

PAARAgraphs



The Official Newsletter of the

Palo Alto Amateur Radio Association, Inc.

The Friendliest Club Around

Celebrating 86 years as an *active* amateur radio club—*Since 1937*<http://www.paara.org/>

So what is FlexRadio all about?

Michael Walker, VA3MW

Mike VA3MW will spend about an hour showing how today's HF radio is not only better than yesterday's super-het radio, but you get more performance for your dollar. He will show how your radio now 'scales' towards the future and not grow old the day you bought it.

Mike has been an active Amateur since 1974 and loving every minute of it. From Repeaters, HF, HF Contesting, Satellites and currently tinkering in EME digital modes and 10 Ghz microwave. As well as being a GA Pilot, he loves HF Station integration, and remote HF operation and currently represents FlexRadio Systems with the Marketing and Education team. He is very well versed in the FlexRadio technology. Technology is truly his hobby.

**This meeting will be a
Hybrid Meeting
Zoom and In Person**

Time: March 3, 2023 07:00 PM Pacific Time
Please check <https://www.paara.org> for
Zoom Details

Upcoming Events

| | |
|--|--|
| <ul style="list-style-type: none"> Mar 3*** April 7 May 5 | PAARA General Meeting, 7:00 PM *** Zoom & IRL Meeting  |
| <ul style="list-style-type: none"> Mar 15 April 19 May 17 | Board Meeting, 7:00 PM. Everyone welcome! Zoom Meeting, eMail President for details! |

President's Corner

March 2023

I draft my column this month as I sit on BLM land just outside the South entrance to Joshua Tree NP. It has been a very interesting these last 4 weeks. I left for Quartzfest right after the January board meeting. I met up with other PAARA members, Joanna, K6YL, Jeanette, N6DQ, Uncle Frank, AF0XX, , Karen, KK6NGA, Rob, KC6TYD, Joel, KD6W, and Joe, WB6JOE. Rob, Joel, and Joe also had their wives with them. Least I forget, Amy and Jerry, "the girls", who created a one of a kind electronic badge with a 2M radio, APRS and GPS chips on the circuit board and a game. These were custom created for Quartzfest. They will be presenting their project at an upcoming PAARA meeting.



The Quartzfest week went very fast with all the various activities. Highlights included the Motorhome show, numerous talks on ham radio and non-ham radio topics, off-road trip, large balloon launch, potluck dinner, Solar walkabout conducted by Uncle Frank, and Joel's amateur TV broadcast on two

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Soil Resistance

Gary Barnes, KI6HIG

After I left the Navy, I went to work for an electronics company in San Carlos, California as an electronics technician. The company had two different ground systems on site. One ground system was in Research and Development (R&D) and the other system was in the production testing area.

The R&D system was a copper rod that went through the concrete floor into the soil below the floor. The production system ground had many copper rods going through a hole in the concrete floor into the soil. This ground system had a rock salt bath and rods were replaced as needed. The equipment test in the production area had a lower noise level or a better signal to noise ratio than in the R&D area.

A few years later, I was working for a different company when I was testing new an analyzer. This analyzer did not pass the signal to noise ratio check so I called the manufacturer. The engineer asked me if I had connected a ground wire to the equipment. I told him no and asked where in the manual it said a ground was needed. He said it was not in the manual.

I rented a stud gun and installed some studs into the concrete floor behind the rack of test equipment. One end of the stainless steel studs were threaded. I connected leads between the studs and equipment. My signal to noise ratio improved to the point where the analyzer would pass the signal to noise ratio test.

I helped a friend install a 54-foot tower in his backyard. I drilled a 20-foot hole in the ground and I installed a 20-foot long copper rod in the hole filled with a rock salt bath. I connected the ground rod to the tower with #4 copper wire.

Determining Soil Resistance

The effectiveness of any ground system is based on soil resistance. To determine the soil resistance for the ground system, a soil resistance measurement should be performed. This is done with either an AC signal or DC signal. The AC frequency can be 90 Hertz or 130 Hertz for example. Other test frequencies can be used. Four pins, or metal rods, are inserted into the soil equal distance apart in a line. The inner pins will be for potential and the outer pins will be for test current. The pins are connected to the re-

sistance meter using wires with a clip at one end and a banana connector at the other end.

