

PAARAgraphs



The Official Newsletter of the

Palo Alto Amateur Radio Association, Inc.Celebrating 84 years as an *active* amateur radio club—*Since 1937*

A Reflection & Tips on Optimizing Your Station

Bob Heil, KN9EID

A reflection of one's many contributions to the sound industry and amateur radio. Bob will share stories from his earlier days as an organizer, to working with famous musicians and the advancement of their sound. Of course, we can't forget about his superior audio products for your ham shack. Bob promises to leave you with new tips on optimizing your station.

First licensed in 1956, Amateur Radio has been the foundation of his careers in the sound reinforcement industry as well as bringing high quality, articulate audio to Amateur Radio. Entering this great hobby during the best sun spot cycle helped me to focus on designing and building one of the first VHF SSB KW stations. Throughout the years, I have enjoyed designing many antennas, from the 128 element two meter "J" Beam array in 1960 to the latest -phased arrays on 40 and 75 meters. I enjoy all of the bands from 160 meters through two meters working my many friends and especially newcomers to this great hobby. Heil Sound is honored to be the only manufacturer in the Rock n Roll Hall of Fame.

This meeting will be conducted with Zoom


Time: April 2, 2021 07:00 PM Pacific Time

<https://us02web.zoom.us/j/89753640741>

Login ID: First name and Call Sign

Meeting ID: 897 5364 0741

Upcoming Events

• April 2	PAARA General Meeting, 7:00 PM
• May 7	Zoom Meeting
• June 4	
• April 21	Board Meeting, 7:00 PM.
• May 19	Everyone welcome! Zoom Meeting,
• June 16	eMail President for details!
• April	Electronic Flea Market Cancelled

President's Corner

April 2021

Now that spring is in the air; flowers are giving us a wonderful display of color and pollen is making our sinuses unhappy but the sweet smells that fill the air are wonderful. I have a large Wisteria plant along our entryway and around the front of our house. The marvelously fragrant long purple and white blooms greet us daily for a couple of weeks and are a sight to behold before becoming yet one more thing to clean up.



This month we are honored to have Bob Heil, KN9EID, of Heil Sound and Ham Nation as our presenter. Bob's informative talk is on his life experiences as well as real-world demonstrations on the differences between microphones as they relate to ham radio. If you ever won-

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IF Radios for Microwave and the IC-705

By Joel Wilhite KD6W

I enjoy building and operating radios for contesting, mostly on the microwave bands. Somehow, most Elecraft kits are too much like cheating. I'm talking about crafting parts with your own hands and chasing grid squares as a rover. Both of these aspects are very rewarding experiences and when combined makes you responsible when it works or doesn't. Another aspect is the team effort knowing all the stations are dealing with the exact same rules where rovers rely on the mountain top operators. After all, it takes two to tango. We each learn from the experience of building and operating together. My experience as a rover has taught me how to minimize a myriad of variables, any of which can break a QSO. Rovers move to activate grids, mountain tops are much like campers monitoring the liaison radios. All newcomers will want to understand how to avoid being disenfranchised. To make a QSO you need three things, your location, their location and what frequency you agree to operate on. All of this takes coordination and some luck. The microwave bands are the perfect combination of building your design before you can operate it. You will want to incorporate certain capabilities to be more successful. To start with, your microwave rig will utilize a kit or a store bought IF rig. This doesn't mean you can't build your own IF rig, but with so many great radios to choose from on the market, the question then becomes which one? I developed a list of three main criteria with other desirable features to select an IF rig. The three main criteria are

- All Mode capability – this eliminates most handhelds for all but short-range FM
- Frequency stability and accuracy – I know this is two different items but read on
- Low power consumption – this eliminates most of the power-hungry bigger rigs

All mode radio operation is essential for work-

ing in the varying conditions typically found on the microwave bands, CW being the obvious choice for operating in very weak conditions. Other modes like FM or AM take advantage of atmospheric characteristics like rain scatter and cloud scatter, while SSB is easiest for making quick contacts. By not having CW mode a Morse key and headphones capability will limit the operator from making the longest DX QSOs.

