

# PAARAgraphs



The Official Newsletter of the

**Palo Alto Amateur Radio Association, Inc.**Celebrating 74 years as an *active* amateur radio club—*Since 1937***Next meeting!  
JULY 8, 2011****Richard E Barber  
Anritsu  
RF Mixer Design****PAARA "The Friendliest Club Around"  
Palo Alto Amateur Radio Association, Inc.  
[www.paara.org](http://www.paara.org)****Date and Time: Friday, July 8<sup>th</sup> at 7 p.m.  
Menlo Park Rec. Center  
700 Alma St., Menlo Park, CA  
Welcome Members and Visitors  
Raffle Prizes****FIRST PRIZE:** SignalLink™ USB Sound Card - Radio Interface**SECOND PRIZE:** Mirage B-34-G 2 meter Power Amp**THIRD PRIZE:** GRUNDIG TRAVELER II DIGITAL G8 AM/FM/LW/ Shortwave Radio with World Time & ATS (Auto Tuning Storage)**FOURTH PRIZE:** West Mountain COMspkr**FIFTH PRIZE:** Pocket Reference / Thomas Glover**SIXTH PRIZE:** NARCC Northern CA Repeater Directory**SEVENTH PRIZE:** Two Dog Bone Insulators

Since (Feb. 2003) 215 Radios, including FOUR Elecraft K3's, a Yaesu FT-847, an Icom 706 MK IIG, a Yaesu FT-897D, and TWO Elecraft KX1's have gone to Fellow Hams.

Special Thanks to Bob, Howard, Jon, Mark, and everyone at HRO for their continued SUPPORT!

K6AK Jim

## President's Corner

July 2011

CQ Field Day CQ Field Day  
W6ARA Whiskey Six America  
Radio America. Yes, Field Day 2011 is nearly upon us as I write this, and it looks like PAARA is in great shape for another KB effort this year. The sunspot forecast isn't exceptional, but it's not bad either. There is a large sunspot group rotating in now (# 1236), and that should just barely remain with us through FD weekend. There are two more active regions on the far side that will rotate towards us through the remaining days. That may support some 10 meter propagation if we're lucky.



I hope that some of you had a chance to attend the recent first annual East Bay Section Convention, held at the California Historical Radio Society museum station KRE in Berkeley. I was privileged to speak there in the morning about the iPad PSK31 project. The museum was packed with hams despite the rain, which put a damper on the swap meet right outside of the building. Attendance was so good that it was universally agreed that we need to find a bigger venue for next year. I'm sure that the EB Section Manager Jim Latham, AF6AQ, would welcome any suggestions. I also enjoyed the talk that followed mine by Bruce Perens, K6BP, on Codec2: New Codec for Digital Voice. After hearing some of the implementation details of this codec, I immediately started to think of things to try to

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**PAARAgaphs—July 2011**  
**Celebrating 74 years as an active ham radio club—Since 1937**

**Palo Alto Amateur Radio Association, Inc.**

PO Box 911 Menlo Park, CA 94026

**Officers**

President ..... Kristen McIntyre, K6WX 510-703-4942  
 kristen@alum.mit.edu  
 Vice President ..... *Position Vacant*  
 Secretary ..... Rick Melrose K6RDM 408-341-9070  
 k6rdm@arrl.net  
 Treasurer ..... Ron Chester, W6AZ 408-243 2221  
 ron@taxhelp.com

**Directors**

Director ('12) ..... Rob Riley, K1GINR 650 799-1607 (cell)  
 k1ginr@arrl.net  
 Director ('11) ..... Byron Beck KG6UOB 408-369-1913  
 kg6uob@arrl.net  
 Director ('11) ..... Marty Wayne, W6NEV 408-246-7531  
 w6nev@arrl.net  
 Director ('11) ..... Larry Rebarchik N6DB 650-465-8210 (cell)  
 n6db@arrl.net

**Appointed Positions**

Membership ..... Vic Black, AB6SO 650-366 0636  
 ab6so@smrn.com  
 Database ..... Rick Melrose K6RDM 408-341-9070  
 k6rdm@arrl.net  
 Chaplain ..... *Position Vacant*  
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 bob@rgktechsales.com  
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 Field Day Coordinator ..... Doug Teter, KG6LWE 650-367-6200  
 ASVARO Rep. .... Rolf Klibo, N6NFI 650-856-2748  
 n6nfi@arrl.net  
 Webmaster ..... John Miller K6MM  
 webaron@gmail.com  
 Technical Coordinator ..... Joel Wilhite, KD6W 650-325-8239  
 kd6w@arrl.net  
 QSL Manager ..... Rob Riley, K1GINR 650 799-1607 (cell)  
 k1ginr@arrl.net  
 Speaker Coordinator ..... *Position Vacant*

