

W6OTX**W6ARA**

PAARA NEWSLETTER
VOLUME 65, NUMBER 10, November 2014

K6OTA**K6YQT**

PAARAgraphs

The Official Newsletter of the
Palo Alto Amateur Radio Association, Inc.

Celebrating 77 years as an *active* amateur radio club—*Since 1937*



November's Speaker:

Building A Wide Coverage Repeater System

Matthew Kaufman, KA6SQG

Upcoming Events

- Nov 7 PAARA General Meeting, 7:00 PM Cubberly Community Center, Room 400 Middlefield Rd, Palo Alto
- Nov 19 Board Meeting, 7:00 PM Everyone welcome! Round Table Pizza Parlor in Menlo Park



President's Corner

November 2014

October was a great month for PAARA. We had a wonderful presence at Pacificon — and don't forget Pacificon itself. Some of us spent some time working the California QSO Party. This month we have the next step in PAARA officer elections, and then we have the PAARA Dream To Reality Raffle next month.



Over the last couple of years, PAARA's profile at Pacificon has been rising significantly. We've gone from just being participants, to a big part of what makes the convention go. I'm so proud of

how our membership and leadership have stepped forward to bring us to the forefront. The biggest part of this is our sponsorship of the special event station. This year it was the W100AW/6 ARRL Centennial station, and Pacificon was the very last of the Centennial Conventions for the ARRL. It was hard to miss the banner and station right in front of the Santa Clara Marriott. This station made over 6600 QSOs with more than 160 countries, over 50 hours of operating time. There were 64 operator certificates issued, and even more operators that did not wish to receive a certificate. This was an incredible operation that was probably the most active special event at Pacificon that has ever been seen. We really owe a debt of thanks to the special event station coordinator, PAARA VP Marty, W6NEV. Of course, the amazing station equipment is what made all those QSOs possible, and the gear and antennas were generously provided by Rick, N6DQ, and Joanna, K6YL. They set up and tore down everything on site. They did an incredible job. Please give them a special "thank you" from PAARA the next time you see them. We hope to do it all again next year, even when Pacificon moves back to San Ramon. We'll see you there.

I had a wonderful opportunity to work the California QSO Party this month. That's why I missed the last PAARA meeting. It's one of the few things that could keep me away! This year we were team N6A, operating from lovely Alpine County. We had a cabin in Bear Valley, literally right across the street from Lake Alpine. It was really in the middle of nowhere, far out on Route 4, towards Reno. As is traditional for CQP, there

(President — Continued on page 4)

Attenuator Use and Testing

Gary Barnes

An attenuator is a passive device that reduces input signal to lower level on the output connection or terminal. The ratio between the input and output is usually expressed in decibels or dB. One Bel equals ten decibels. The unit Bel is named after Alexander Graham Bell. Therefore an attenuator with a ratio of 10:1 would have 10 dB of attenuation, and ratio of 1000:1 would have 30 dB of attenuation. A 30 dB attenuator with 100 watts of input power will have 100 milliwatts of output power, and a 40 dB attenuator would have 10 milliwatts of output power with the same 100 watts of input power or $10\log(100/0.01)$ equals 40 dB.

Most frequency counters and spectrum analyzers may be damaged with more than 10 milliwatts of input power or +10 dBm. Laboratory grade power meters will measure power levels from 1 microwatt to 100 milliwatts, although some power meter sensors will have different ranges. Power meters will display power in either watts or dBm. Zero dBm equals 1 milliwatt of power.

Other attenuator parameters include power rating, impedance, frequency range and connector type. Attenuators are available from less than 0.5 watts to millions of watts. Attenuators are available in many different impedance's such as 50, 75, 150 or 600 ohms.

Attenuator use

When testing a 100 watt amateur radio transmitter, a 40 dB, 100 watt, 50 ohm attenuator could be used. I use a 40 dB, 250-watt, 50-ohm attenuator for my testing. The lower the power attenuator's temperature, the better the attenuator's accuracy. Therefore, it is best to use an attenuator with the greater power rating than the input power to the attenuator to reduce the attenuator's heating.

