December 2024

Newsletter of the County of Orange Radio Amateur Civil Emergency Service

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OCRACES Holiday Dinner

Monday, December 2nd, at 6:30 p.m.

Marie Callender's in Orange

Orange County Sheriff's Department
Emergency Management Division

CRO's Nest

by Ken Bourne, W6HK, OCRACES Chief Radio Officer

RF Power Amplifiers

Simply stated, a radio-frequency (RF) power amplifier converts a low-power RF signal into a higher power signal. If you consistently get reports that your signal is too weak, maybe it's time to add an RF amplifier to your station (after first putting up a better antenna!).

Let's first look at what an electronic amplifier is, in general, and then investigate the various classes of RF power amplifiers and their applications.

An electronic amplifier increases the amplitude (magnitude of the voltage or current) of a signal by means of the amplifier's power supply. The amount of amplification is called the amplifier's gain, which is the ratio of output voltage, current, or power to the input. A device is an amplifier if its power gain is greater than one.

A preamplifier commonly precedes other signal processing stages, while a power amplifier is commonly used after other amplifier stages to produce the resulting signal.

Ideally, an amplifier produces a signal at its output that replicates the signal applied to its input, but increased in magnitude. Its input can be voltage, which draws no current, and with the output proportional to the input voltage. Its input can also be current, with no voltage across it, and with the output proportional to the input current.

RF amplifiers commonly attach to a transmission line at the input and output. Rather than dealing with voltage or current individually, they ideally couple with an input or output impedance matched to the transmission-line impedance. They amplify power, matching ratios of voltage to current.

Linear amplifiers (which most of them are) provide constant gain. If the gain is not linear, the output signal might be distorted.

Most modern amplifiers have a form of negative feedback, which increases bandwidth, reduces distortion, and controls gain. Part of the output is fed back, out of phase with the amplifier's input, thus subtracting from the input. If the amplifier introduces distortion, it's fed back. Since distortion is not part of the original input, it's added to the input in the opposite phase, subtracting from the input. Negative feedback also reduces nonlinearity and increases an amplifier's bandwidth.

Amplifiers are not perfect devices and some feedback, positive or negative, is unavoidable. It can be introduced by parasitic elements, such as capacitance between input and output of transistors in an amplifier, or by capacitive coupling of external wiring. Excessive frequency-dependent positive feedback can turn an amplifier into an oscillator, which is not good!

RF power amplifiers convert a low-power signal in the radio-frequency range between 20 kHz and 300 GHz into a higher power signal. They are typically the final transmitter stage in a radio transceiver, or a separate device attached to the output of a transceiver, driving an antenna. Specifications to consider include gain, power out-

(Continued on page 2

CRO's Nest *Continued from page 1*

put, bandwidth, power efficiency, linearity (low signal compression at rated output), input and output impedance matching, and heat dissipation.

Linear amplifier classes for amateur radio applications include class A, class AB, and class B. In these amplifiers, the active device is used as a controlled current source. A class C amplifier is nonlinear, in which the active device is used as a switch. The bias at the input determines the class of the amplifier. Amateur radio amplifiers typically can operate in more than one class by switching the bias, depending on the desired mode of operation. Operating the active device as a switch results in higher efficiency but lower linearity.

In a class-A amplifier, 100 percent of the input signal is used. The active device (tube or transistor) conducts over the entire range of the input cycle. Class-A designs are simpler (and less efficient) than the other classes. Class AB and class B require two connected active devices in push-pull, each handling one-half of the waveform.

In a class-B amplifier, the active device conducts for 180 degrees of the cycle, producing harmonic distortion in the output signal. Consequently, class-B amplifiers are generally operated with tuned loading, where harmonics are shorted to ground by a series of resonators. At RF, if a tuned circuit couples to the load, a single device operating at class B is possible, because the stored energy in the tuned circuit supplies the "missing" half of the waveform. It's a linear amplifier because the RF output power is proportional to the square of the input excitation voltage. This prevents distortion of amplified AM or FM signals.

In a class-AB amplifier, each one of the two active devices conducts more than half the cycle. Thus, the region where both elements simultaneously are nearly off is reduced. When the waveforms from the two active devices are combined, the crossover is greatly minimized or eliminated. Efficiency is slightly less than a class-B amplifier, but is more linear.

In a class-C amplifier, less than half of the input signal is used. Distortion is high and a tuned circuit is used as the load. The tuned circuit resonates at the fixed carrier frequency, so the unwanted frequencies are suppressed and the wanted full signal is extracted by the tuned load. A class -C amplifier is nonlinear and should only be used for FM. It is no longer recommended for CW, since modern transmitters shape the pulses so that key clicks are reduced.

