

SCOPE

A newsletter by and for the
Palomar Amateur Radio Club
of San Diego, California.



*Photographs from the April 2010
membership meeting. Photos taken by
Paul KB5MU.*

Save the Date

Club Meeting
7 July 2010

Program at 7:30pm
presented by Marty Woll
N6VI.

Board Meeting
14 July 2010

Palomar Amateur Radio
Club board meeting at
7:00pm at K2RP QTH

Field Day
18 July 2010

Low Power Field Day

Membership

New Members Joining PARC:

N6JO, KE6KFW, KF6UVF, W6FM, KJ6FTX, KJ6GOQ KJ6DPR and KJ6HCT

And thirteen "old" members reinstated their membership.

Last month we sent postcard "reminders" to those that didn't renew their memberships last year. (It appears that it was quite successful.)

Here is the list of members receiving the SCOPE on the web, that "expired" in the last month or so. Please check this list, and get your renewal checks in the mail!

Pretty PLEASE!!! WD6FZA, AF6JN, N6TWO, KG6HKM, K6WSC, KI6JTC, and KE6AFH.

AI
W6GNI

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TOROID CORES

Palomar stocks a wide variety of cores and beads. Our RFI Tip Sheet is free on request.

Our RFI kit keeps RF out of your telephones, TVs, stereo, etc. **Model RFI-4**
\$35 +tax+\$8 to ship.

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Ferrites slip over coax. Shrink tubing holds them in place. Works from 3.5-60 MHz (Use two kits for 160m).

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Model BA-8 (for RG-8, RG-213, 9913 and similar cables up to 1/2" dia.) \$16.50+tax+\$8 S&H/order.

See catalog at www.Palomar-Engineers.com

Please check our complete ads in **QST**, **CQ**, and **WorldRadio** magazines.

Upcoming General Meeting Topics

July program will be Marty Woll, N6VI, asst. Southwest Director

Month TBD - Lin Robertson KJ6EF – Vintage broadcast radios

Month TBD David Doan KC6YSO "AM and other boat anchors"

Month TBD - AK6QJ – Subject TBD

June Fold & Staple Crew

W6GNI AI & Kathy

KB6YHZ Art & Janet

KB6NMK Jo Sonny WA5ACE



2010 ARRL Southwestern Division Convention

September 17, 18 & 19, 2010

San Diego, California

Four Points Hotel Sheraton, San Diego

It's time for one of the best ARRL Conventions on the West Coast! Come see the Ham Gear and take in the sights of Sunny San Diego!

For up to date information about the Convention, please visit us at the website: www.sandarc.org/Click on Convention Button.

Contact Person: Paul KC6QLS at (619) 593-9445 or Email at kc6qls@cox.net

See you at the Convention!

HAM RADIO OUTLET

Jose XE2SJB
Jerry N5MCJ
Joe N6SIX

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Advertisements are free for members.

For Sale

Have items that need to find a new home? Advertise here! Send your ads to scope@palomararc.org

For Sale

Item	Price
YAESU FT-1000	\$2,500.00
Kenwood TS-950 S	2,500.00
FT-2500 M	350.00
Kenwood SWR/PWR Meter, Model SW-2000	50.00
TR-7330 2 M	150.00
Astro PS7 A	25.00
Cubic Astro -150 A-10-80M Transceiver	250.00
Ten-Tec Centurion amp 1kw	1,500.00
Ten-Tec Titan amp 1kw	2,500.00
FLUKE Meter Model 77	65.00
SHURE Microphone Push to talk Modle 444	30.00
3-500 tubes	100.00 ea.

Contact: R. F. Krist, W6KTE, (760) 724-2786

For Sale

Crank-up tower, 4 sections (collapsed length=12' 9"), triangular- 18" bottom to 10" top. 3' top bolt on tapered section with rotor head and thrust bearing installed + 6' of pipe above the taper. Base plate 22" x 22" with 3 spuds to set tower on. Lifting winch had a motor at one time but now gone, leaving a spline shaft sticking out of the worn gear box to which a handle or motor can be grafted. Located in Poway , weight 400+/- lbs for tower alone and 150+/- lbs for the top piece, base plate and winch - \$250. Gary 858-748-6076 wb6gsn@gmail.com

For Sale: HUSTLER 6BTV High Performance HF Vertical Antenna system, 80/75/40/30/20/15/10 m, complete with 250ft spool 14 ga wire and all precut radials, SS Tilt base and SS Radial plate. Used one year. Bought new at \$400, will sell for \$200. contact: Rich Ortloff KE6DUG 760-861-1406

For Sale: 6BTV Vertical Antenna. Crank up Tower with rotor and 3 El Yagi. Must be taken down and removed. Call Lee, (760) 726-1097

HRO is **sponsoring a class** for newly licensed hams. This will give info on what to do with new license, programming transceivers, etc. Contact Joe at HRO for details. (858) 560-4900

HRO is **sponsoring a parking lot swap meet** on July 10 from 7:30 to 2:00. Call there to reserve spaces. (858) 560-4900

Volunteer at the Del Mar Fair!