The second point I consider is the need for both frequency stability and accuracy. I consider these as a single criterion knowing they are two different characteristics mostly because one affects the other and while operating during a microwave contest the IF rig will likely experience a wide temperature range exceeding 40 degrees Fahrenheit in some cases. Stability is needed to hold the frequency once you find it across the wide temperature swing while being outside. If one can't find the radiation you don't want it to be while tuned to the wrong frequency. Most operators know their rigs and most are within +/- 100Hz but there is always one or two odd balls which can be as much as 1000 Hz or more off frequency. You will want to fix this if it turns out to be your rig. A microwave activity day will help you calibrate. But then once you know the offset, you will want the rig to settle in the same spot after some amount of warm up time and so by having a local reference which runs in a heated state (well above ambient outdoor temperatures) to lock the rig is a must. Both of these attributes

My third criteria may not seem as high a priority compared to other mentionable attributes, but since most microwave rigs are running on batteries and sometimes for long hours this can be a great cause for concern. Say your battery is the one in your car, you don't want to strand yourself by having a rig which idles at high current to drain the only battery you have to start your car. The IF rig in the microwave rig is the dominating current load at idle

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next to any crystal heaters employed to lock the radio. The microwave contest will have some amount of idle time while the rovers move to their next grid.

With these three criteria, other desirable features come to mind like how the PTT can be extracted and how compact or light weight the design is, to how good the audio is. There are times when the rover will make a stop parked off to the side of a road with trucks going by, which can get loud.

There are many all mode rigs to choose from, but we will focus on the most portable radios like the ICOM IC-705, the Elecraft KX3 and the FT-817ND (now FT-818) as they tend to have the lowest current draw as well. Like Brian W6BY and Andreas N6NU, I also plunked down the big bucks on the IC-705, we all paid over \$1350 with tax and shipping. However, the IC-705 is a very compact, clever design and IMHO, a very good IF radio choice with good performance. I say very good as the price is very high, setting the bar very high for considering this as an IF radio since other radios are much lower cost. The IC-705 as a solution for microwave IF rig however can easily be justified with the more seasoned operators.

The shape of the design is the first thing you notice, it's unlike any other radio ever designed. The dimensions are much like the shape of most modern oscilloscopes, big face, reduced depth. Unlike most radios the ICOM radios and specifically the IC-705 have a touch screen front panel along with the other familiar knobs, the main tuning knob is the biggest one. To me the touch screen is awesome and anybody who has ever operated satellite on the IC-9700 knows what I'm talking about. Perhaps a little challenging in daylight, but who can't make a sunshade with their hand to make seeing the display easier to see the waterfall details. Anyone can easily recognize the advantage the fish finder spectrum scope brings to our game, when you can see the carrier, you can touch the spot where the

carrier is and the radio snaps on frequency. It's much like shooting fish in a barrel. And like Brian, I too have been using my trusty FT-817ND for all the years I have been roving the San Joaquin Valley chasing QSO's. Some of you have seen my rig, most of you have worked it. Thanks for all the QSOs. I have been using the Yaesu FT-817 as an IF rig and it has been reliable, and I have zero complaints. I would estimate maybe one third of all the microwave operators I know use the same FT-817 as their IF radio too, I see the Yaesu FT-818 will likely continue to dominate the IF rig market. Before it was released, I speculated the price of the IC-705 would be around one thousand dollars as I had paid just under \$1200 for my IC-9700. When I found out the IC-705 was even more, it reinforced my belief, ICOM knows most hams are addicted to having the latest radio technology and will exploit this in their pricing. I'm working on building more microwave rigs and when I found another FT-817 at the flea market I couldn't resist as it was a great price and snapped it up so I can build more rigs. On the other hand, I also want to up my game and pull in any extra advantage to help with finding and making more successful QSOs so like others, the IC-705 intrigued me so much I burned up my credit card.

I too wanted to leverage the advantage of a waterfall, but I didn't want to lug a laptop around while roving as I use my cell phone to get my location and bearings. I have also considered and looked at the KX3+PX3 with the 2m option but I came to the same or similar conclusions as others. The Elecraft radio combination is very nice but is a little more cumbersome and power hungry and even MORE expensive than the IC-705!