Class-D amplifiers use a form of pulse-width modulation to control the output elements. The active devices (transistors) function as electronic switches instead of linear gain devices. The analog signal is converted to a stream of pulses that represents the signal by pulse-width modulation, pulse-density modulation, delta-sigma modulation, or a similar modulation technique before being applied to the amplifier. A class-D amplifier is power efficient. It can operate from a digital signal source without requiring a digital-to-analog converter to convert the signal to analog form first.

Class-E and beyond amplifiers attempt to outperform class D, using techniques to enable the device to make the switching transition as quickly as possible. A class-E amplifier is a highly efficient tuned switching power amplifier.

Some digital modes are a form of FM and can use a nonlinear class-C, class-D, or class-E amplifier.

Now that MFJ and Ameritron have closed down, new tube-type amplifiers are becoming scarce. Most amplifiers on the market use solid-state devices, predominantly

Palstar LA-1K RF-sensing dual HF LDMOS 1000-watt amplifier covers 1.8 through 54 MHz.

ACOM 2100 linear amplifier covers 1.8 through 54 MHz, providing over 1,500 watts PEP or continuous carrier output power.

SBE Expert 2K-FA Series Three 2-kW solid-state fully automatic linear amplifier covers 1.8 to 50 MHz.

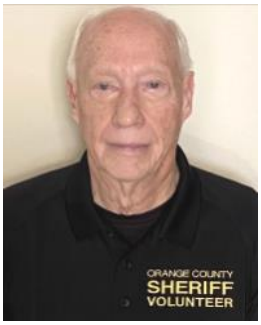
Mercury LUX amplifier covers 160 meters through 6 meters at 1500+ watts SSB/CW. It has RF auto band decoding.

MOSFETs (metal-oxide-semiconductor field-effect transistors), particularly LDMOS (LD = laterally diffused). Transistors are mechanically robust but are electrically fragile, easily damaged by excess voltage or current. Tubes are mechanically fragile but electrically robust.✸

OCRACES Adds Three New Members

Dick Palm, KN6RVU

Welcome to Dick Palm, KN6RVU, who became an OCRACES member on Wednesday, October 30, 2024. Dick holds a Technician Class amateur radio license and also a General Radiotelephone Operator License. He is ready to serve with his considerable technical knowledge, especially on Winlink, AREDN mesh, and computer communications.



Dick Palm, KN6RVU

Dick became a PSR on September 5, 2024. He formerly served in Anaheim RACES.

Dick received a BS in Electronic Engineering from Cal Poly University and an MS in Electrical Engineering from Utah State University, specializing in Information Theory. His engineering experience includes Interstate Engineering Corporation in the Phase-Lock Tracking Filter Group, Receiver Design Group, and Anti Submarine Warfare Group. He also started Motor Control Corporation with two other associates, to design and manufacture three-phase electric motor controls. He started Voyager Computer Corporation, designing and manufacturing microcomputer projects and consulting for Liebert Corporation on a new 3-phase transistor 300-kW UPS.

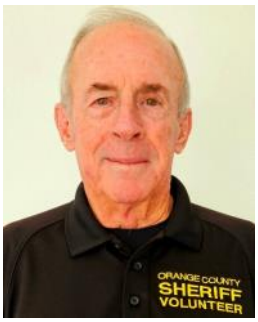
As an Adjunct Professor at Biola University, Dick taught upper-division mathematics and also taught programming in the Computer Science Department. Dick is a California Professional Engineer—Control System Engineer.

Dick has been active on our OCRACES Monday nets, first as a visitor beginning in June 2023, and then as an applicant beginning in July 2024. He participated in the October 1, 2022, OCRACES drill, Winlink exercises, and in the May 4th drill, focusing on Winlink, AREDN mesh, VoIP contacts, and FTP. He has attended our meetings and ran 2-meter simplex net control at Loma Ridge during our October 5 drill. ✸

Bill Ehart, KM6ZHO

Welcome to Bill Ehart, KM6ZHO, who became an OCRACES member on Wednesday, November 20, 2024.

Bill is a retired Sergeant from the Santa Ana Police Department. During his 28 years of service, Bill worked several assignments including Patrol, traffic investigator, motor officer, DUI enforcement officer, Police Pilot, Robbery/Homicide Detective, and Crime Analyst. At the time of his retirement, Bill was a motor Sergeant responsible for writing and administering several OTS grants including the first Orange County DUI Avoid program involving 23 Orange County law-enforcement agencies and the three Orange County offices of the California Highway Patrol. Prior to Santa Ana, Bill worked with the Bell Gardens Police Department.