Dear SANDARC Delegates:

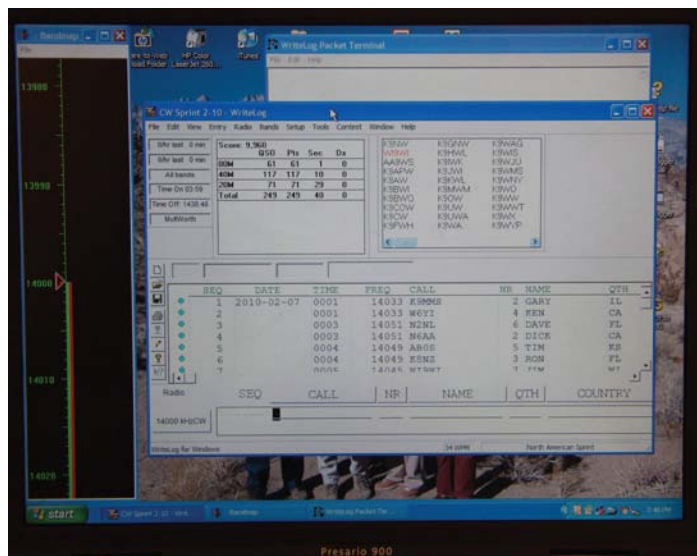
I have posted the schedule of the Del Mar Fair at www.sandarc.org. Go there and click on calendar. If your club can work any days please contact Paul KC6QLS at kc6qls@cox.net and send me the day and shift you like to work.

Please ask your club to pick some days that they will cover. We need to fill in all the days. Last year Steve and myself worked well over 20 days and most were both shifts.

The Del Mar Fair runs from 6/11 to 7/5 and the shifts are 10am to 2pm and 2pm to 5pm. Your pass and code will be at WILL CALL at the main gate and you can get in early!

Radio, antenna and pass to get in are provided. Send me a list of Name, Call and Shift (s) and contact information!

Paul KC6QLS
Vice Chair SANDARC



Photos from the April "Contesting 101" program, presented by Dennis N6K1 and John K6AM. The shots of the computer screens are showing the different contesting logging programs that were demonstrated at the meeting. Photos by Paul KB5MU.

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May Board of Directors Meeting Minutes

The meeting was called to order at 7:07 PM by President Dennis Baca KD6TUJ. The meeting was held at the home of Ron Pollack K2RP. Present at the meeting were:

President Dennis Baca KD6TUJ
Vice President Ron Pollack K2RP
Secretary Gary Kent W6GDK
Director #1 Paul Williamson KB5MU
Director #2 Conrad Lara KG6JEI
Membership Al Donlevy W6GNI

Treasurer's Report The treasurer's report was not available as of meeting date

Secretary's Report- Minutes of the April meeting were presented by W6GDK. There was one correction regarding the 111 cards that Al was sending out for renewals. His request was approved. No other changes. Motion to approve by KB5MU, second by K2RP. Approved

General Meeting: June meeting will be on Field Day preparations. For July, it is hoped to have Marty Woll, N6VI on batteries.

Membership Report: Current membership is 276.

Repeater Site/Technical Report: A problem with the 146.73 machine was fixed. There was a bad trace causing low audio levels on transmit. The packet password has been reset, but aliases are still needed.

NEW business:

Del Mar fair is coming up, and SANDARC is now booking slots for clubs to run the usual ham radio booth.

We got a convention ad from KC6QLS to run in the Scope.

The afghan contributed by Rusty Kalkofen AF6WF will still be available for raffle at meetings.

Don Johnson, WD6FWE, gave an excellent presentation on ham radio to Adobe Bluffs elementary school.

The 146.73 machine use was requested by Steve Early AD6VI Section Manager for the Golden Guardian exercise on May 18. Dennis KD6TUJ gave approval for this use.