Back to my rover rig design, I fabricated a metal shelf to strap the FT-817 radio down with to keep it securely fastened from bouncing around. To integrate any other radio means I must change the shelf. In the case of

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the 705, I can use a simple plate and secure it with a single 1/4 20 or with four M4 screws. The 817 has an accessory port on the back which includes a dedicated pin to send PTT output which I use to trigger my home-made sequencer. This way, I avoid the need to modify the rig to inject DC bias up the coax. This also means I need to find the equivalent pin on a new rig if I choose to replace it. The IC-705 has a connector with "SEND". But now comes the confusing part.

On closer examination of the 705 manual the drawing has a label for the pin which says "SEND (I/O)" though the pin description above only says "SEND" and says it is an output only. But if the drawing is correct, this implies a PTT input signal is also possible on this pin. But when I read the sentence in the 705 manual it says nothing about the pin being an input. So ICOM, which one is it? Did they cut and paste the artwork from the 9700 manual into the 705? Or is the wording for the SEND pin in the 705 manual incomplete?

When I read the 9700 manual and errata, the ACC connector has a more comprehensive definition for SEND (I/O) pin which includes sections for both input and output behavior. This tells me, whichever pulls the pin low first commands the radio. The pin both senses a low level input OR pulls the pin low when the radio is in TX.

I tested this on my 705 and when the radio is in TX the output is low, but when the radio is in RX mode the tip potential is high impedance. When I pulled the pin low the radio goes from RX to TX. Surprise! The ICOM tech writer for the IC-705 manual must have forgotten that little detail as the pin acts like the behavior described in the IC-9700 manual. This is what I was looking for. The IC-705 does include a micro USB jack which serves MANY features, one being a DC power input port to run and charge the internal battery but more on the serial interface later. I'll write more about this and other deeper features lat-

er.

Like the IC-9700, the IC-705 has the ICOM front panel display making all of the soft menus easy to navigate. One must get familiar with the hard buttons for specific functions. The display includes a top row of notation and the display modes come with multiple screen presentation configurations. The generic layout is simple but with a few menu changes can be set to be very dense. The radio comes with 3 multi selector knobs and the big knob dedicated to tuning only. CW mode supports full break in and has options for straight key input and paddles with speed adjustable rate from 6 to 48 WPM. The radio is very compact and packed with features and best listed out as pros and cons.

Pros:

Front facing speaker, good volume.

Separate speaker output mini phone jack and micro phone jack for microphone and PTT input.

Large 4.3" touch screen, color display, supports waterfall RF and waterfall and spectral display audio display, in English or Japanese

Comes with a small combo Speaker/Mic, with output port selection for external speaker, headphone or line level

Frequency Stability is < +/- 0.5ppm from 14F to 140F (e-gads!) with 1Hz tuning steps and RIT +/- 9.99kHz

Built in GPS receiver and SD memory Card slot (user provides micro SD memory card)

Built in QSO logging stamps with GPS time/coordinates, Altitude, Speed, Temperature, Barometric,

Direct sample receiver up to 25MHz, with single and double conversion to cover all the bands,

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Can charge from micro USB or 12 volts, easily accessible BP-272 Li-ION 1880mAh (14Wh) battery {Made in Japan, Assembled in China}

BNC antenna port, ground lug screw, other jacks include SEND/ALC, ANT tuner, keying CW/RTTY

Connectivity via WiFi 802.11 b/g/n to remote control the entire rig using ICOM RS-BA1 remote software installed on any Windows laptop in the world.

Connectivity via Bluetooth V4.2 for ICOM VS-3 headset (sold separately) eliminates all the dangling wires

Connectivity via micro USB port in A or B modes (watch for more detail description later)

Each operating mode has three ranges of pass band filters (in software, all adjustable)

Built in voice recorder and playback from memory, helps record those record breaking QSOs

Has numerous memories, allows user to recall grid square locations once they are recorded.

2M/440 all modes including D-Star with SSB/CW sensitivity < -19dBuV, FM (@12dB SINAD) < -15uVdB w/preamp on (both same as the 9700)

600mA on receive with audio, front screen, WiFi, BT, GPS all on, < 500mA when squelched, screen saver on and WiFi, BT and GPS disabled

Has mounting holes on bottom of case for a tripod mount and foam rubber foot pads.

Cons

Expensive but its really small so it's easier to hide from the wife.