Modern amateur radio receivers have sensitivity of less than 1.0 microvolts, but not all RF signal generator can output signal levels below 1 microvolt. An attenuator can be placed between the signal generator's output and the radio's input. A

20-dB attenuator will reduce the output so that 1 microvolt will have a receiver input voltage of 0.1 microvolt. Two attenuators can be combined in series to increase the amount of attenuation.

Another type of attenuator is the adjustable attenuation model. The attenuation can be continuously adjustable like a volume control in a radio or it can have step adjustment using switches. These attenuators can only be used with low power, less than 1-watt. One use for an adjustable attenuator would be the check the operation of a receiver's S-Meter. A S-9 indication is when there is 50-microvolts at the receiver's input terminals, and each S-unit should be about 6 dB difference. However, some radios use 100-microvolts for S-9, and most radios do not have 6 -dB change between S-units. The adjustable attenuator is placed between the RF signal generator and the receiver under test.

Attenuator Testing

One parameter of an attenuator to check is the amount of attenuation verses frequency. First a laboratory grade power meter and sensor are connected to a radio frequency signal generator. Both the signal generator and power meter must cover the frequency range of the attenuator. For an attenuator with frequency range of DC to 18 Gigahertz (GHz), the first test point would be at 1 GHz, and the test points would be every 1 GHz step up to 18 GHz. If the frequency range of the power attenuator is 250 MHz, then the test points could be 50-Mhz apart or maybe 25-MHz apart.

The signal generator is set to each test frequency, and then the power meter's indication is recorded on a data worksheet with the test frequency. Next, the attenuator under test is placed between the output of the signal generator and power meter. The signal generator is set to the same test points as before and the power meter indications are recorded for each test frequency. Then the difference between the two readings is recorded. If the power meter readings were recorded in dBm, then the results are the attenuation in dB.

To measure an attenuator's attenuation, use a

(Continued on page 3)

(Continued from page 2)

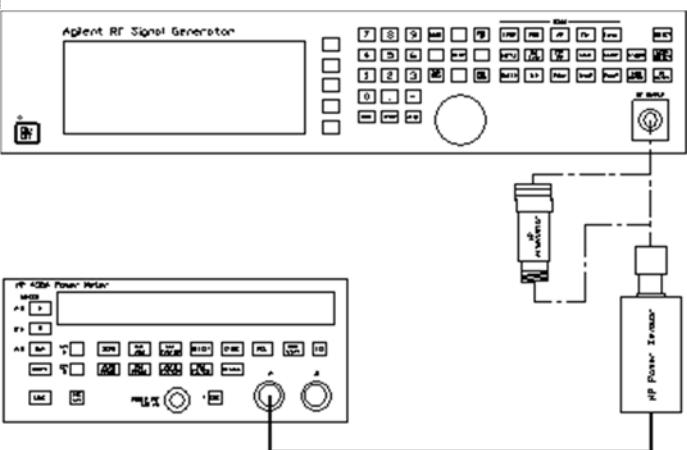
signal generator and power meter. If the first power meter reading without the attenuator is +9.0 dBm and the second power meter reading with the attenuator is -21.0 dBm, then the measured attenuation is 30.0 dB. The attenuator should be reversed and data recorded again. A good attenuator should have about the same amount of attenuation in either direction. Also the SWR or impedance should be checked at both the input and output terminals of the attenuator.

Using a power meter to measure the amount of attenuation is not the best way to calibrate an attenuator. A network analyzer is a better instrument to use to measure the attenuation and standing wave ratio or SWR. A vector network analyzer will display both magnitude and phase angle of both attenuator's loss and SWR. A network analyzer can be used to measure the performance of a filter as well as many types of electronic equipment.

A network analyzer will sweep over a band of frequencies selected by the operator, but limited by the network analyzer. The results will be displayed on a screen, with frequency displayed horizontally across the screen and amplitude displayed vertically. It can measure the loss or attenuation and SWR of an attenuator or filter or the gain of an amplifier.

Attenuator Testing Setup

1. Both the RF signal generator and power meter should be on for at least 30 minutes.
2. Follow the power meter's manual to zero and calibrate the power sensor.