Field Day – planning is progressing on our Field Day effort at the home of Nash Williams, W6HCD

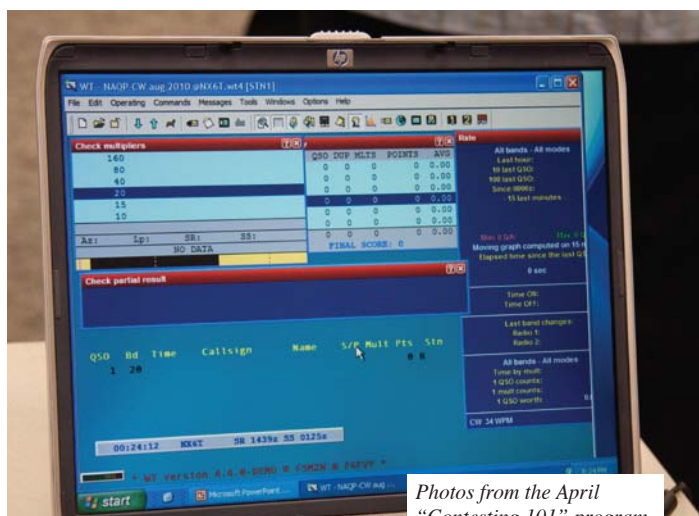
in Bonsall. This effort is being coordinated by Ron Pollack, K2RP and Dennis Vernacchia N6KI. There will be a Field Day net on Wednesday evenings at 8PM on 146.73. Directions will be posted.

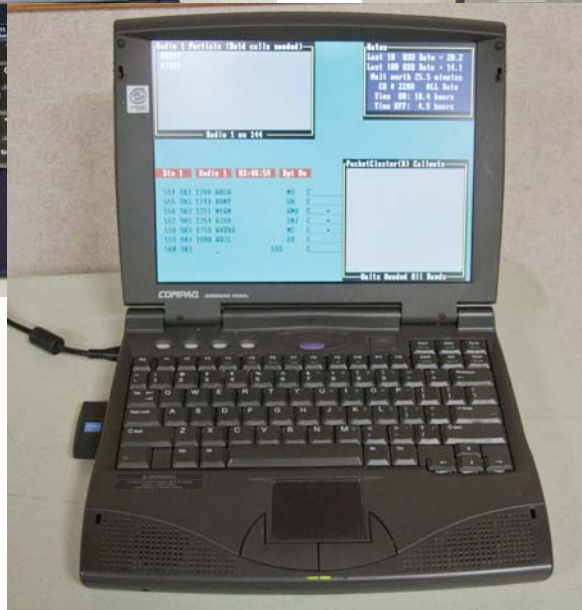
OLD Business: None

Motion to adjourn at 8:22 PM by W6GDK, second by KG6GEI. Approved

Next meeting will be at home of Ron Pollack K2RP on June 9, 2010 to start at 7PM or thereabouts

Submitted by Gary Kent W6GDK

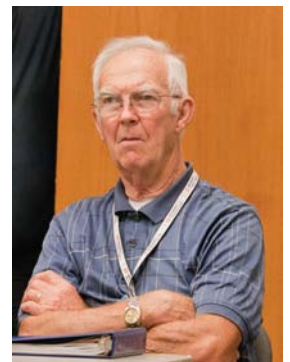




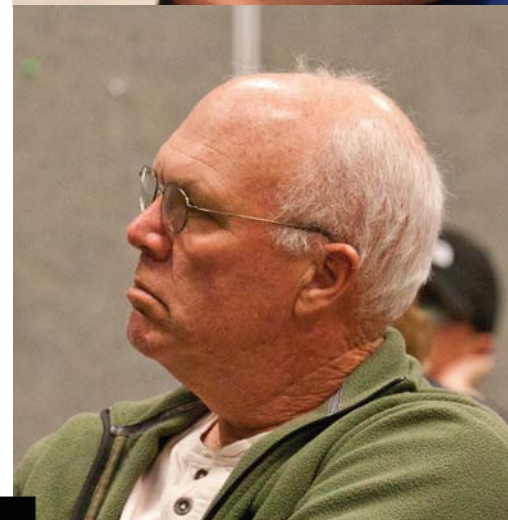
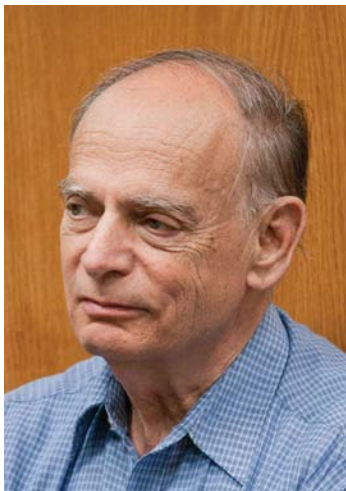
The April PARC membership meeting was dedicated to the basics of Contesting. A fundamental part of contesting is scrupulous log-keeping. Computer-based log-keeping is considered to be the best method.

There are several options available for computer-based log-keeping, and some of those options are pictured in this issue of the Scope. Most contest logging programs have functionality that allow for data entry and offer multiple options for changing the band and mode, checking for spots, organizing and (occasionally) visualizing the data and call sign error checking.

Some logging programs can be used over networked computers. This allows them to be linked together as a site logging system.