When the pins are aligned North to South, the Southern most pin would be called C1 (current one). The next pin North would be called P1 (potential one). The next pin North would be called P2 (potential two), and finally the last pin North would be called C2 (current two). The distance between C1 and P1 would be 10 feet. The distance between P1 and P2 would be 10 feet, and finally the distance between P2 and C2 would be 10 feet. After the resistance measurement is completed and recorded, the spacing is increased by a factor of 1.5, so the C1 to P1 distance would become 15 feet as well as the rest of the pin distances.

After all the measurements are made in the North to South direction, then the pins are moved to the East to West direction and all of the readings are repeated. Finally the pins are moved to the South-West to the North-East direction, and readings are repeated. Then the Meter-Ohms versus Distance graph is completed. My test plan is to take 13 test points for each direction, starting at 1 foot distance for potential spacing and ending at 129.7 feet for potential spacing.

Another parameter that can be measured is moisture content of the soil. This is a value between 0 and 50 percent. A soil sample is weighed and the value is recorded. Next, the sample is placed into a laboratory oven to remove any moisture content from the soil sample. Then the soil sample is weighed again and the percentage of moisture calculated. This is the most accurate method for moisture content. Some companies make probes to insert into the soil to obtain moisture content. The moisture content should be recorded on the test report.

Since soil temperature can also effect resistance, it should be measured.

The soil resistance measurement should be repeated on a regular basis to understand how the soil resistance changes with time. This could be done once a month for the first year and then once a year.

Soil Resistance Meters

The price for the soil resistance meter can be greater than \$8,000. The higher priced unit will

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(Resistance — Continued from page 2)

have greater output power, such as 600 volts and 2.5 Amperes with a maximum power of 200 watts. This unit will use an external power source for full power. Nilsson has a unit that cost about \$800, but it is harder to use because the operator must adjust two dials to get the reading. My new soil resistance meter cost me \$500, and it was manufactured in China. The maximum output voltage is 20 volts and the maximum test current is 20 milliamperes. The current level must be greater than 1 milliampere for a resistance reading. The internal power supply is 9 volts using six, 1.5-volt "C" size cells. An external power supply can not be used.

I checked the accuracy of my new soil resistance meter by using some 2% fixed value resistors. I measured the resistance value using my 6.5-digit multimeter. My new soil resistance meter was within tolerance at all test points from 10 ohms to 10,000 ohms.

The next step is to do soil resistance measurement in someone's yard. This yard should be at least 400 feet by 400 feet. A safe dig check will need to be performed before we insert the pins 12 inches into the ground. This should be done after the ground has dried out. Two additional people will be needed to install the pins in the ground at all the test points.

Fall-of-Potential Measurement

The National Electrical Code states the ground rod resistance should be less than 25 ohms. Some electricians say they do not know how to perform the test. Other electricians say they do not have the required equipment. A few say the test is not necessary. For communications equipment, the ground rod resistance should be less than 5 ohms.

The required test is called the Fall-of-Potential Measurement. A current source lead and potential lead are connected to the ground rod. The other current lead is connected to a pin 200 feet away. The potential lead and pin are placed between the ground rod and other current pin. The potential pin is placed in at 10 foot intervals from the ground rod, the current pin and the resistance value is recorded.

The resistance value is calculated from the data recorded. Find three sequential data points that are close to the same value and calculate the

average of these three values and report the value as the ground rod resistance.

If the ground rod resistance value needs to be reduced, than add more ground rods spaced about 6 to 8 feet apart, in a line, and connected together with #6 or larger copper wire. Then repeat the ground rod resistance check.

Another Method to Measure Soil Resistance

If the Fall-of-Potential Measurement check can not be performed, then I found another way to measure ground rod resistance on YouTube. This method is not listed in any electrical reference. A resistor is connected between 120-Volt line and the ground rod. The current is measured and the total resistance is calculated. Then the power resistor's resistance value is subtracted from the total resistance yielding the ground rod resistance. The test current should not exceed 5 Amperes.