**PAARAgaphs Staff**

Editorial Board  
 Robin Yee K16YTA Kristen McIntyre K6WX  
 Ron Chester W6AZ Vic Black AB6SO  
 Joel Wilhite, KD6W  
 Editor ..... Robin Yee, K16YTA  
 K16YTA@arrl.net  
 Ass't Editor ..... Bob Van Tuyl, K6RWY 408 799-6463  
 rrvt@swde.com  
 Advertising ..... Ron Chester, W6AZ 408-243-2221  
 ron@taxhelp.com  
 Member Profiles ..... *Position Vacant*  
 Technical Tips ..... Vic Black, AB6SO 650-366 0636  
 ab6so@smrn.com  
 Photographer ..... Bill Young, K6VVO  
 jdsinger@sbcglobal.net

The new member to be welcomed this month is:

Randy Scarborough K6RGS Palo Alto

**VE Exams**, 3rd Saturday each month, 10:30AM, 145.23-

PL=100Hz  
 Redwood City Main Library, Community Conference Room  
 1044 Middlefield Road, Redwood City, CA  
 contact: <http://amateur-radio.org/> or 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-October, 6am-2pm  
 Howard M. Krawetz, N6HM 650-856-9761  
 Contact: <http://www.electronicfleamarket.com/>

**PAARA** Palo Alto Amateur Radio Association

Meets 1<sup>st</sup> Friday 7:00pm each month at Menlo Park Rec. 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 4<sup>th</sup> Friday each month at 7:30pm  
 contact: <http://www.fars.k6va.org/>

**NCDXC** Northern California DX Club

meets 2<sup>nd</sup> Friday 7:30pm each month,  
 repeater for member info 147.360, Thursday 8:00PM  
 contact: <http://ncdxc.org/> or Mike Gavin W6WZ, (650) 851 8699

**QCWA Chapter 11**

Northern California Quarter Century Wireless Association  
 Meets third Wednesday monthly at Harry's Hofbrau in Redwood City @ 11:30 AM.  
 Guests are welcome. Saturday morning net on 146.850 MHz, PL 114.8

**NorCalQRP** Northern California QRP Club

meets 1<sup>st</sup> Sunday each month  
 contact: <http://www.norcalqrp.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 3<sup>rd</sup> Thursday 7:30pm each month, San Carlos City Hall.  
 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](mailto:pres@k6mpn.org)

**SCCARA** Santa Clara County Amateur Radio Association

Operates W6UU & W6UU/R, repeater 146.985-pl  
 Nets: 2m, 7:30pm Mon; 70cm, 442.425+ (pl 107.2) Thur.  
 meets 2<sup>nd</sup> Mon each month @ 7:30 PM.  
 contact: <http://www.qsl.net/sccara/> or Clark Murphy KE6KXO 408-262-9334  
 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 3<sup>rd</sup> Wednesday of every month.  
 contact: <http://wvara.org/>, Bill Ashby N6FFC, 408-267-3118, N6FFC@Juno.com, or  
 N6FFC@ARRL.NET

**American Red Cross, SANTA CLARA VALLEY CHAPTER**

contact: <http://santacalaravalle.redcross.org/> or Scott Hensley KB6UOO, (408) 967 7924  
[fshenslev@Novell.com](mailto:fshenslev@Novell.com)

(please send changes to PAARAgaphs editor: K16YTA@arrl.net)

**Badges Available for Pickup**

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 KF6SRD Chuck Palo Alto  
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 KG6QKN Francis Palo Alto  
 K6TSR George Portola Valley  
 N6GYR George So. San Francisco

N6JCY Joani San Jose  
 K6FTF Mark San Jose  
 K1PAS Phil Redwood City  
 KJ6GBE Sreenidish Redwood City  
 K6VVK Vincent Palo Alto

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improve it. Of course, I'll be working on this in my infamously copious spare time, right? In any case, it was a great event, and I hope you will be able to attend next year.