Photos from the April PARC meeting by Paul KB5MU.





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10GHz Station Progress Report

Codename: Hello Giggy

by Michelle W5NYV

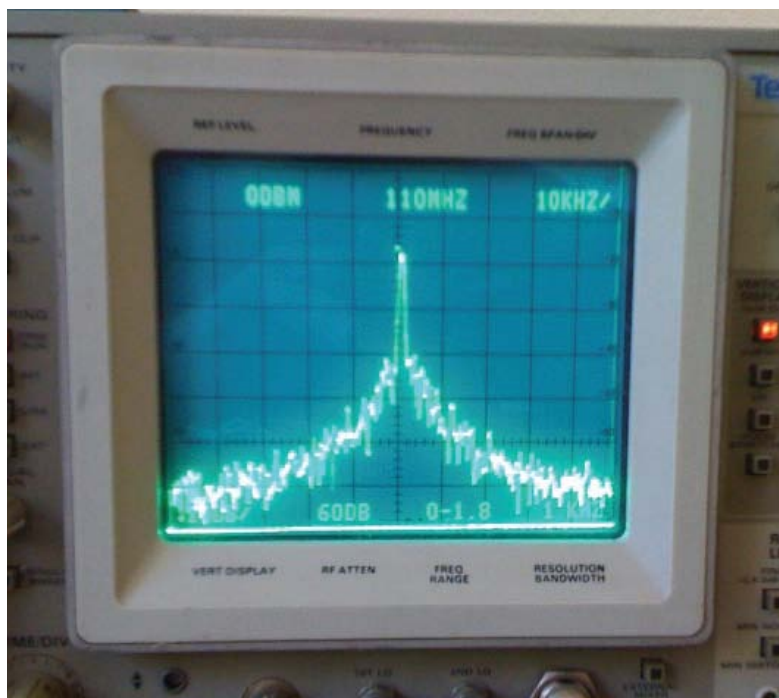
Members of the San Diego Microwave Group (SDMG), along with other amateur radio microwave enthusiasts all over the country, are gearing up for the fall microwave contest season. Operators are getting their rigs checked out at events such as the traditional range party at Kerry Banke's QTH. Kerry N6IZW hosts most meetings of the SDMG, and has generously provided parts, surplus gear, expertise, and test equipment to many local hams.

Most of the 10GHz rigs are transverters. An intermediate frequency (IF) rig, such as a Yaesu FT-817, is usually employed as the baseband-to-IF stage. A transverter takes the IF up to RF microwave bands, and then the signal is routed to the antenna, usually a dish. Most stations are unique creations, with surplus or kit-based transverters in custom or repurposed enclosures. Dishes from a wide variety of sources make for a very interesting visual array at a contest or range test. It is very typical for the entire station to rest upon a tripod of some sort, with some way to adjust azimuth and elevation. For the most part, these stations are portable designs, and are battery powered.

To the right are photographs of the two sides of the fully populated VHF OCXO from W6PHL. This surface mount kit implements an oven-controlled crystal oscillator circuit. Crystal is purchased separately. The exact value depends on the application. In this build, a 106.5 MHz crystal was used. Photos by Paul KB5MU.

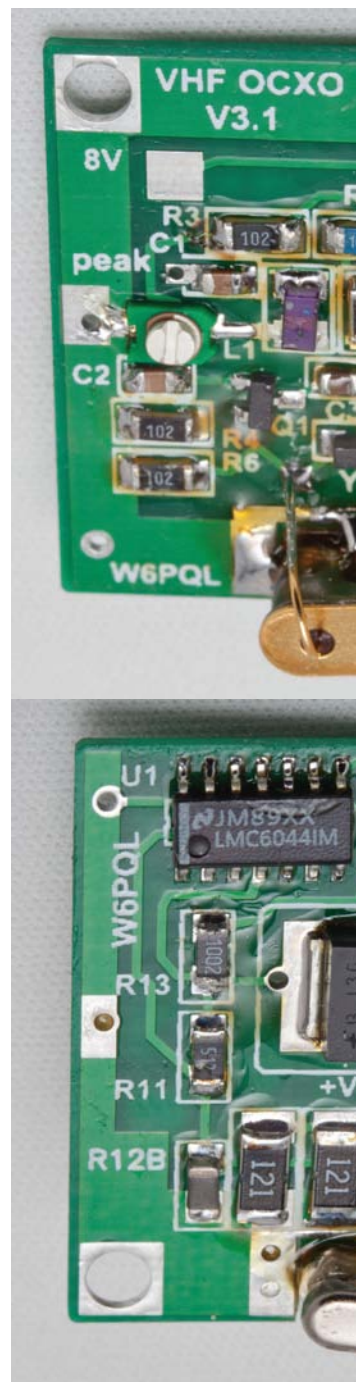
For my 10GHz station, I built a transverter kit (the G2) from DB6NT. A fellow PARC member was kind enough to loan me an FT-817 as an IF rig. The kit I selected required an external oscillator.