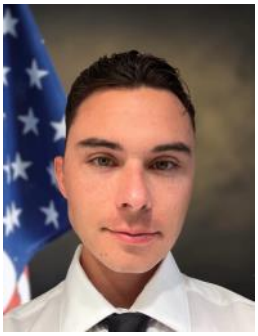
Bill Ehart, KM6ZHO

Following his career with Santa Ana and Bell Gardens, Bill worked for the U.S. Department of Homeland Security/ Federal Emergency Management Agency out of Washington D.C. FEMA headquarters as part of the FEMA security unit. As a FEMA security manager, Bill was deployed throughout the U.S. in support a variety of presidential declared disasters.

Bill is a United States Marine veteran, a proud graduate of the University of Southern California, an FAA Multi-Engine Commercial Instrument Pilot with Instructor Ratings - CFII, and is currently working on upgrading his amateur radio license to General Class. ✸

Lance Rzepiejewski, KO6CXL

Welcome to Lance Rzepiejewski, KO6CXL, who became an OCRACES member on Wednesday, November 20, 2024. He received his Technician Class license on January 25, 2024. His goal is to earn his Amateur Extra Class license by the end of 2025.


Lance Rzepiejewski, KO6CXL.

Currently, Lance is studying Homeland Security and Emergency Management at National University, with the intent of earning a Master's degree.

Lance has always had an interest in radio communications, but he finally got involved in amateur radio after learning about RACES from a local emergency manager. EmComm is his primary motivation, and amateur radio is his passion. He is especially enthralled with CW, using Morse code, and is getting involved with the CW Operators' Club. He is also interested in participating in this year's NRR (Novice Rig Roundup). He also delights in "tube gear" and "boat anchor" rigs, and all of his HF gear is from the 1960s.

As a member of OCRACES, Lance looks forward to bringing his enthusiasm for amateur radio and advanced knowledge of emergency operations to the team. ✸

Yaesu Introduces 3 New Radios

Yaesu has launched three new mobile radios featuring "Super-DX" and an Audio Digital Signal Processor to improve audio quality. The Super-DX function increases the receiver sensitivity and improves weak-signal reception. The new ASP: Audio Digital Signal Processing Unit is also activated when the Super-DX key is pressed.

The **Yaesu FTM-150RASP** is a 55-watt (VHF)/50-watt (UHF) FM dual-band mobile transceiver with the new Super-DX and Audio Digital Signal Processor. It provides true dual-band operation with two different receivers on different bands or within the same band (V+V, U+U, V+U, U+V). The full dot-matrix display provides a clear view of the radio operating status. The front panel is detachable. The optional SJMK-500 swing head provides flexible angle adjustment of the front panel.

Yaesu FTM-150RASP FM dual-band 55-W VHF/50-W UHF transceiver.

A front speaker is furnished inside the control head. Combined with the main body speaker, it provides 6 watts of audio. The volume level of the main body speaker is adjustable, relative to the front-panel speaker.

Up to five VFO or memory-channel frequencies may be assigned to the PMG (Primary Memory Group). The reception status of the PMG channels is displayed in real time with a bar graph in the PMG screen. The AUTO or MANUAL mode is switchable by pressing and holding the main VFO knob during PMG operation. The AUTO mode simultaneously shows up to two channels when signals are received. Transmit is automatically moved to the received channel. In the MANUAL mode, transmit and receive stays on the manually selected channel. The signal received on the other channel is shown on the screen and the audio can be heard.

With its Customized Function List (CFL), up to nine frequently used functions from the 62 menus can be registered and then easily selected. With Memory Auto Grouping (MAG), memory channels can be automatically grouped and recalled for each band. The new "My Group" feature in MAG permits selection of any memory channel regardless of band. Bands that are not normally used can be set to hide with the VFO Band Skip function.

Yaesu FT-3185RASP 85-watt 2-meter mobile transceiver.

Up to 47 channels can be displayed with the band scope. By rotating the left DIAL knob, the frequency range can be centered and the signal at the center marker is received. By rotating the right DIAL knob, the marker can be moved across the display and the signal at the marker is received.

By installing the optional BU-5 Bluetooth unit, hands-free operation is available with the optional SSM-BT20 headset or commercially available Bluetooth product.