A few days ago, as I write this, we completed our final Amateur Radio Technology Day at the SLAC National Accelerator Center. It was a poignant, yet Amateur Radio fun filled day on the lawn of the Linear Cafe. I personally took the opportunity to get 'radioactive', setting up my K2 with the PAC-12 antenna on the lawn. I was joined by my son Christopher, KG6SVI. I also noted that Darryl, KI6LDM, set up a station with his IC-7000 and Buddipole. There was much conversation, and many demonstrations of the latest newly built projects by many people. The sunlight was very bright, making any kind of LCD hard to read, but despite this, Christopher and I made the first contact with my newly written-from-scratch PSK31 modem. While the modem has been working in a test environment for some time, I thought it would be appropriate to save the first contact for the final Am-Tech Day at SLAC. I had a nice QSO with John, W4FGA, in Jackson, GA on 20 meters. The modem worked flawlessly, and he was apparently able to receive my modified PSK waveform just fine. Following that contact, we struck the station and helped with the final Am-Tech cleanup at

any suggestions or connections, I'm sure he will be grateful to hear about them.

Field Day preparations have continued apace, with the recent 'network day' at Doug, KG6LWE's, shop in Redwood City. We connected the radios and computers and verified that everything is operational. It appears that Rick, N6DQ, and I have cleared up a problem I was having last year with the CW keyer, and that Doug has fixed what was wrong with the 15 meter tri-bander I was using. We have a full lineup of K3s this time, and that should minimize inter-station interference. I'm really psyched for the event, and for the caffeine and adrenalin infused operating to come. I hope you are too! There will be one final antenna work day before we load everything up for Bedwell Bayfront Park in Menlo Park on June 25th and 26th. We hope to see you there. Oh, and don't forget the PAARAshoot coming up on July 31st at the San Jose Field Sports Park.

Until then, 73 ES GUD DX DE K6WX.



Winners from left to right: Jon Gefaell / K6OJ, John Conrady / KI6QQW, Rob Krensky / KI6GCL, Rick Melrose / K6RDM who is standing in for Steve Sabram / KI6FYG, Ralph Hunt / AG6Q

All Prizes listed below:

1st—Jon Gefaell / K6OJ / Yaesu FT-1900R / 2m / 55W / Mobil

4th—Rick Melrose / K6RDM / Battery Tender Junior / 12V / 0.75A / 4-Step Charging / Auto Float

2nd—Robert Krensky / KI6GCL / Grundig Traveler II Digital G8 Shortwave Radio / AM/FM/LW

5th—Vic Black / AB6SO / Two Midland FRS / GMRS Radios

3rd—Ralph Hunt / AG6Q / Two West Mountain COM Speakers

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SLAC. I will miss it greatly. Dave, K6WA, deserves many, many thanks for all of the hard work he has put into Amateur Radio Technology Day over the years, and for his work with the SLAC staff to keep us there for as long as we were. I know that it was not easy. If you see Dave, please personally thank him for all that he has done for our hobby. Dave is searching for a new venue for the event. If you have





## HIGH INTERCEPT LOW NOISE AMPLIFIER with GaAs pHEMT MMIC

By: Goran Popovic AD6IW

### Abstract

Design requirements for LNA:

Simple construction, small size, no tune, low noise, wide band, high linearity, unconditional stable, high reverse isolations, frequency coverage from VHF up to L band. Resistance to large input signals up to 27 dBm without destruction. The LNA was utilized with SPF-5122Z GaAs pHEMT MMIC device, from RFMD.

### Stability first

Stability is important because it is affecting overall performance of LNA. High gain, poor return loss and reverse isolation, together with feedback are major cause for oscillations. Feedback may be conducted through a bias or radiated inside cavity. Oscillations may occur even unnoticed, or suppressed. They will appear as modulated carrier, spurious or mixing products together with desired signal on high frequencies. Stability of amplifier should be provided over all frequencies. LNA should be carefully designed to suppress conducted and radiated feedback. New MMIC are spatially combined with its intrinsically low VSWR, and High reverse isolation  $S_{12}$ ,  $> -30\text{dB}$  at low frequency. They are unconditional stable with any source or load impedances, whose reflection magnitude is less than 1. By definition, unconditional stable amplifier is the one with  $\Gamma_{\text{Source}} < 1$  and  $\Gamma_{\text{load}} < 1$  for all source and load impedances. Conditional stable amplifier, or potentially unstable amplifier has the same definition as above except it would be stable only with certain source and load impedances. Stability may be checked with simulation software (Rollet factor  $K > 1$ ) or tested with phase shifter and different termination resistors.

### MMIC LNA description

MMIC simplified LNA design. MMIC is already matched to 50 Ohms. No additional matching networks are needed. Bias circuit is done internally, and it is temperature compensated. This LNA PCB was designed for multi purpose. Few configurations are possible.

Low noise amplifier with external supply needs only few capacitors, C1, C7, C8, C9 single inductor L4, and 5V regulator with C11 and C12, and R2, R3. This configuration has low noise figure. MMIC

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has lower noise at 3V, but Linearity and gain is higher at 5V supply. Selection is done with R1 and R2 resistors. On 3V supply MMIC current is 58 mA and on 5V is 90 mA.