I found several problems with the procedure. The first problem was the series resistance is a Ohmite 25-ohm, 220-watt wire wound resistor. The resistance value is a good choice, but the power rating and resistor type, wire wound, are not good choices. If the ground rod had zero ohm of resistance, then 120 volts would be applied to the series resistor. The resistor would dissipate 574 watts of power which is greater than the 220-watt rating of the Ohmite resistor. A resistor's power rating is when the resistor has a temperature of 200°C at room temperature. The wire wound resistor would be inductive which may provide incorrect current indication.

Kanthal Company has a resistor series called Gload which are non-inductive and have power ratings up to 1000 watts. These resistors need a special termination and mounting bracket available from Kanthal. This 1000-watt resistor is 24 inches long and 2 inches in diameter. Mount this resistor in an enclosure to prevent injury to the user. A power switch should be included and a 120-volt pilot lamp installed for safety.

Before the resistance check, disconnect any wires attached to the ground. An AC voltmeter will display line voltage and an AC ammeter displays the test current. The actual series power resistance value is needed. Calculate the total resistance in ohms, then subtract the series resistor's resistance. This will be the ground rod resistance in ohms. Reconnect the wires that were connected to the ground rod.

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nights using Starlink to connect to the broadcast origin. I must confess, I did take my radio et all but never set it up due to the wind and the many activities.

We did have a surprise guest, Kristen, K6WX, flew out for the day to be there for the ARRL update presentation. Rob and I transported her to and from the Blyth airport. As it turned out, she picked a great day to come as the wind picked up considerably the next day.

It was her first trip to Quartzfest and she vows that it will not be the last. As usual, Murphy had his way; the very last day was the nicest weather of the week!

From Quartzfest, several went home and others went to different locations. For myself, I went to Johnson Valley to attend and volunteer to work part of the King of the Hammers off-road race. This event combines desert and extreme rock crawling into a race. I even managed a bit of off-roading in order to find my way around the hundreds of acres of the area. I thought the weather was challenging at Quartzfest this year, HA. The first 2 days I was there, it was 26 degrees in the morning! Most mornings were somewhere in the 30's. The days would warm up to the mid 50's with a couple of days in the 60's. One night the wind was so strong, I am guessing 20~30 MPH sustained with who knows how high gusts were. Many tents and awnings suffered or gave up completely that night!

However, the racing and event was far more interesting than the YouTube videos! The number of exotic off road vehicles was amazing. As was commented to me, it's like attending a mini Burning Man except there is no organization to how and where people setup camp. The only rule, don't camp in the road, which some-



Left to Right, Front to Back
 Jeri AI6TK, Amy AI6ZU, Joanna K6YL, Janette N6DQ,
 Karen KK6NGA, Joel KD6W, Cathy, Jim K6SV

Kristen K6WX, Rob KC6TYD, Frank AF0XX

times can be hard to figure where "the road" is. Before you ask, there aren't any street signs so you better know where you setup camp before you leave as the area changes hourly.

Last month I mentioned that we'd be using the business part of the band, 150~159 Mhz, so users didn't have to be licensed. After being there, it seems that everyone is using section of the band like the old CB days! Kids were on the

air regularly using it as a toy. Others to find their campsites, and others clearly violating section 97. What a mess! Then you had the racers using it to communicate with their pit during the race. There wasn't any coordination on frequency usage that I could see. One racer was using the same frequency as the local fire repeater, oops!

It seems if you take away the ability to use a cell phone, there was next to no service in the valley especially when there were so many people there that everyone decided that the HT was the way to go. My phone has never showed "SOS" mode only before, which it did for a good chunk of the time I was there. In fact, I didn't know such a mode existed. How can these people be "converted" to using the tool correctly and being licensed? I'm not sure it's possible under the current situation. I had a long talk with the head of Medic3 who were responsible

for covering a large area of the course with his team. He was interested in getting his team licensed so they could use the ham frequencies and get away from all the chaos. We'll see if they migrate that way but it would make their emergency coms easier.

