Field Day is fast approaching! Planning efforts for this year's Palomar Amateur Radio Club Field Day Effort are underway. Field Day this year will fall on June 26th, 27th, and 2th 2015. See website for location.

The Field Day net occurs Wednesdays at 8PM. We are currently looking at a 4A setup this year. This will free up 10M for GOTA so they have a place to operate and will also free up some of the congestion at the site on the airways (hopefully).

Our Field Day Chef this year will be Gina along with her impressive Psycho Kitchen. Cuisine still to be determined.

We have sourced many of the needed supplies. We still need help with setup and tear down. Setup will begin on Friday at 11am on site. Field Day is a group effort and cannot be accomplished with out all the generous help from PARC club members and other volunteers. Many hands make light work!

Field Day is not a contest, but will sure be fun. When you have fun doing something you love, you generally end up doing well. That is this year's goal. To have FUN and do well. Come out and visit with your fellow club members and hams alike, get on the air and operate, eat good food, enjoy eyeball QSO, demonstrate amateur radio to the public, and most of all have fun. Thank you for all you do and I look forward to hearing you on the Net and more importantly, seeing you at Field Day.

73,
Greg Gibbs KI6RXX
Cell: 760-583-9668

Save the Date

Club Meeting	Board Meeting	Club Events
3 June 2015	**10 June 2015**	**27-28 June 2015**
Field Day Program! Plus, Trade Tech High shows off their robotics project.	Palomar Amateur Radio Club board meeting at 7:00pm at W6GNI QTH.	Field Day! New site! June 7th work party!

Advertisements are free for members

Have items that need to find a new home? Advertise here! Send your ads to scope@palomararc.org
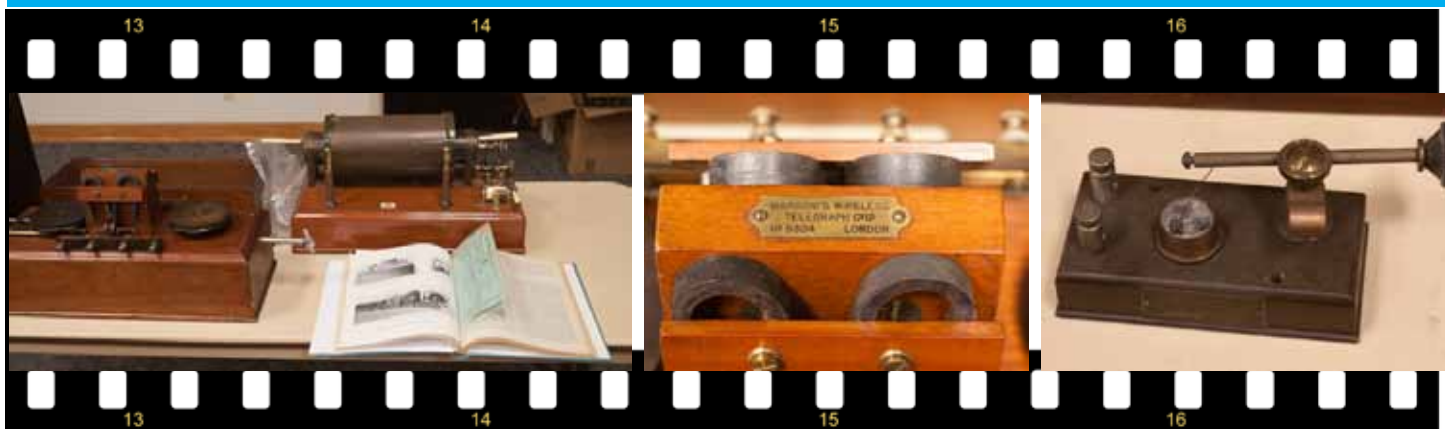
Spectrum Analyzer, HP141T working mainframe with HP8553 (working 110 MHz) RF plug in with HP 8552 I.F. module. Several HP8555s (10 MHz - 22 GHz) parts units and extra HP8552A & B I.F. modules. Make offers. WB6IQS@att.net. John, Vista.