Additional input matching network will not improve noise figure, because every additional component will only increase losses. To achieve low noise LNA, input coupling capacitor C1 should have low reactance. Capacitor series resonance frequency should be close to the LNA operational frequency, where its insertion loss is low.

Improved input matching is done with L1 and C2 network. Series inductor improves input RL but increases NF. This option is useful for driver amplifier application where good input return loss is needed.

70CM LNA with 2M Notch filter was done with L2 and C3 network. Two meter signal is attenuated >30dB, and return loss is improved. NF is slightly higher. See simulation and measurement plots.

Negative feedback network, C4, L3, R1 provide flat gain up to 2.4GHz and better return loss. This is convenient for wide band applications, but on the cost of higher noise figure, and IP. The small inductor 1 to 2nH in the feedback circuits improves a gain and RL at the high frequency. This inductor may be replaced it with 0 Ohm resistor because the trace inductance is sufficient. Bias Tee T1 is used for voltage supply and T2 as wide band drain inductor for flat frequency gain response. Bias tee have no resonances or ripples inside pass band, and it has low insertion loss. With small modifications and different matching components this board may be used with ATF-531P8 device, from Avago.

### **Application**

The MMIC is designed as low noise amplifier for frequencies between 50MHz and 2.4GHz. Because of the size the whole LNA was encapsulated in N connector and supplied thru the Coax cable. External feed thru is available too. Three pole helix filters are installed at the receiver side, see block diagram. Attenuator and band pass filter preventing receiver overload, from in and out of band signals. Large input signal, -3dBm drive LNA in P1dB or up to 23dBm at 5V supply. If this is a case limiter or attenuator is needed to protect receiver or mixer.

### **Construction**

Either very simple design, but construction may not be easy. The pcb and components are small size. Hand soldering is not recommended. Easies way to assemble the board is to put solder paste on the pads, and place all components on the board, under the microscope or magnifying glass, and than re-flow the board in oven. Those boards were done with inexpensive infrared toaster oven, with temperature control. Exactly temperature profile for soldering, type of solder and procedure is available in Manufacturer App note. See Avago AN-1316. Finally, re-flow method is faster and gives better performance than hand soldering, But it will require some practice. Enclosure and PCB ground connection and connectors attachment are directly related to the performance of LNA. Board was fixed with silver epoxy to the bottom of enclosure.

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### June 2011 PAARA Board Meeting Minutes

The Board Meeting was held at the Palo Alto Red Cross building, commencing at 7:30 PM on the 15<sup>th</sup> of June, 2011. Attending were Kristen McIntyre K6WX (Pres), Rick Melrose K6RDM (Sec, Database), Ron Chester W6AZ (Treas), Rob Riley KI6INR (Dir), Byron Beck KG6UOB (Dir), Larry Rebarchik N6DB (Dir), Marty Wayne W6NEV (Dir), Gerry Tucker N6NV (Property Manager) and Vic Black AB6SO (Membership). A quorum was present.

Secretary's Report: Rick K6RDM reports that the minutes of the 18<sup>th</sup> of May, Board meeting had been previously submitted and approved. There were two renewals and one new member at the June 3<sup>rd</sup> General Meeting.

President's Report: Kristen K6WX reported that the presentation at the June meeting by Dean Straw N6BV on Pursuing and Handling QSOs was very timely in proximity to Field Day and the drills were enlightening and entertaining. Moreover, the French Toast graciously provided by Lodema KI6UGV was delicious and likewise enthusiastically received. Kristen went over the speakers scheduled for upcoming meetings with the board.

In a surprise shift, our June meeting was held in the Council Chambers due to a schedule conflict with our regular meeting space at the recreation center, however it is expected that we will meet in our usual space in on July 8<sup>th</sup> (moved up from the 1<sup>st</sup> due to the 4<sup>th</sup> of July holiday). Kristen mentioned that the sign-up book went missing at the end of the last meeting. If anyone happened to pick it up, please let Kristen know.

Treasurer Ron W6AZ gave his report on receipts from the Raffle, Flea Market and so on and club finances appear to be in good shape to handle Field Day expenses.

The agenda proceeded with current business and once again, the membership is reminded that this year's PAARASHOOT at the Santa Clara County Field Sports Park is set for the 31<sup>st</sup> of July and non-PAARA club member guests are welcome, so feel free to invite them. It will be a pot-luck and coordination of details on what to bring will be on the agenda at the July General Meeting.