As for things closer to home, I proposed to the board in January that we hold another event like the 85th anniversary event where PAARA sets up ra-



Left to Right
 Joanna K6YL, Janette N6DQ, Joe WB6JOE,
 Gail KK6PB, Joel KD6W, Jim K6SV

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(Pres — Continued from page 4)

dios in the park. Doug, KG6LWE, mentioned having 4 events a year with one of them being Field Day. With that said, I'm happy to announce, Darryl, KI6LDM, has applied for the permit to hold another event, now called "PAARA in the park", on April 15th. So, mark your calendars to join us in Memorial Park in Cupertino. It will be much the same event as the anniversary event was but we are planning a slightly different program. Stay tuned for more information but please mark your calendar so you keep the date reserved.

I received an email from the IDXC regarding their lineup of raffle prizes. Boy, what a list they have come up with! How about an Elecraft K4D, two Icom IC-7610's, a Flex 6400, a Yaesu FTDX101D, three Yaesu FTDX10's, and four Icom IC-7300's! There are other prizes but that's a big HF lineup! I hope to see you there. If you still haven't registered, you can do so at: <http://www.dxconvention.com/index.html>.

A reminder, the April meeting will be our annual "Home Brew" night. I hope to see lots of interesting homebrew projects on display. There must be a wide array of interesting projects that were been created over the last couple of years that would be of interest to other members. Please plan to show others your creations to everyone at the meeting. Of note, the April meeting will be an **IN-PERSON**-only meeting.

I look forward to seeing a room full of smiling faces at the March 3rd meeting.

73, Jim K6SV

Get on the air to keep the airwaves alive!

February 2023 Board Meeting Minutes

Present were President Jim Thielemann K6SV, Vice President Rob Fenn KC6TYD, Secretary Ric Hulett N6AJS, Treasurer Bob Korte KD6KYT, Directors Darryl Presley KI6LDM, and Doug Teter KG6LWE. The meeting was called to order at 7:15 pm. A quorum was present.

• **President's Report** — After Quartzfest, I went to King of the Hammers in Johnson Valley — an extreme off-road event. Many kinds and classes of vehicles attend. The 'top of the food chain' is Ultra-4400, an unlimited class. My official title was 'course marshal', handling such things as crowd control, communications, veri-

fying the race rules, and keeping drones out of the area. Race communications were conducted on some business-band channels. There was significant interference from other unlicensed users. It was a bit of a Wild-West show.

Wouldn't it be interesting if we could get these folks interested in Ham radio? The Medic-3 medical aid group supports the event. They might be interested in HR as a communications mode.

• **Secretary's Report** — We have gained a few new members: Shuhan Wang KN6VKX, Jerry Kaidor KF6VB, Andrew Atwell KN6YKY, Bob Ridenour KN6YGN and George Carlton-Ridenour KN6YGW have all joined. Welcome to PAARA!

Our membership roll is up to 171 members.

Don't forget, 2023 renewal dues are now overdue — Don't leave us now! Renew by our webpage (membership tab) or by sending a check to PO Box 911, Menlo Park 94026.

• **Treasurer's Report** — Treasury activity has been low, a check was sent to the printer for PAARAgaphs.

• **VP / Program Chair Report** — Our next presentation is by Michael Walker VA3MW, from FlexRadio:

So what is FlexRadio all about? When you buy a radio, it is obsolete when you get it, but a FlexRadio is never obsolete

We had enough people in attendance at the February meeting to have a reduced raffle. We had some new members, and we had a journalist on Zoom who wanted to talk to some club members about Ham Radio.

Thanks to KG6LWE for running the Zoom half of the meeting.

Rob will check with KA6Q to see if we can list the raffle prizes on the PAARA website.

Old Business

• Our editor is running out of PAARAgaphs articles: Members, please write up your ham radio experience and send to Jim K6SV. There are no articles in the pipeline!

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• Education Committee

Darryl has e-mailed the board proposing an HF antenna project. Members can construct a 10,15,20 meter dipole antenna, measure it, and put it on the air. We agreed to have the exercise at the next PAARA-in-the-Park event.

• Los Altos antennas & towers, Doug will contact the owners to see if they need our services.

