, and technology.

"The heart of providing exceptional service is our people, but giving them the space and tools they need enhances their ability to protect our community," said Don Barnes, Orange County Sheriff-Coroner. "We are driving a culture change in the

way we utilize technology, and I look forward to seeing the solutions-focused ways we will prevent crime, solve cases, and improve quality of life for our residents."

In June 2022, the County of Orange purchased the building. The facility is estimated to cost \$110 million, which includes all security, audio/visual, and structural upgrades.

The Sheriff's Technology Center will house the department's Technology Division, which is comprised of six teams with varying critical roles. Their responsibilities include maintaining the county's 800-MHz radio infrastructure, conducting information technology services, and providing technological vehicle up-fitting for more than 100 county agencies.

The Operations Support and Intelligence Division also will operate out of the new center. That division includes the Real Time Operations Center, Sheriff's dispatch and Control One, and the Orange County Intelligence Assessment Center.

As part of the Special Enforcement Bureau, the SWAT team and Hazardous Devices Section will also run their operations out of the Sheriff's Technology Center in a space that can adequately support the bu-

reaus' personnel, tools, and assets.

Through a "Fusus" interface provided by the Technology Center, the Sheriff's Department will be able to connect to cameras at any partnering City school or private business to properly assess a potential crime or emergency situation. A business or City must have the Fusus technology to be a part of this program. Once permissions are granted by both parties, OCSD can access and use the cameras when needed. For example, if there is a shooting at a school or other emergency, OCSD's Technology Division will be able to connect to the campus' cameras to determine where first responders are needed. OCSD already has a partnership with Lake Forest. The Department utilizes "license-plate-reading cameras" throughout the City as well as a new crime-data reporting system that gives OCSD the ability to spot local crime trends in real time.

In addition, the facility offers large training and meeting rooms, a media briefing room, and collaborative spaces, and eventually will include a museum space dedicated to preserving and honoring the rich history of the Sheriff's Department.

★

12 Volt Power, Inc., Offers Power Supply

RACES members can easily set up a home station, using a mobile transceiver, DC power supply, and small antenna. For a power supply, consider the SS-30P 13.8-volt, 30-ampere DC switching power supply offered by 12 Volt Power, Inc. It is efficient, compact, and lightweight, with a fixed output voltage of 13.8 V and rated at 25 A continuous and 30 A peak. Featuring two Powerpole outputs on the front and 0.25 inch binding posts on the rear, the SS-30P is capable of powering multiple DC devices.

Features include:

- Universal input: 100-240 VAC (50 or 60 Hz)
- Illuminated on/off power switch
- Connection ports: Powerpoles (front) and 0.25-inch binding posts that also accept banana plugs (rear)
- Built-in protection: fused input, over current, over voltage, and thermal shutdown
- Oversized cooling fan (temperature regulated).



12 Volt Power SS-30P power supply.

Price: \$99.99.

See 12 Volt Power's website at <https://www.12voltpower.com> for information on this power supply and other interesting products. ★

OCRACES Meeting: August 5th on Zoom

The next OCRACES meeting will be on Monday, August 5, 2024, at 7:30 p.m. on Zoom. We will discuss smartphone apps for alerts, activations, evacuations, and exchanging RACES information. ★

Ham Radio in World's Largest Naval Exercise

Rim of the Pacific (RIMPAC) 2024, the world's largest international military maritime exercise, with the theme of "Partners: Integrated and Prepared," ran from June 27 to August 1, 2024. Conducted from Joint Base Pearl Harbor—Hickam, Oahu, Hawaii, the exercise encompassed many islands in the Hawaiian chain.

The event included 29 nations, 40 surface ships, three submarines, 14 national land forces, over 150 aircraft, and more than 25,000 personnel, including amateur radio operators working with health-care facilities.

During the amateur radio portion of the exercise, 36 hams from Hawaii volunteered to demonstrate the value of amateur radio in emergency preparedness and response, according to ARRL Assistant Section Manager and State Government Liaison Michael Miller, KH6ML. "Some of hospitals, staff and administrators involved had their first experience with amateur radio. The operators were able to blend their skills using public service radios, satellite phones, as well as amateur radio," said Miller. He pointed out that hospitals on the smaller islands don't usually have

a fulltime communications officer, so working with amateur radio gives them experience for future emergencies. The amateurs worked with Health Comm Hawaii, which provides amateur radio communications to health-care associations in Hawaii during emergencies and disasters. "Health Comm Hawaii really needs 100 more operators for backup and to build skill sets through monthly exercises," Miller added.

Vice Adm. John Wade, commander, U.S. 3rd Fleet and RIMPAC 2024 Combined Task Force (CTF) commander, said the Rim of the Pacific exercise has grown over the years to be the world's largest and premier joint combined maritime training opportunity. "The exercise's purpose is to build relationships, to enhance interoperability and proficiency, and, ultimately, contribute to the peace and stability in the vitally-important Indo-Pacific region."

Many of the volunteers participating in RIMPAC 2024 were also members of other vital emergency communication groups, such as RACES, ARES, and CERT.