This year's Field Day is now only a week and a half away, and a good deal of the board's time was spent reviewing planning and preparations which are in their final stages. Antenna renovations and network testing are all but complete and plans on food coordination and team schedules at various station sites are being finalized. There will be a lot of member-volunteers wearing a lot of hats making all aspects of Field Day roll up into a great score. We hope many members and guests will make a visit to our Bayfront Park site in Menlo Park a part of their weekend plans, as it is always a hoot and a great way to acquaint others with Ham Radio, particularly via Rob KI6INR's GOTA station!

And speaking of volunteers, the board wishes to extend a much deserved commendation to Richard Tucker, Gerry's brother (no call sign), for the help he has been on occasions too numerous to mention. The contribution is noticed and is much appreciated. Discussion continued with plans for excursions to a number of sites, possibly including a reprise of the PAARAtroop to KPH, and other interesting possibilities. Stay tuned!

The meeting was adjourned at 8:55 PM.

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6th—Robert Krensky /  
KI6GCL / Power Pole Con-  
nectors / 30A / 10 Pack

8th—Karl Dresden /  
KJ6GUK / Coax Seal

7th—John Conrady /  
KI6QQW / NARCC Northern  
CA Repeater Directory

9th—Hunt / AG6Q / Broad-  
band LNA with SMA Con-  
nectors "Thanks to AD6IW Go-  
ran"



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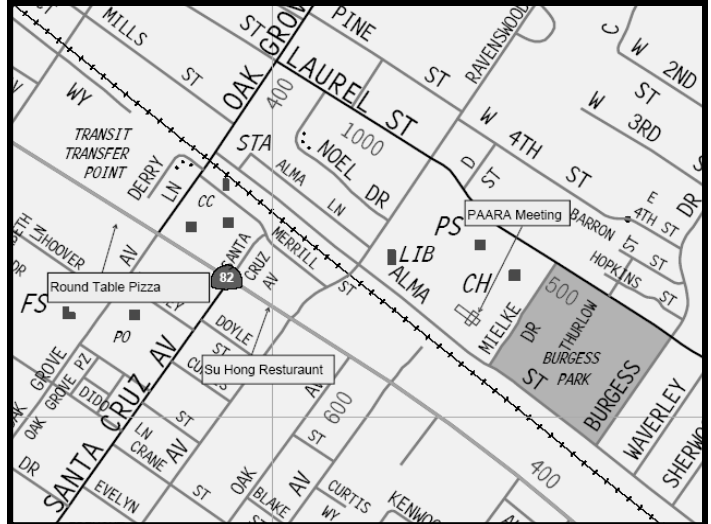
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 pickup.*

If you would like to  
 order a badge, see  
**Lynn Gentry, KG6JPV.**

## PAARA Weekly Radio Net

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

<u>Week</u>	<u>Control Operator</u>
1 <sup>st</sup>	Doug Teter - KG6LWE
2 <sup>nd</sup>	Robin Yee—KI6YTA
3 <sup>rd</sup>	Jack Pines - W1VSL
4 <sup>th</sup>	Marty Wayne - W6NEV
5 <sup>th</sup>	Mike Bray - N6MEB



**Directions to PAARA meeting:**  
<http://paara.org/meetings/>

Join us for pre-meeting eyeball  
**Eye Ball QSO  
 gab & gobble**

*Food will be served at 6:00 sharp, so guests will be on time for the  
 PAARA meeting. Those arriving late will be responsible for their own  
 food order.*

**5:30 pm—at Su Hong Restaurant**  
**1039 El Camino Real**  
**Menlo Park**

*across from Kepler's Book Store  
 on El Camino Real  
 Walking distance from Caltrain!*

**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 Menlo Park Rec Center, 700 Alma Street, Menlo Park, CA.

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


Membership in PAARA is \$20.00 per calendar year,  
 which includes one subscription to PAARAgaphs  
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<p><b>Amateur Radio Technology Day</b></p> <p>WILL RESUME WHEN A NEW VENUE IS DETERMINED.</p> <p><b>8AM TO 6PM</b></p>	<p>Ilse Beck, E. A. , KI6IBM</p> <p>Beck Business Services</p> <p>441 N. Central Avenue, #9                  Campbell, CA 95008</p> <p>Enrolled Agent                  Income Tax                  Bookkeeping/Payroll                  Elder Care                  Consultations                  Billing and A/R</p> <p>Phone/FAX: 408-267-8234                  Email: ilsebeck@jps.net</p>
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2. For Profit organizations and/or individuals: \$5-business card size, \$25-half page, \$50 full page or back cover per issue.

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