About 500 menu items and settings, this thing is LOADED with features and functions and

includes a reset to default.

Front end is sensitive and has an attenuator as it is easily over-driven in the presence of strong RF but are NOT available on 144/440.

Larger face compared to FT-817 (width and height) but half as deep and slightly heavier

LCD screen may be washed out in direct sunlight (show me an LCD screen that doesn't) and easily scratched.

No option for adding DC keying up the coax (but neither did the FT-817 unless modified).

No PTT direct output pin (neither does the IC-9700).

No internal antenna tuner (but neither did the 817 or 9700).

Has RF birdies (spurious signals) and says so in the manual (page ii) 3 of them on 10m, 7 of them on 6m and one on 440 (438.602).

Lithium ION batteries are not happy in the heat like what we get in the SJV, but it does make a great emergency flare in a pinch.

I'll write up more later after I research how I can extract PTT interface through USB options. The key here is the USB interface has access to most of the radio features (CI-V protocol) so I want to understand what all the options are before I go hacking around with a soldering iron. Another interesting feature is the built in AMBE+2 voice coder technology, specific to specification of ICOM D-Star. Though D-Star technology is not as energy efficient when compared to SSB, D-Star protocol does include a robust FEC to overcome bit errors putting it on par or exceeding FM quieting for intelligibility. Some say the sound is too mechanical, but who cares about voice fidelity when it comes to squeaking out a weak signal QSO and providing yet another category for DX, digital voice.

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dered how to optimize the sound of your station, this is a presentation not to be missed. I'll be adjusting a few meeting items to make a little more time for his informative presentation.

As you'll read in the board minutes elsewhere in this issue, you'll see a reference to PAARA as a club of experienced hams with very diversified interests in the hobby. One of the areas that I see as "missing" in the hobby is a structured program to help the new ham answer the question, "what now"? This inevitably is the first question once one obtains their license. Yes, there is the informal process of finding an Elmer to help but the process of finding an Elmer doesn't work for everyone. Or maybe you attend a meeting at a club like ours and are overwhelmed with the higher level of conversations. Over the years, I've been approached by members or prospective members asking "what now", or "how do I operate and make contacts"? I've assisted a few in answering their questions. It's time some group does better and proactively offers assistance on an ongoing basis.

At the board meeting, I proposed setting up, what was voted on and approved, an education committee to establish a curriculum targeted at the new technician first followed by a program for the new general. Rob Fenn, KC6TYD, stepped forward to lead the development and implementation of this program. He's reaching out to a couple of members he feels would be interested in assisting him with this endeavor. He needs more members to step up and get involved in creating the curriculum, teaching the classes, and getting the word out. Please reach out to him and offer your assistance in whatever way you can, even if you're a new ham. We need input on what questions new hams, young or older, have on their minds after getting a license so we can provide the most rounded and complete class possible.

If you attended our last Zoom Club meeting, you participated in a new "event" during the meeting. Before the presentation, I broke the attendees into smaller groups, ~8 attendees per group. The idea of breaking out the attendees into smaller groups is similar to a coffee break

during a meeting in that participants can mingle with other attendees. The experiment was well received. We can thank Clark, KK6ISP, for the idea. Several questions about the process have been asked. "How do you break everyone into groups"? Fortunately, Zoom has a breakout meeting function. The moderator can select the number of groups and assign people to each group or let the software randomly assign participants to the groups. I chose the latter as it's much quicker. "Can an attendee choose a group or jump between groups"? No, attendees can't choose a group nor can they jump between groups. From my perspective, this is fine as an attendee doesn't know who they will be with and opens the door for more mixing of attendees than might happen at a meeting. One never knows who they might meet in a group that they might not meet at an IRL meeting. As the moderator, I determine the amount of time spent in groups. At the last meeting, I sent a warning out about 8 minutes into the breakout session that in 2 minutes the groups would close. The software allows 1 minute for people to rejoin the main group. I asked if the ~10 minutes is the correct amount of time. A few want it longer and one would like to see 2 different breakout sessions done with each being a bit shorter. For this next meeting, I think I'll keep the breakout time at about 10 minutes so we have more experience with the idea. The other reason is our presentation is a little longer than they usually are thus we could use the time elsewhere.