★

Preparing for Natural Disasters

In the "Hints from Heloise" column in the Monday, June 24, 2024, edition of *The Orange County Register*, a reader in North Carolina wrote about the need to be prepared and equipped before a hurricane hits (as is common in that State) to ensure survival with the least amount of trauma and property loss. Hurricanes are not common out here in Southern California, but other disasters are "waiting to happen." RACES members and their families are encouraged to prepare according to the following advice that the reader posted:

The first thing we all need is an evacuation plan. If plan A is not viable, then have a plan B. Make a list of all the items that you will need, then have all or most of it available in one spot, such as a closet, so you can leave in a hurry. Make a plan not only for yourself and your family; make sure to have one for your pets. Never leave your pets behind. Many shelters now accept animals.

In addition, have the following:

- Copies of all important documents. The originals should be stored in a plastic bag inside a water-tight container or in a bank.

- Emergency contact information, along with all phone numbers of family and friends.
- Bottled water.
- Batteries and flashlights.
- Nonperishable food.
- A change of clothes for each family member.
- A first-aid kit.
- All of your medications and prescriptions.
- Maps. (Paper maps are good to have.)
- Cash.
- Pet supplies. (A number of shelters will accept four pets per person.)
- When you bring your pet, you will need proof of residency, current vaccination records, and a dog license, if necessary. Some require that you also bring pet food. Make sure your pet has a collar.
- If you are evacuating the area, before you leave your home, make sure that you have locked all of the doors and turned off all utilities.

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ARRL Offers 6/10-Meter Monobeam Antenna

ARRL has partnered with the Italian manufacturer Monobeam to offer the dual-band Monobeam 6/10 antenna, which features 10-meter Moxon (28 MHz) and a 6-meter Yagi (50 MHz). It weighs just over 10 pounds and has a turning radius of approximately 6.5 feet. It comes with two sets of hardware for both permanent installation and portable use (thumb screws and wingnuts). It can be turned with a simple TV rotator.

The antenna is made of aluminum tubes, galvanized steel hardware, UV-resistant POM-C driver insulators, and polypropylene clamps.

It uses an open sleeve feed method, coupling the driven element of the 50-MHz section by proximity and length to the 10-meter driven element with minimal loss. Simply attach a single coaxial cable to the included SO-239 equipped coaxial pigtail for operating on both bands.



Dual-band Monobeam 6/10 antenna.

The antenna is available from the [ARRL Store](#) (ARRL Item No. 0084), for \$299.95 retail plus shipping, handling, and sales tax. ★

OCRACES Member Ray Grimes, N8RG, Retires

Ray Grimes, N8RG (formerly W6RYS), after 31 years as an OCRACES member, is retiring from OCRACES and OCSD where he served as the Aero Squadron Reserve Unit Captain for 13 years and as a reserve deputy for 27½ years. Ray became an OCRACES member in July 1993 and served as the OCRACES Captain and Chief Radio Officer from February 9, 1998, to April 4, 2005. Ray and family are relocating to Arizona this fall, and once he obtains an Arizona driver license (and surrenders his CDL), he will no longer qualify as a County of Orange RACES volunteer or California peace officer.

Ray served as OCSD Communications Division Chief Engineer and Administrator II from 2005 to 2010, managing the 800 MHz Rebanding program for the County and its 800 MHz CCCS stakeholders and negotiating for Sprint-Nextel funded replacement equipment and upgrades of the 800 MHz CCCS as prescribed by the FCC. Ray was a member of the Orange County 800 MHz CCCS Governance Board, presenting at meetings and working for the benefit of the County, OCSD, and the partnership (all contract cities and partner organizations). Ray developed three new radio sites for 800 MHz CCCS, saving lives and improving countywide

public-safety communications.

During his time as an OCRACES member, Ray supported many County events such as County Elections, the Baker to Vegas Race, and several wildfire responses, and shadowed law enforcement and park rangers at large events such as the Tet Festival and the Orange County Fair. Ray helped to develop Amateur Television capabilities on land and in the air, bringing “eyes” to the County and OCSD years before smartphones and sophisticated public-safety dedicated video links were available.

In 2004, Ray plus a Sheriff's Lieutenant and a Captain formed the Orange County Sheriff's Museum & Education Center, a non-profit organization that will celebrate its 20th anniversary this fall. The Sheriff's Museum maintains exhibits at the Sheriff's Training Academy lobby and at the Association of Orange County Deputy Sheriff's (AOCDs) facility. A major accomplishment of the Sheriff's Museum is in protecting the historical artifacts of OCSD, dating back to 1889. The Museum purchased secure storage cages for an OCSD substation that houses around 10,000 cubic feet of OCSD and partner organization historical artifacts that would have certainly been discarded by now. The Sheriff's Museum assembled a



Res. Capt. Ray Grimes, N8RG (Ret.).

1962 Chrysler Newport replica patrol car that it owns and is the hit of many OCSD public relations events, academy graduations, parades, and car shows.

Ray is setting up his new ham station in Arizona and will be on the air on VHF and HF. HOA antenna restrictions have necessitated “stealth” antennas such as an HF multi-band end-fed long-wire hidden among the trees. ★

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



Irvine RACES (IDEC)

IDEC had a mesh station active during June 22 Field Day with VoIP and video cameras.