3. Set the power meter to the dBm mode.
4. Connect the power sensor to the RF signal generator's output connector.
5. Record the power meter's indication and frequency for each test point.
6. Remove the power sensor from the RF signal generator. Connect the device under test to the RF signal generator, and then connect power sensor to the device under test.
7. Record the power meter's indication for each test point.
8. Record the difference between the first reading and the second reading. This is the gain or loss of the device under test.

The following is the test data for a 20-dB, 25-Watt, 50-ohm power attenuator. The first column is the test frequency in Megahertz, The second column is the measured output power level of the signal generator in dBm. The attenuator under test is placed between the signal generator's output and the power meter. Column three lists those results. The last column are the final results of the test, or the amount of attenuation for each test point. This is a good attenuator.

The power meter is a Hewlett Packard 438A, and the power sensor is a Hewlett Packard 8482A.

Attenuator Check:			
Frequency (MHz)	Generator Level (dBm)	Attenuator Output (dBm)	Attenuation (dB)
25	5.01	-14.81	19.82
50	5.01	-14.81	19.82
75	5.00	-14.82	19.82
100	5.00	-14.82	19.82
125	4.99	-14.83	19.82
150	4.99	-14.83	19.82
175	4.98	-14.84	19.82
200	4.99	-14.82	19.81
225	4.98	-14.83	19.81
250	5.00	-14.82	19.82

(President — Continued from page 1)



was no cell service, and the weather was just beautiful. The team was Rick, N6DQ, Joanna, K6YL, Daniel, KJ6SEE, and myself. We arrived on Thursday night, with me coming up separately, and the others in an RV that was towing the tower trailer. On Friday we set up the hex beam on the tower and then Daniel made some perfect shots with the tennis ball launcher to get our 40m and 80m dipoles up into the trees at about 90 ft and 70 ft respectively. With that the stations were about ready. The radios were assembled, and then we had our traditional pre-contest dinner. After dinner we got on the radio and I had the most amazing QSO I've ever had to South Africa. I spoke to a gentleman in Pretoria for about 40 minutes on 15m, and it was just like talking on the telephone. Just unreal! Next morning, an early breakfast, and off we went for 30 hours of fun and adventure. There were lots of great QSOs and pileups. I had runs and pileups with EU going on 15m. 10m was hot, hot, hot. It was wonderful. I exchanged CQP numbers in exchange for ten-ten numbers to get some points. What



fun! We were less serious; actually getting some sleep, and we scored really well. We might even have set a new record. Check out our picture on cqp.org.

The November meeting is the last meeting for officer nominations. If you wish to nominate someone, please contact someone on the leadership team as soon as possible. Nominations close at the end of the November meeting. Start thinking about that new K3 you might win at the December Dream To Reality Raffle. It's coming up soon. The December meeting is on the 5th of December, so put it on your calendar now. You don't want to miss it.

Kristen (K6WX)

October 15 2014 Board Meeting Minutes

The October Board Meeting was held at the Menlo Park 'Round Table Pizza Parlor', commencing at 7:40 on October 15th, 2014. In attendance were Kristen McIntyre, K6WX (President), Marty Wayne, W6NEV (V.P.), Jim Thielemann K6SV (Sec, Membership), Rob Riley KI6INR (Dir), and non-Board Members, Rick Melrose, K6RDM (Chaplain), Doug Teter, KG6LWE (Field Day Coordinator), and Walter McVeigh KK6GTU. A quorum was not present.

President's Report: Kristen, K6WX, commented on how much fun CQP operations were. A few pictures of their operations can be found on <http://cqp.org/>. CQP conflicted with the October meeting but she did receive positive comments regarding Michael Fox, N6MEF, presentation entitled "Internet outages: not just for disasters". Though the turnout for the meeting was smaller than normal, those in attendance came away with a different perspective on the use of Ham Radio. She also thanked Marty for running the meeting in her stead.

Though we have another great meeting coming up in November, it's not too early to start talking about the December Dream to Reality raffle. Once again PAARA will be raffling off a K3. According to Elecraft, "PAARA has given away more K3's

(Minutes — Continued on page 5)

(Minutes — Continued from page 4)

than any other club". It's not too late to start saving your pennies so you can better your odds at the December 5th meeting.