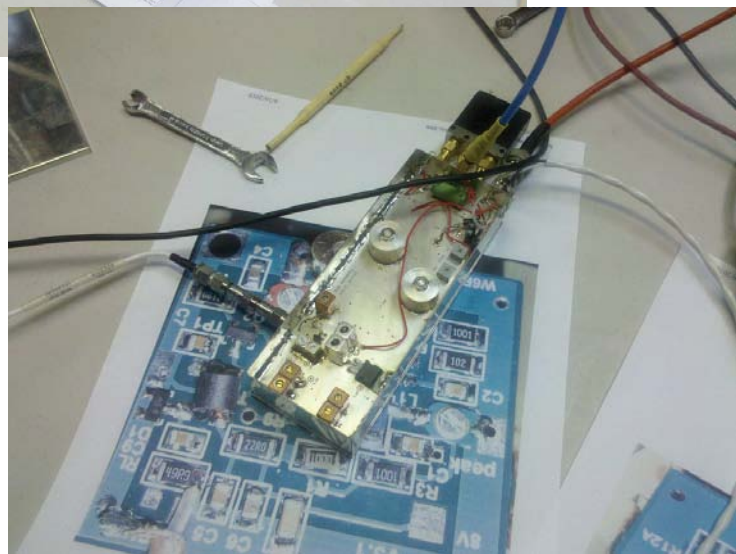
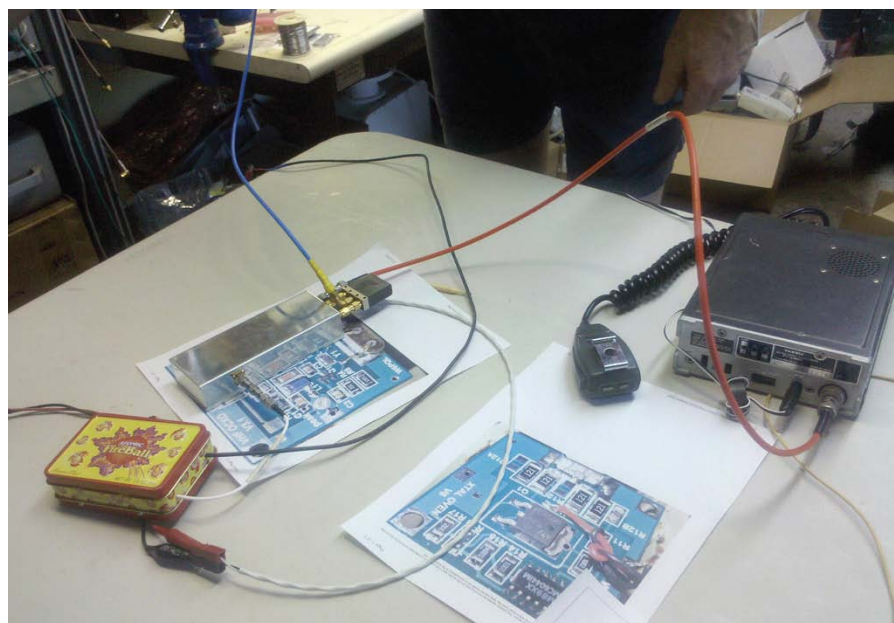
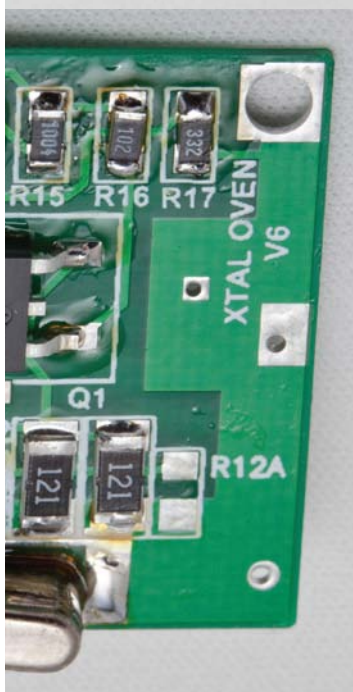
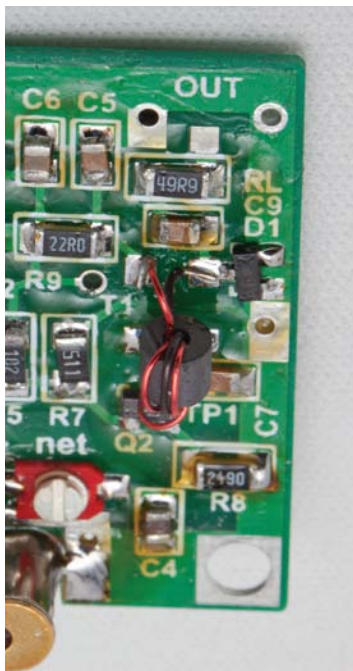
The first oscillator, a programmable digital oscillator kindly programmed and given to us from another club member, had way too much phase noise! We used it to get the station pulled together in time for last year's range party. Analyzing the phase noise after it failed to receive the transmitted test signal revealed that the carrier from the DB6NT transverter was at best 40dB below the noise. We were able to tell that there was a received signal in there when other people transmitted at the range party - it was just about 150kHz wide.