73, Jim K6SV

Get on the air to keep the airwaves alive!

Mar 17, 21 Board Meeting Minutes

Please take the Field Day Interest Survey: tinyurl.com/PAARA-FIELD-DAY

The March board meeting was held online, via Zoom. The meeting was called to order at 7:06 p.m. Attending were: Jim Thielemann K6SV, President; Rob Fenn KC6TYD, Vice President; Ric Hulett N6AJS, Secretary; Bob Korte

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KD6KYT, Treasurer; Doug Teter KG6LWE, Walt Gyger K6WGY, Darryl Presley KI6LDM, Joel KD6W, Directors, and Mikko Sannala, AB6RF. A quorum was present.

President's Report: PAARA is a strong club with a large number of seasoned hams. But, are we reaching out to the newer hams as much as we should? No other clubs that I know of have active outreach programs. (With COVID, this is challenging at best). We should have a program ready to launch when we can meet again in person. I refer to an article from October 2020 QST, "Amateur Boot Camp": The goals: Guided practice making contacts on the air: Help to overcome "mic fright": Help choosing equipment for their first VHF/UHF or HF station. I know that a large number of hams get licensed and then don't get on the air. We sometimes lose new hams after one or two meetings because we aren't addressing their "needs". As the friendliest club, we can do better at this.

After discussion, the board voted to establish an education committee, with Rob KC6TYD as coordinator. Rob will reach out to other club members for support.

Secretary's Report: Membership renewals continue to roll in. This month, we will send reminder postcards to members who have not yet renewed.

Ric N6AJS created a survey to gauge the club's interest in Field Day activities.

So far, 15 surveys have been received. The preference is for operation either from Bedwell Bayfront Park (as in past years) or at a more secluded site at Doug's KG6LWE property in San Martin.

Treasurer's Report: Our main expenses have been for printing and postage for PAARAgaphs. Club dues and expenses are approximately in balance.

Vice President / Program Chair's Report: We renewed our request for the meeting room at Cubberly community center. We have not received a response yet.

When we meet again in person, we plan to continue zoom media for people who cannot attend. We will need video, a laptop and a good internet connection. Rob KC6TYD will investigate this.

This month's speaker will be Bob Heil, K9EID, founder of Heil Sound.

Old Business:

PAARA members are reminded that we always need interesting, ham-related stories for PAARAgaphs. If you have a topic, please put pen to paper and submit an article (short or long) to Jim, K6SV. After this issue, he doesn't have any stories.

900 MHz repeater status: Repeater is online, with good coverage across the peninsula, up as far as Menlo Park. Congratulations to Joel KD6W for his work on this project.

We will be videoconferencing the next club meeting on April 2nd.

Electronic Flea Market: EFM is on hold at this time. ASVARO will need to determine when we can resume markets, and locate an appropriate site.

New Business

PAARA meeting breakout sessions: The consensus of the board was that these were interesting and valuable as a club activity. The conversations were good. We will consider extending the breakouts to 15 minutes.

Article for next PAARAgaphs: Joel will write an article on our new 900 MHz repeater.

PACIFICON (Mikko AB6RF): No participation in MDARC meetings yet this year. If Pacificon is held, PAARA may operate the special event W1AW/6 station again. We need to be sure that we can provide a team of volunteers to make this successful. Covid-related restrictions remain a concern.

The meeting was adjourned at 8:40 pm.

Respectfully submitted,

Ric Hulett N6AJS
PAARA Secretary

Palo Alto Amateur Radio Association, Inc.

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Appointed Positions

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Public Affairs	<i>Position Vacant</i>	
Station Trustee W6OTX, W6ARA....	Gerry Tucker, N6NV	
Station Trustee K6YQT...	Doug Teter, KG6LWE	650-367-6200
Station Trustee K6OTA...	Ron Chester, W6AZ	
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Photographer	<i>Position Vacant</i>	

VE Exams

Redwood City Main Library, Community Conference Room, 4th Saturday 10:30 am each month and 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> or Contact Al, WB6IMX@att.net

Electronics Flea Market

Sponsorship by A.S.V.A.R.O. — Association of Silicon Valley Amateur Radio Organizations