She also mentioned that election nominations will close at the end of the November meeting. Up for election are the 4 officers and 2 of the directors. Contact Daniel Rahamin, KJ6SEE, if you are interested in running or wish to nominate someone. His email address is KJ6SEE@gmail.com. Remember you must be a member of PAARA for 2014 in order to vote.

Kristen indicated her reserve of stories is ok but new stories are always needed. The board wishes to encourage the general membership to submit articles to be published in upcoming issues of PAARAGraphs. Do you have any projects, like those for home brew night in January, technical articles, hints n kinks, DX, on the air experiences that might be of interest? We can even help you write them up, "even if it's only 4 sentences", says Kristen.

Vice President's Report: Marty, W6NEV, reported that the speaker for the November meeting is Matthew Kaufman, KA6SQG whose talk is entitled "Building a Wide Coverage Repeater System". Marty also reported that he has a full roster of interesting speakers lined for the rest of the year and 2 months into next year. Marty is still working on the next field trip. His idea from last month isn't going to pan out but he has come up with another one. Stay tuned.....

Secretary's report: Jim, K6SV, reported that the membership stands at 149 for 2014, with twelve members paid through 2015, for a total of 161 members. So far there have been 44 renewals via PayPal through the Club website. He also reported there was one new member in October. Now is the time to jump on the website and renew for 2015 via PayPal.

Treasurer's Report: Ron, W6AZ, was not able to be at the meeting due to other commitments. He reported via email that though the Raffle sales as well as sources of income were down for October, the club finances are in fine order.

Under Old Business, Marty reported that the W100AW/6 station PAARA provided, mostly setup by Marty, W6NEV, Rick, N6DQ, and Joanna,

K6YL, for the PACIFICON convention was VERY successful. Read his report elsewhere in this issue. The board wishes to congratulate them for such a successful event and for all of the time they spent planning, setting up, operating and packing it all back up. Additionally, the board wishes to extend Rick and Joanna additional gratitude for providing ALL the radio equipment to make the event happen.

Jim, K6SV, reported that he hopes to update the web site roster before the November meeting as the number of roster changes has slowed to a crawl.

Under New Business, Kristen, K6WX, indicated she'd received an inquiry from Sergey, NS6W, regarding a club station. The board discussed the merits of having a station and possible locations. The board agrees that such a station will need someone to "champion" the cause. Should Sergey agree, the board agrees to consider, at a later date, any backing that may be necessary.

Joel, KD6W, suggested the board consider selling the DStar repeater and purchasing a DMR repeater. Though a quorum wasn't present to vote, those in attendance did agree that owing to the DStar repeater having been donated to the club, the board doesn't see how we could sell it without potential ramifications.

Owing to the success of the PACIFICON station, there was some conversation regarding the club sponsoring a special event station at some time of the year when it wouldn't conflict with all the other events, possibly the 1st quarter of the year. This idea will require further exploration.

Doug, KG6LWE, reported that the tower trailer was taken to the brake shop for repair. The repairs needed were a bit more than anticipated as all the bearings were falling apart. The trailer is now ready for longer "missions".

The meeting was adjourned at 9:00.

Jim Thielemann
Secretary/membership
K6SV

New Member

Rod Broyles, KF6EDJ

Pacificon Special Events Station Report

It has been about month since the Special Events Radio Station, W100AW/6, ended its operation at noon, Sunday, October 12 at PACIFICON. I am still recovering from the hours of set up, operating, and tear down at the station that was part of the ARRL Pacific Division Convention.

The special events station operated for 50 continuous hours plus set up and tear down time. There were 6,630 contacts made with other operators in 160 different countries including the USA. About 90 different operators worked the station, 63 of whom elected to accepted a certificate verifying they operated the W100AW/6 station. This was the last station to use this special call. An email from Dave Patton, NN1N from the ARRL expressed his amazement at our effort and success.

**"Wow-- those really are terrific #'s
Marty!...No other regional convention
has come even close! :-). 73, Dave."**

What fun it was.