The **Yaesu FT-3185RASP** is an 85-watt 2-meter mobile transceiver. It features the Super-DX and Audio Digital Signal Processor. It also has PMG (Primary Memory Group) for up to five VFO or memory-channel frequencies, displayed on a bar graph. The Customized Function List (CFL) registers up to nine frequently used functions from the 44 menus.

The **Yaesu FT-3165RASP** is a 65-watt 2-meter transceiver, featuring the Super-DX and Audio Digital Signal Processor. Its front speaker provides 5 watts of audio. The MLS-100 external speaker is optional. It has 220 memory channels with alphanumeric 8-character labels. Scan features include Preferential Memory Scan and VFO Scan. Dual watch is provided with Priority Channel Scan. ✸

Yaesu FT-3165 65-watt 2-meter mobile transceiver.

OCRACES Holiday Dinner: December 2nd

OCRACES will hold its annual Holiday Dinner on Monday, December 2, 2024, at 6:30 p.m. (an hour earlier than regular meetings), at Marie Callender's Restaurant & Bakery, 307 E. Katella Avenue, in Orange. Members and their families, as well as applicants, former members, as well as staff from the OCSD Emergency Management Division and Technology Division were invited. Meals may be selected from Marie Callender's full menu. It will be the responsibility of each member to pay, including any drinks, and gratuity will be automatically included. There will be no regular meeting or net on that day. The next monthly OCRACES meeting will be on Monday, January 6, 2025, at 7:30 p.m. If it's on Zoom, it will probably be hosted by Joe Selikov, KB6EID. ✸

SKYWARN Recognition Day: December 7th

SKYWARN Recognition Day is December 7, 2024. The annual event is celebrating its 25th anniversary. SRD was established in 1999 by the National Weather Service and ARRL® to commemorate the contributions of SKYWARN volunteers. Using amateur radio and other means of communication, SKYWARN spotters provide real-time ground truth to NWS offices. The ham-volunteers can also provide vital communications between NWS and local emergency management officials when other means go down.

In a video posted to the SRD web page, National Weather Service Director Ken Graham, WX4KEG, said the information ham radio operators and other SKYWARN volunteers provide is critical. "I, along with the entire National Weather Service, want to acknowledge and thank you for your invaluable service to the communities we serve."

There will be an SRD special event from 0000 to 2359 UTC on the day. The objective is for all amateur stations to exchange QSO information with as many amateur radio SKYWARN Spotters and National Weather Service Stations as possible on the 80, 40, 20, 15, 10, 6, and 2-meter and 70-centimeter bands.

ARRL will be on the air during the event from the ARRL Radio Laboratory station, W1HQ, using the call sign WX1AW. ARRL Public Relations and Outreach Manager Sierra Harrop, W5DX, said SRD is a great opportunity to welcome non-ham SKYWARN volunteers to explore amateur radio. "Storm spotting was my original draw into ham radio. I watched a large tornado tear up my community on May 3, 1999, and was listening via my mom's 2-meter mobile radio to spotter reports being relayed to the NWS Norman, Oklahoma, office. I knew I wanted to be a part of that and within months I was licensed. Amateur radio was my path into that community service and has been the hobby of a lifetime ever since," she said.

ARRL has a web page to help those interested with getting licensed. Find details at https://www.arrl.org/getting-licensed.

Spotters are encouraged to register for SRD at https://www.weather.gov/crh/skywarnrecognition. There will be participation certificates available after the event. ✸

Two License Pool Questions Removed

The National Conference of Volunteer Examiner Coordinators (NCVEC) Question Pool Committee (QPC) has removed one Extra Class pool question and one General Class pool question from use. Both Extra pool question E2A13 and General pool question G8C01 have been deleted from use on examinations as the two questions each have more than one correct answer. The deleted questions must be removed from examinations as soon as possible.

Updated question pool files, including the errata and new information, have been posted on the NCVEC Extra Class question pool web page at https://www.ncvec.org/index.php/2024-2028-extra-class-question-pool-release. The current Element 4 Extra question pool became effective on July 1, 2024, and it is valid through June 30, 2028.

Updated General Class question pool files, also including the errata and new information, have been posted on the NCVEC General Class question pool web page at https://www.ncvec.org/index.php/2023-2027-general-question-pool-release. The current Element 3 General question pool became effective on July 1, 2023, and it is valid through June 30, 2027.

The ARRL VEC advises the community to regularly check the NCVEC website at http://www.ncvec.org/ for updates to the question pools, which may include errata and withdrawn questions. ✸

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

OCSD Mutual Aid Bureau, FTO Team

Joel Bishop, AJ6ZP.