Second Saturday of month, March-September, 6am–12 noon
 Contact: <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 our website at <http://www.paara.org> for more information or contact: Joel Wilhite KD6W, KD6W@ARRL.NET, 650-325-8239

FARS — Foothills Amateur Radio Society

Meets 4th Friday each month at 7:30pm
 Contact: <http://www.fars.k6ya.org>

NCDXC — Northern California DX Club

Meets 3rd Thursday 7:30pm each month,
 Repeater for member info 147.360, Thursday 8:00PM
 Contact: <http://nodxc.org> or Mike Gavin W6WZ, (650) 851 8699

50 MHz & Up Group

Meets 1st Thursday each month at 7pm in the Summit Room at the Sunnyvale Sports Basement, 1177 Kern Ave, Sunnyvale
 Contact: <http://50MhzandUp.org>

SPECS

Southern Peninsula Emergency Communication System

Meets each Monday 8:00pm on Net 145.27, 440.80 MHz
 Contact: <http://specsnet.org> or Tom Cascone, KF6LWZ, 650-688-0441

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+)
 contact: <http://www.svecs.net> or Lou Stierer WA6QYS 408 241 7999

TEARS — The Elmer Amateur Radio Society

Dedicated to operational training, knowledge building & FCC exam testing.
 KV6R repeater under construction.

Contact: AA6T@ARRL.NET

Most members are Extra Class or VE's. See QRZ dot com/kv6r for class info

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 1286.20 (-12m) 100.0 ctcss
 223.96 (+1.6) 156.7 ctcss

Meetings are 2nd Wednesday of every month except July, August and December.
 Contact: <http://wvara.org>, Bill Ashby N6FFC, 408-267-3118, president@wvara.org

American Red Cross, Santa Clara Valley Chapter

Contact: <http://santaclaravalley.redcross.org> or Scott Hensley KB6UOO, (408) 967 7924 shensley@Novell.com

(Please send changes to PAARAgaphs editor)

WE ARE PLEASED TO ANNOUNCE
THE NEXT CHAPTER FOR US:

HSC HAS SOLD TO

EXCESS SOLUTIONS!



That's right!

- ✦ Halted Specialties Co., Inc. has sold HSC Electronic Supply to Excess Solutions of San Jose...making the biggest surplus electronics store in the Bay Area!
- ✦ Much of the millions of parts seen on HSC's shelves will be showing up soon on Excess Solutions' shelves...for your electronic needs.
- ✦ Techs, Developers, Experimenters, Hobbyists and Creators will once again have access to the basic parts that Silicon Valley was built upon!
- ✦ Support your local surplus store...there are few left, and you know how much this Silicon Valley resource is needed!

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(Diagonally across intersection from Spartan Stadium)

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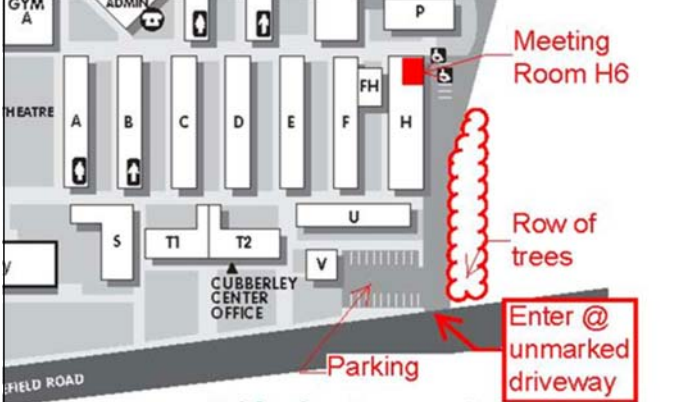
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PAARA Weekly Radio Net

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

Week	Control Operator
1 st	Joel - KD6W
2 nd	John - W6JMK
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.



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 650/856.8756 fax
 www.cityofpaloalto.org

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 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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PAARAgaphs Ad Rates

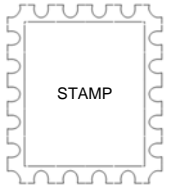
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All fees payable in advance by the year with "scanner-ready" copy or text-only ads. **Give payment and copy to Walt Gyger, K6WGY.**

PAARAgaphs — April 2021

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