Rick Huisman, N6DQ and Joanna Dilley, K6YL deserve a special thanks for providing all the station operating equipment. What a setup we had with 4 HF stations and a VHF station, a K4KIO 6 band Hex Beam along with 40 and 80 Meter double bazooka antennas also thanks to Mt. Diablo Amateur Radio Club for allowing PAARA to participate in Pacificon 2014.

It was a pleasure to be associated with this fantastic group of ham operators that helped assemble and take down the station along with the guest operators. What a great group.

Come on 2015 Pacificon!

73,

Marty, W6NEV

PAARA 10/3/14 Raffle Prize Winners

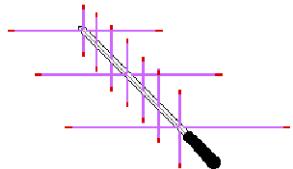
- 1st Prize Andy Korsak / KR6DD / Wouxon Dual Band HT**
- 2nd Prize Rod Broyles / KF6EDJ / Daiwa Co-ax Switcher**
- 3rd Prize Dale O'Harr / NX6S / Battery Tender Junior**
- 4th Prize Howard Califf / W6HOC / World Atlas**
- 5th Prize Doug Teter / KG6LWE / ARRL Repeater Directory**
- 6th Prize Vic Black / AB6SO / Rescue Tape**
- 7th Prize Bill Parsons / AF6AE / Minilog**
- 8th Prize Rob/ KI6INR / Bongo Ties**

Raffle Prizes

- 1st Wouxon
KGUV3D-2-
UHF HT Trans-
ceiver 2M/440
DUAL BAND
HT, 128 Memo-
ries, 1700mAh
LI-ON BAT-
TERY**



- 2nd Arrow Yagi / 3 Element VHF / 7 Element UHF / Max**



(Raffle Prizes — Continued on page 7)

(Raffle Prizes — Continued from page 6)

- 3rd MFJ Magnet Antenna Mount**
- 4th Ham Radio Book**
- 5th ARRL ID Badge Lanyard**
- 6th Rescue Tape**
- 7th Bongo Ties**



**2014
CQP Pictures**





Palo Alto Amateur Radio Association, Inc.

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President	Kristen McIntyre, K6WX	510-703-4942
	kristen@alum.mit.edu	
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	w6nev@arrl.net	
Secretary	Jim Thielemann, K6SV	408-839-6815
	thielem@pacbell.net	
Treasurer	Ron Chester, W6AZ	408-243 2221
	ron@taxhelp.com	

Directors

Director ('13)	Byron Beck N6UOB	408-369-1913
	N6uob@arrl.net	
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	ki6inr@arrl.net	
Director ('14)	Larry Rebarchik N6DB (cell)	650 465-8210
	n6db@arrl.net	
Director ('14)	Darryl Presley, KI6LDM	650 255-2454
	ki6ldm@arrl.net	

Appointed Positions

Membership	Vic Black, AB6SO	650-366 0636
	ab6so@smrn.com	
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	thielem@pacbell.net	
Chaplain.....	Rick Melrose K6RDM	408-341-9070
	k6rdm@arrl.net	
Public Affairs.....	<i>Position Vacant</i>	
Station Trustee W6OTX, K6YQT, W6ARA....	Gerry Tucker, N6NV	
Station Trustee K6OTA.....	Ron Chester, W6AZ	
Property Manager	Gerry Tucker, N6NV	
Fund Raising Coordinator Bob Korte, KD6KYT	408 396 4745	
	bob@rgktechsales.com	
Badge Coordinator.....	Doug Teter, KG6LWE	650-367-6200
	dteter@wcwi.com	
Historian Position.....	<i>Position Vacant</i>	
Raffle Coordinator.....	Jim Rice, K6AK	650-851-2274
Ticket Master	Marty Wayne, W6NEV	408-246-7531
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	
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kd6w@arrl.net		
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	jdsinger@sbcglobal.net

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 AI, 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.electronicsfleamarket.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://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

50 MHz & Up Group

Meets 1st Thursday each month at 7pm in the Texas Instruments Building E conference room in Santa Clara.
 Contact: <http://50MhzandUp.org>