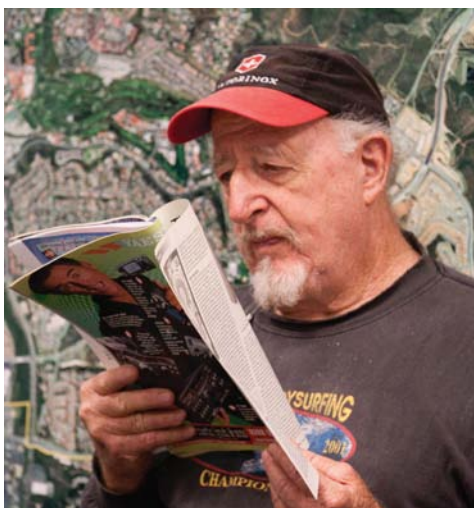


To the left is a spectrum of the programmable digital oscillator used at the range party. The spectrum of the OCXO kit that I built as a replacement was much improved. I favor crystals over synthesizers, and want to compare the OCXO to the synthesizers that many of the SDMG use in their rigs.

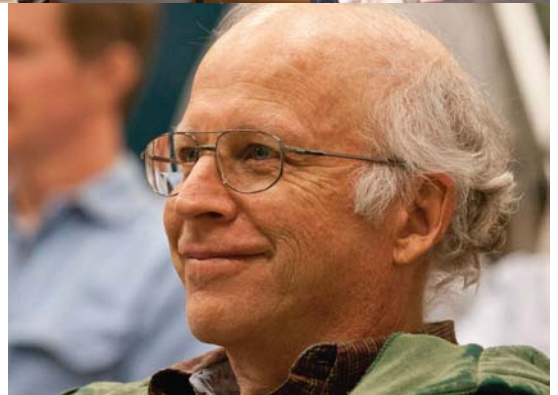
On the facing page are photographs from the test session at Kerry's QTH. The yellow and red enclosure for the OCXO is an Atomic Fireball mini-lunchbox, continuing a theme from Field Day a few years back (we did the Atomic Cafe). The interior of the transverter kit can be seen on the lower right. At the upper righthand side of the facing page, the results from the first pass on the frequency counter.







Photos from the May PARC meeting by Paul KB5MU. Rusty AF6WF created an afghan for the club raffle. The program was about Repeaters and was presented by Art KC6UQH.



Surface-Mount Oscilloscope Kit

by Paul KB5MU

I love building kits. I built a few of the legendary Heathkit products before their lamented demise, and as many of the fantastic kits from Elecraft as I could justify. Unfortunately, Elecraft is not alone in their belief that the amateur kit-builder can't be trusted with modern surface-mount assembly. Their kits all use through-hole circuit boards, except the latest K3 which is offered as a "no-solder kit". That means you get to assemble the chassis but don't get to build any of the electronics modules. Where's the fun in that?

There's nothing wrong with a through-hole kit, but these days some of the most interesting parts are only available in surface-mount packages. I'm fascinated by the capabilities of modern microcontrollers, for instance, and many of them have never been made in a through-hole package.

There are a few surface-mount kits out there. Here's one example I recently built up. It's a complete digital storage oscilloscope on a single circuit board, with two other boards serving as front and rear panels. It has an analog bandwidth of 1 MHz, and samples at up to 5 MHz. It has all the basic trigger modes, including external, and can save six captured waveforms and transfer them to a computer via a serial connection. It even includes a test oscillator that you can use to check out its functions. That's a useful set of capabilities. Beyond the state of the art ... as of 1970 or so. While it's not competitive with modern oscilloscopes from Tektronix, it's also a lot cheaper, and you get to build it yourself.

I got mine from Seed Studio

www.seedstudio.com

where the slogan is "Electronics can be art." They're also one of many sources for versions of the popular Arduino design for a tiny single-board computer based on the ATmega microcontrollers from Atmel (see www.arduino.cc for more). They

describe my kit as "Digital Storage Oscilloscope DIY Kit with Panels" (TOL107C3M) and sell it for \$49.95. That's cheap! They do pre-solder the microcontroller itself, alas, but there are still several ICs and lots of tiny resistors and capacitors and such for you to solder yourself.