OCRACES Member Joel Bishop, AJ6ZP, has been added to the PSR Field Training Officer (FTO) Team. He also regularly assists with the PSR Transportation Team. He will be acting as FTO for the occasional new PSR trainee and future new PSR trainees with OCRACES aspirations, as his priority. FTO Team Leader Julie London says, "We welcome his experience and expertise with these teams, and he also seems well-connected within the community." Referring to Joel's participation at John Wayne airport as an actor during training for law enforcement, Julie joked, "He has even been known to try to smuggle contraband through JWA's TSA checkpoints! But, don't hold that against him...he's a really great guy, and I'm sure he doesn't try to break the law too often! ;)" Congratulations to Joel on his new appointment.

OCSD Aero Squadron Reserve Unit

Steve Brown, who has commanded ASRU as a Reserve Lieutenant since Reserve Captain Ray Grimes, N8RG, retired and moved to Arizona, was promoted to Reserve Captain on November 19, 2024. As a pilot for Southwest Airlines, he has also been promoted to Captain by SWA. Congratulations "Captain Captain!" ASRU will have its Christmas dinner on Sunday, December 8, 2024, at 1730 hours, at the Elks Lodge in Santa Ana.

InfraGard

InfraGard is offering an overview webinar for prospective members on December 11, 2024 at 10:30 a.m. PST. This 30-minute webinar provides background on the InfraGard Program and encourages qualified individuals to apply for membership. It includes an open forum to answer questions about InfraGard.

To register, you can join via the InfraGard homepage or via this direct link: https://forms.fbi.gov/infragard-program-overview-webinar-1/view.

This webinar is intended for people considering membership. Current members are encouraged to attend the more comprehensive New Member Orientation Webinar instead.

To qualify for InfraGard membership, an applicant must:

- Be employed or formerly employed within critical infrastructure (student internships may be considered).
- Be at least 18 years of age (as of the date of application completion).
- Be a U.S. citizen (U.S. citizen by birth as defined by 8 USC 1401-1409 or a U.S. citizen by naturalization as defined by 8 USC 1421-1459).
- Agree to the InfraGard information-sharing policy, privacy act statement, agreements to hold harmless, and code of ethics.
- Consent to and pass a security risk assessment and to periodic re-confirmation of the security risk assessment (this does not equate to a security clearance).

Registration for the next session of the New Member Orientation Webinar is on December 17, 2024, from 10:30 a.m. to 12.p.m. PST. Click on the link below to register. Though the webinar is designed for new members, the information is also of interest to tenured members. The Webinar will be hosted on MS Teams.

To register, click here: https://forms.fbi.gov/infragard-new-member-orientation-webinar-december-17th-2024/view. Ensure you provide the email address affiliated with your InfraGard account or attendance will not be permitted. Registration is limited to 500 attendees, so please only register if you plan to attend the event. Future orientation dates will be scheduled in the coming months.

Learn more about:

- InfraGard's Mission + History
- Membership requirements
- How to submit tips and information to the FBI
- Information Sharing and Intelligence Products for Industry
- And more

December 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2 OCRACES Holiday Dinner (no net)	3	4	5	6	7 Weekly 60 m ACS Net; SKYWARN Recognition
8	9 Weekly 2 m ACS Net	10	11	12	13	14 Weekly 60 m ACS Net
15	16 Weekly 2 m ACS Net	17	18	19	20	21 Weekly 60 m ACS Net
22	23 ACS Nets on 4 Bands	24 Christmas Eve	25 Christmas Day	26	27	28 Weekly 60 m ACS Net
29	30 Weekly 2 m ACS Net	31 New Year's Eve				

Upcoming Events:

- **December 2, 1830-2030 hours:** OCRACES Holiday Dinner, Marie Callender's Restaurant & Bakery, 307 E. Katella Ave., Orange
- **December 7:** SKYWARN Recognition Day
- **December 25:** Merry Christmas!
- **January 1:** Happy New Year!
- **January 6:** 1930-2130 hours: OCRACES meeting

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

Questions or Comments?
Contact *NetControl* Editor Ken Bourne, W6HK
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"W6ACS ... Serving Orange County"

Meet Your County of Orange RACES Members!

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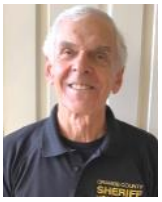

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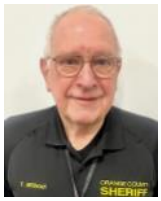

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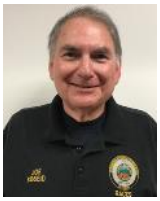

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