• Members should plan to attend the IDXC convention in Visalia, April 21-23. If you're a DXer or interested in any aspect of Ham radio, then IDXC is the place to be. Top DX operators (and contesters) from around the world will be there. The raffle prizes include multiple IC-7610, IC-7300 and FTDX10 transceivers, a Flex 6400, and the grand prize is an Elecraft K4D.

• N6AJS has been updating the references and links to other clubs on the contact page in PAARAgaphs.

• PAARA homebrew night will be at the April meeting. We will have Visa gift cards for the 3 top projects.

• Members, Let's make sure we have our badges on during meetings. It helps new people identify members when they drop into meetings.

New Business

• Field day progress: Doug has contacted the City of Menlo Park. There may be a fee for the special event permit at Bedwell Bayfront Park. The board approved spending for the park permits, if needed. We will plan on class 2A plus GOTA.

• When should we plan on another PAARA in the park event? April is the target date. The board approved spending \$113 for a park permit. Darryl will determine available dates.

The meeting was adjourned at 9:20 pm

Respectfully Submitted

Ric Hulett N6AJS
 PAARA Secretary



Raffle Winners, Left to Right

| | |
|---|------------------------------------|
| Ben Glick, KN6UBF won the Antenna then gifted it to Andrew Atwell | Dual Band Signal Stick Antenna |
| Dean Miller, KJ6IWI, | EDCFANS Utility Knife |
| Keith Swaney, K1OKS | Nitecore NB 10000 GEN 2 Power Bank |

PAARA



1st



Nano VNA-H4 with touch screen

2nd



FLUKE-101 Digital Multimeter

3rd



Double Sided Box Organizer

Palo Alto Amateur Radio Association, Inc.

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 Technical Tips..... Ric Hulett, N6AJS
 Photographer *Position Vacant*

VE Exams

De Anza Park, Sunnyvale, 2nd Saturday 10:30 am each month except November and December. See website for details and exceptions: <http://amateur-radio.org>

Electronics Flea Market (ESM)

Sponsorship: Association of Silicon Valley Amateur Radio Organizations (ASVARO)
 The Electronics Flea Market is seeking a new location. Until that is resolved, the EFM is on hold. Website: <http://www.electronicfleamarket.com/>

PAARA — Palo Alto Amateur Radio Association

Meets 1st Friday 7:00pm each month at Room H-6, Cubberley Community Center; Net 145.230 - PL 100Hz Mondays at 8:30. See website at <http://www.paara.org>. For more information. contact: Joel Wilhite KD6W, KD6W@ARRL.NET, 650-325-8239

FARS — Foothills Amateur Radio Society

Meets 4th Friday each month at 7:00pm at Covington School, Los Altos. Website: <http://www.fars.k6va.org>

NCDXC — Northern California DX Club

Meets 3rd Thursday 7:00pm each month, Repeater for member info 147.360. Contact president@ncdxc.org. Website: <http://ncdxc.org>. YouTube content: "The Northern California DX Club Official Channel". Cohost of the International DX Convention.

The 50MHz & Up Group of Northern California

This organization specializes in vhf + wak signal and microwave activities. Meetings are held on the first Tuesday of each month. Time is usually 5pm for in person meetings, and 7pm for Zoom only meetings. In person meetings are held Sports Basement, 1177 Kern Ave, Sunnyvale. Always check the website, <http://50MhzandUp.org>, for correct information. Zoom information is also there.

San Mateo Radio Club W6UQ.ORG

Meets, 3rd Friday, January through November.
 Tuesdays & Thursdays, [Directed] Net, 7pm, N6ZX 145.370Hz, -600KHz, PL107.2Hz
 Contact: SanMateoRadioClub@gmail.com, Website: <http://W6UQ.org/calendar>

SPECS

Southern Peninsula Emergency Communication System users Group

Meets each Monday 7:30pm and 8:00pm.
 See: <https://specsnet.org/monday-night-net> for more info.
 Contact: <https://www.specsnet.org/contact> or board@specsnet.org