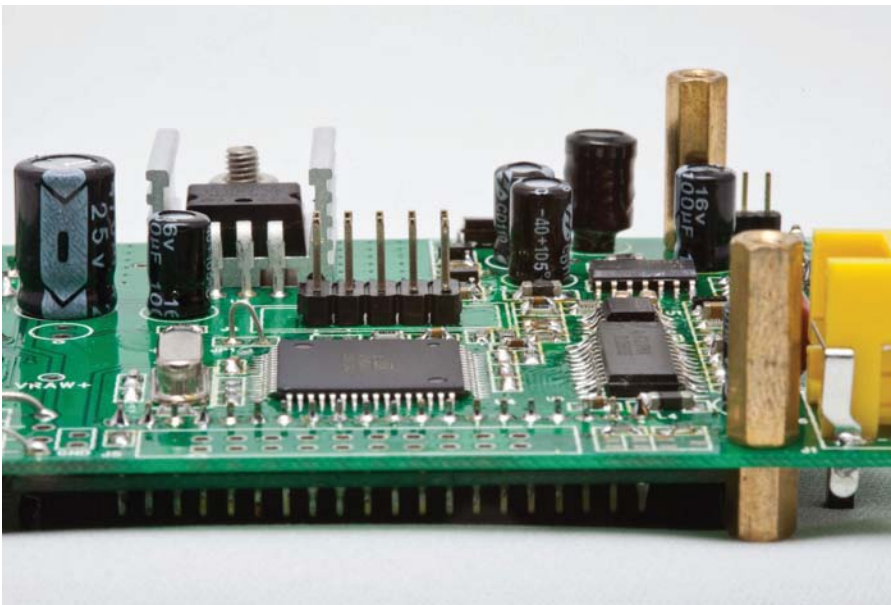
If you're in agreement with Elecraft that surface-mount soldering is too hard, and you still want to build this kit, you can order it from SparkFun Electronics. They call it "Digital Oscilloscope DIY Kit" (KIT-09484) and sell it for \$59.95 with all the surface-mount components pre-soldered. That leaves you with a handful of through-hole capacitors, diodes, the voltage regulator, and all the connectors and switches to solder.

You can also order it either way, or completely assembled and tested, directly from the company whose URL is printed on the circuit board: JY-ETECH (www.jyetech.com).



Unless your eyes are sharper than mine, you'll need some magnification to build at this scale. I'm a believer in having great tools, so I have one of these zoom stereoscopes. This is one of the cheaper ones, available locally at Scope City. It's really amazing how the brain is able to adapt to working under magnification. Your hands are steadier than you think they could possibly be, once you can see what you're doing.

And yes, the oscilloscope did work the first time I powered it up.



Having the right tool for the job is key. For constructing surface mount kits, some form of magnification is a powerful tool. Pictured above is the surface mount oscilloscope kit board, fully populated, and the stereoscope used to construct it. Photos by Paul KB5MU. Below, Field Day 2010 photos by KC6V DX.



Field Day Preparations

by Ron K2RP

On 20 June 2010 a work party was at the Field Day site to prepare and test the towers and antennas. All is progressing well, thanks to this group:

N6KI, K6KAL, AF6WF, WD6FWE, K4RB, WB6IQS, KJ6RET, KC6UQH, KG6JEI, and K2RP.

The whole crew worked very hard, but a few special thanks are in order. Art, KC6UQH, for bringing his "magic truck" with front hitch to put the trailers in place. John, WB6IQS, for bringing his knowledge of our towers and beams. He's the expert! Conrad, KG6JEI, for bringing a truckload of supplies.

And last but certainly not least to:

"Dennis of the South," N6KI, for all the planning, site selection, vast knowledge of everything, caring, and dedication. It truly could not have happened without him!

"Dennis of the North," KD6TUJ, although he wasn't able to be here on Sunday, made two trips last week to deliver our trailers with the antennas and towers.

Thanks to all, and we're looking forward to a great time at Field Day! Photos to the right submitted by KD6TUJ. Photos below from KC6VDX.

Preliminary Report

by Michelle W5NYV

The club operated Field Day (June 26-27) from Dennis N6KI's new favorite location, the hilltop home of Nash W6HCD in Bonsall. Ron K2RP coordinated logistics. The club participated in class 6E. The views were magnificent and the weather was almost perfect. The property has very interesting landscaping with many native plants. Stations were set up outside in either trailers brought to the site or on verandas and porches. Work continued Saturday on refining the collection of antennas and getting the most out of the stations. More to come in the August Scope.