Mission Viejo RACES-ARES

Mission Viejo RACES-ARES again participated with SOARA for Field Day on June 22, 2024, at Gilleran Park in Mission Viejo. They had their own canopy setup, in which they displayed member radio GoBoxes and power GoBoxes and used a battery-powered Winlink station from which they transmitted 14 messages (for the FD 200 points) and received one reply message. They also had an information table setup with emergency-preparedness materials from FEMA, infor-



MVRACES CRO Charley Speelman, WA6RUZ, operating the Winlink station.



MVRACES information table at Field Day.

mation about ham radio, RACES, ARES, ARRL, Fire Watch, AREDN, and SKY-WARN. The FD site sees many visitors (ham and non-ham). MVRACES members helped with site setup and take-down and took turns operating in the SOARA Field Day Tent and the MVRACES Area.

Seal Beach/Los Alamitos RACES

Seal Beach/Los Alamitos RACES worked Field Day, not from the original Seal Beach Pier location, which usually has a lot of visitors, but instead from the Leisure World Am-



Leisure World Amateur Radio Club station.

ateur Radio Club (LWARC) station atop the LW Amphitheatre building.

The change in location was due to the loss of about six combined CERT/RACES members who were attending an important CERT training session at the same time, reducing appreciably the number of members who would normally work Field Day.

The Seal Beach Leisure World location (including their emergency van) allowed a more focused attempt at making contacts but reduced the opportunity to talk with the public.

Rather than being a solar-panel battery-charged station, they were utility powered. Nonetheless, six RACES members and the president of the LWARC worked 62 contacts, including Puerto Rico, North Texas, Iowa, Indiana, and Canada. They started on 10 meters, which was open at 11:00 a.m., but moved to 15 meters and ultimately 20 meters and FT8. Their mission at this point was to test their abilities to work through a “pileup” in a gentlemanly way. Originally, they wanted to demonstrate their ability to set up an emergency field station, but working through a pileup of stations was just as educational. There were three main operators. Participants included Robert Spence, KF6KVR, Los Alamitos RACES Radio Officer Michael Peer, WD6CDN, Rich Erickson, KU6H, Seal Beach RACES Chief Radio Officer Dick Crowe, KG6XJ, and Assistant Radio Officer John Breiding, KG6IMB.

Westminster RACES

Westminster Police Sergeant Jerad Kent is the new RACES City Coordinator. Anna Burton is the City’s Emergency Manager.

August 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3 Weekly 60 m ACS Net
4	5 Weekly 2 m ACS Net & OCRACES Meeting	6	7	8	9	10 Weekly 60 m ACS Net
11	12 Weekly 2 m ACS Net	13	14	15	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 Nets on 4 Bands	27	28	29	30	31

Upcoming Events:

- **August 5, 1930-2130 hours:** OC-RACES Meeting
- **August 16, 1900 hours:** Orange County Amateur Radio Club meeting, American Red Cross (George M. Chitty Building), 600 Parkcenter Drive, Santa Ana. Bob Brehm, AK6R, of Palomar Engineers, will talk on RFI interference and what you can do to remedy it.
- **September 5, 1830 hours:** Orientation for Professional Services Responder (PSR) applicants, Orange County Sheriff's Regional Training Academy, 15991 Armstrong Ave., 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)
 - 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 (down for repair)
 - 70 cm: 449.680 MHz output, 444.680 MHz input, 131.8 Hz PL (private)
- *Primary Net—Mondays, 1900 hours

OCSD RACES Coordinator

Lee Kaser, KK6VIV, (714) 628-7081

Chief Radio Officer

Ken Bourne, W6HK, (714) 997-0073

Radio Officer

Scott Byington, KC6MMF

Assistant Radio Officer

Randy Benicky, N6PRL

County of Orange RACES

Orange County Sheriff's Department, Emergency Management Division
 2644 Santiago Canyon Road, Silverado, CA 92676
 Telephone: (714) 628-7081 • Fax: (714) 628-7154
 Email: LKaser@OCSheriff.gov

County of Orange RACES

OCSD Emergency Management Division
 2644 Santiago Canyon Road
 Silverado, CA 92676

Telephone – (714) 628-7081
 Fax – (714) 628-7154
 E-mail: LKaser@OCSSheriff.gov

Visit Our Web Site
<https://ocraces.org>
It's Where It's @!

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 Randy Benicky N6PRL

**OCSD
 RACES
 Coordinator** →



Lee Kaser
 KK6VIV



Heide Aguire K3TOG Joel Bishop AJ6ZP Eric Bowen W6RTR Ted Lavino KG6LZP Steve Livingston NJ6R Scott MacGillivray KM6RTE Robert Moore KW6B



Ryan Moore KN6WSJ Ron Mosher K0PGE Fran Needham KJ6UJS Chi Nguyen KE6MVS Joe Selikov KB6EID Robert Stoffel KD6DAQ Chuck Streitz KK6HFS Ken Tucker WF6F