SCARES

South County Amateur Radio Emergency Service

Meets 3rd Thursday 7:30pm each month, Belmont EOC, Belmont City Hall, One Twin Pines Lane, Belmont CA 94002. Net is on 146.445 [PL 114.8] & 444.50 (PL-100) 7:30 Monday evenings. Contact: President Gary D. Aden, K6GDA 650-743-1265 (D), 650- 595-5590 (N)
 Web: <http://k6mpn.org> E-mail: pres@k6mpn.org

SCCARA

Santa Clara County Amateur Radio Association

Operates W6UU & W6UU/R, repeater 146.985-pl
 Nets: 2m, 7:30pm Mon; 70cm, 10M (28.385) 8PM Thur.
 Meets 2nd Mon each month @ 7:30 PM.
 ARRL/VEC license testing contact 408-507-4698

SVECS — Silicon Valley Emergency Communications

Operates AA6BT repeater (146.115 MHz+)
 Website: <http://www.svecs.net> or contact: Lou Stierer WA6QYS 408 241 7999

WVARA — West Valley Amateur Radio Association

W6PIY six-meter repeater on 52.58MHz. Normally, six-meters is linked with 147 and 223, while 441 and 1286 repeaters are linked.

VHF: 52.58 (-500) 151.4 ctcss UHF: 441.35 (+5.0) 88.5 ctcss
 147.39 (+600) 151.4 ctcss 223.96 (+1.6) 156.7 ctcss 1286.20 (-12m) 100.0 ctcss

Meetings are 2nd Wednesday of every month except July, August and December.

Website: <http://wvara.org>. Contact: info@wvara.org

(Please send changes to PAARAgaphs editor)



PAARA Weekly Radio Net

Info and Swap Session
 every Monday evening at 8:30pm
 on the N6NFI 145.230 MHz repeater

Week Control Operator

| | |
|-----------------|---------------|
| 1 st | Doug - KG6LWE |
| 2 nd | Doug - KG6LWE |
| 3 rd | Ric - N6AJS |
| 4 th | Rob - KC6TYD |
| 5 th | Rob - KC6TYD |

If you're interested in trying out at Net Control, Contact Doug, KG6LWE. It's good practice, and lots o' fun! Give it a try.

**Meeting Location — Middlefield Road
 between San Antonio and Charleston in Palo Alto. 4000 Middlefield Road**

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KJ6GUK General License, PAARA member

777 Woodside Rd., Suite B, Redwood City, CA 94061

Email: KARLDRESDEN@juno.com

Palo Alto Amateur Radio Association P.O. Box 911, Menlo Park California 94026-0911

Club meetings are on the first Friday of each month, 7:00pm at the Room H-6, Cubberley Community Center.

Radio NET & Swap Session every Monday evening, at 8:30pm, on the 145.230 –600 MHz repeater, PL 100Hz.

Membership in PAARA is \$25.00 per calendar year, which includes one subscription to PAARAgaphs \$6 for each additional family member (no newsletter).

Make payment to the
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NOT A CLUB, CLOSED GROUP OR CLIQUE; AMATEUR RADIO OPERATORS AND FRIENDLY PEOPLE ARE ENCOURAGED TO ATTEND!
 Call in on the N6NFI Repeater, 145.230 MHz, PL® 100Hz

Submit items to
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The cost for a badge is \$25.00.

PAARAgaphs Ad Rates

PAARAgaphs accepts paid advertisements from non-members. (short personal ads remain free for members in good standing). All ad rates listed are per issue.

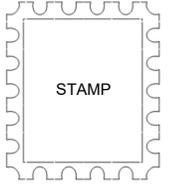
- Not-for-profit ads by association members for ham-related items and wants. No cost for business card-size ads (additional space at \$2.50 per business card size per issue).
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These fees may be reduced or waived in exchange for a valuable consideration that is given to the Association or its general membership. Such consideration must be in addition to any existing arrangements with the association. The PAARAgaphs editors reserve the right to reject any ad deemed to be not in the best interest of the Association.

All fees payable in advance by the year with "scanner-ready" copy or text-only ads. Give payment and copy to Walt Gyger, K6WGY.

PAARAgaphs — March 2023

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