Crystal Oven

From Wikipedia, the free encyclopedia
<http://www.wikipedia.org>

A crystal oven is a temperature-controlled chamber used to maintain the quartz crystal in electronic crystal oscillators at a constant temperature, in order to prevent changes in the frequency due to variations in ambient temperature. An oscillator of this type is known as an Oven-Controlled Crystal Oscillator (OCXO, where "XO" is an old acronym for "crystal oscillator".) This type of oscillator achieves the highest frequency stability possible with a crystal. They are typically used to control the frequency of radio transmitters, cellular base stations, military communications equipment, and for precision frequency measurement.

Description

The frequency at which a quartz crystal resonator vibrates depends on its physical dimensions. A change in temperature causes the quartz to expand or contract due to thermal expansion, changing the frequency of the signal produced by the oscillator. Although quartz has a very low coefficient of thermal expansion, temperature changes are still the major cause of frequency variation in crystal oscillators.

The oven is a thermally-insulated enclosure containing the crystal and one or more electrical heating elements. Since other electronic components in the circuit are also vulnerable to temperature drift, usually the entire oscillator circuit is enclosed in the oven. A thermistor temperature sensor in a closed-loop control is used to control the power to the heater and ensure that the oven is maintained at the precise temperature desired. Because the oven operates above ambient temperature, the oscillator usually requires a warm-up period after power has been applied.¹ During this warm-up period, the frequency may not be fully stable.

AT- or SC-cut crystals are used. The SC-cut has a wider temperature range over which near-zero temperature coefficient is achieved and thus reduces warmup time.² The temperature selected for the oven is that at which the slope of the crystal's frequency vs temperature curve is zero, further improving stability. Power transistors are usually used for the heaters instead of resistance heating elements. Their power output is propor-

tional to the current, rather than the square of the current, which linearizes the gain of the control loop.³

A common temperature for an crystal oven is 75 °C.⁴ But may vary between 30 - 80 °C depending on setup⁵. However a standard commercial crystal may specify an environmental temperature of 0 - 70 °C, with an industrial version range of -40 - +85 °C.⁶

Accuracy

Because of the power required to run the heater, OCXOs require more power than oscillators that run at ambient temperature, and the requirement for the heater, thermal mass, and thermal insulation means that they are physically larger. Therefore they are not used in battery powered or miniature applications, such as watches. However, in return, the oven-controlled oscillator achieves the best frequency stability possible from a crystal. The short term frequency stability of OCXOs is typically 1×10^{-12} over a few seconds, while the long term stability is limited to around 1×10^{-8} (10 ppb) per year by aging of the crystal. Achieving better performance requires switching to an atomic frequency standard, such as a rubidium standard, caesium standard, or hydrogen maser. Another cheaper alternative is to discipline a crystal oscillator with a GPS time signal, creating a GPS Disciplined oscillator (GPSDO). Using a GPS receiver that can generate accurate time signals (down to within ~30 ns of UTC), a GPSDO can maintain oscillation accuracy of 10^{-13} for extended periods of time.

Crystal ovens are also used in optics. In crystals used for nonlinear optics, the frequency is also sensitive to temperature and thus they require temperature stabilization, especially as the laser beam heats up the crystal. Additionally fast re-tuning of the crystal is often employed. For this application, the crystal and the thermistor need to be in very close contact and both must have as low a heat capacity as possible. To avoid breaking the crystal, large temperature variations in short times must be avoided.

¹ Glossary. Time and Frequency Division, NIST. 2008. Retrieved 2008-08-07.

² Marvin E., Frerking (1996). "Fifty years of progress in quartz crystal frequency standards". Proc. 1996 IEEE Frequency Control Symposium. Institute of Electrical and Electronic Engineers. pp. 33–46.

³ Marvin E., Frerking (1996). "Fifty years of progress in quartz crystal frequency standards". Proc. 1996 IEEE Frequency Control Symposium. Institute of Electrical and Electronic Engineers. pp. 33–46.

⁴ "Temperature Controller for Crystal Oven". 091117 freecircuitdiagram.com

⁵ "EKSMA OPTICS - manufacturer of laser components - Oven for Nonlinear Crystals TK7". 091117 eksmaoptics.com

⁶ "IQXO-350, -350I Commercial Oscillator". 091118 surpletronics.com

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Editor: Michelle Thompson W5NYV

Submissions: scope@palomararc.org

Questions? Ideas? Comments? W6NWG@amsat.org

Featured Program:

At 7:30pm, Palomar Amateur Radio Club will host a program at the monthly membership meeting on 7 July 2010. The program will be presented by Marty Woll N6VI, asst. Southwest Director of ARRL.

Arrive at 7:00pm to socialize.

We look forward to seeing you at the Carlsbad Safety Center, 2560 Orion Way, Carlsbad, CA.