SPECS

Southern Peninsula Emergency Communication System
 Meets each Monday 8:00pm on Net 145.27, 440.80 MHz
 Contact: <http://specsnets.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 & W6UUR, repeater 146.985-pl
 Nets: 2m, 7:30pm Mon; 70cm, 442.425+ (pl 107.2) Thur.
 Meets 2nd Mon each month @ 7:30 PM.
 Contact: <http://www.qsl.net/scarra> 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:
 147.39 (+600) 151.4 ctcss 441.35 (+5.0) 88.5 ctcss
 223.96 (+1.6) 156.7 ctcss 1286.20 (-12m) 100.0 ctcss

Meetings are 3rd 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://santaclaravalley.redcross.org> or Scott Hensley KB6UOO, (408) 967 7924
shensley@Novell.com



James Farrey
Sales Manager

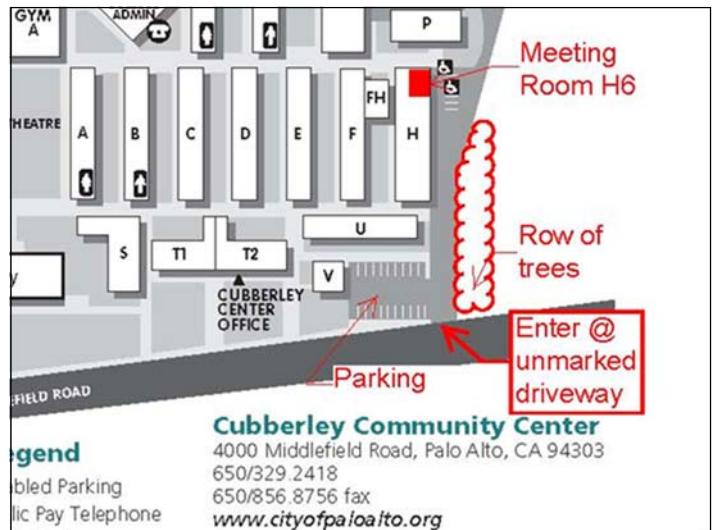
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Badges are ready for pickup.

If you would like to order a badge, see

Doug Teter, KG6LWE.

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	Doug - KG6LWE
3 rd	Jack - N1VSL
4 th	Marty - W6NEV
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.

<http://www.foto.mail.ru/list/shkurkin>

Vladimir Vladimirovich

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Palo Alto Amateur Radio Association
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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 \$20.00 per calendar year, which includes one subscription to PAARAGraphs \$6 for each additional family member (no newsletter).

Make payment to the
Palo Alto Amateur Radio Association,
P.O. Box 911, Menlo Park, CA 94026-0911

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RADIO IN THE PARK

9:30am - 12:30pm
Check Back In the
Spring

QTH:
Agnews Historic Park
4030 Lafayette St.
Santa Clara, CA
95050

N 37° 23.549
W 121° 57.297

Ilse Beck, E. A., KI6IBM
Beck Business Services

441 N. Central Avenue, #9
Campbell, CA 95008

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Bookkeeping/Payroll
Elder Care
Consultations
Billing and A/R

Phone/FAX: 408-267-8234
Email: ilsebeck@jps.net

Starbucks Store 5686
3605 El Camino Real
Santa Clara CA 95051

(Corner of Lawrence Expwy and El Camino)

PAARA thanks the crew at Starbucks Store 5686 for their generous support of our radio club.

W6AZ



Ron Chester
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Ron@taxhelp.com

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

1. 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).

2. For Profit organizations and/or individuals: \$5-business card size, \$25-half page, \$50 full page or back cover per issue.

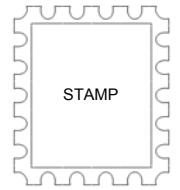
These fees may be reduced or waived in exchange for a valuable consideration that is given to the Association or its general membership. Such consideration must be in addition to any existing arrangements with the association. The PAARAGraphs editors reserve the right to reject any ad deemed to be not in the best interest of the Association.

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PAARAGraphs Ad Rates

PAARAgraphs — November 2014

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