Wanted: E. F. Johnson electronic T-R switch, working or not. Matt, 619-865-8497, ae6hf@arrl.net. Matt AE6HF

Goodie Table Update!
For next few month's meeting I would like the Scope to stress that the Goodie Table will be exceptionally well stocked. I will have all manner of variable capacitors, resistors, power resistors, power and RF cables, coaxial fittings, relays, digital and analog ICs. I am hoping to get fair value for the club for these items but JoAnne McBride is more interested in them being used for future projects rather than just being dumped as electronic trash going to the recycle. Also, a large assortment of test meters and component parts will be on the "Goodie" table at the June & July meetings. Bird type RF Wattmeter w/ VHF/UHF slugs, variable capacitors, cables, power resistors / fixed capacitors, etc. Bring bags / boxes to take home the treasures. Contact WB6IQS@att.net for any specific requests. John Kuivinen, WB6IQS

May 2015 Club Meeting Filmstrip

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{special} **THANKS** to our sponsors
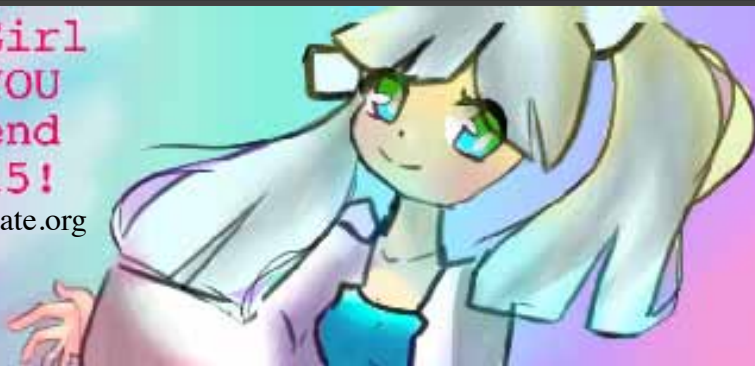
Integrating Yaesu System Fusion Photos into the World

Paul KB5MU and Michelle W5NYV

Some of the Yaesu C4FM "System Fusion" transceivers (FTM-400D mobile, FT-1DR and FT-2DR handhelds, but not the C4FM-enabled FT-991 HF/VHF rig or the brand-new (Dayton 2015) FTM-100DR) support a camera microphone accessory (MH-85A11U) that can take relatively poor-quality, low-resolution photographs. These photographs are stored locally on a microSD card, as are photos received over the air. Later, any photograph stored on the microSD card can be transmitted to ALL or to a specified Group ID. The FTM-400D has a color graphic display which can display the photos. The FT-2DR can display the photos in monochrome. The FT-1DR can't display the photos at all, so if you transmit a picture taken with the camera mic or forward a received photo you're doing it without seeing the photo first. The FTM-100DR can't display the photos either, but it can still receive and forward them, even though it doesn't support the camera mic.

Photos are integrated to some extent with Yaesu's WIRES-X internet linking system. Photos can be stored on the server, and can be part of so-called News items. These capabilities have not been evaluated. WIRES-X server software for C4FM repeaters has yet to be released. WIRES-X support for user stations requires the HRI-200 interface box (about $125) and a Windows computer. We recently bought an HRI-200 for evaluation. The HRI-200 software limits photos to 40 kilobytes, according to the user manual. Pictures taken by the MH-85A11U seem to be a maximum of about 20 kilobytes.

The goal of this investigation is to bring this photo capability into the wide world of the internet and open systems, somehow, to whatever extent seems feasible. Here are some possible use cases to consider.

* Photo Channel Logger. A receiver would be dedicated to monitoring a particular channel frequented by C4FM users and store every picture it hears. These pictures might be made available in real time on the web, or on other amateur radio data systems. The pictures could be enhanced with EXIF metadata generated by the logger, which could easily include, for example, the date and time of reception. With a little more work, the pictures could be associated with signal strength information, or even signal bearing from the receiver site. A logger could be placed at an EOC and set to automatically display all photos sent to a list of Group IDs, so that information gathered in the field would be immediately available to served agencies.

* Automatic Photo Sender. A system that has automated access to some kind of image data would be able to automatically transmit the image on a particular channel. For example, it would be easy to hook into weather forecasting systems and transmit a radar image periodically, or only when weather alerts are active, or according to any other set of rules. A system placed temporarily at a key location in an event could be set up to take a photograph of the area and transmit it periodically, or when some other sensor is tripped, or even when computer image analysis says that the photo contains something interesting.

* Interactive Photo Sender. A system controlled by text messaging (whether over C4FM, or AX.25 packet, or cellular SMS, or any other system) or via the web (whether over amateur radio or not) could be set up to allow a remote user to trigger the transmission of a specific image. The image might be one that already exists, or it might be captured by a camera on demand, or it might be computer generated on demand. The "News" feature of the WIRES-X software is a simple

Why A Packet Repeater?

by Paul KB5MU

Why do we have a full duplex repeater on 146.700 MHz dedicated to packet radio? Like a regular FM voice repeater, the packet repeater gives every little station in range the coverage that comes with a good antenna and a spectacular mountaintop location. A handheld on one end of the county can communicate with a mobile in a crummy location on the other side of the county. That's good magic.

Packet radio, though, can get the same range with just a digipeater on the mountaintop. A digipeater is much simpler than a full duplex repeater. It's just an ordinary transceiver connected to a little controller called a TNC ("Terminal Node Controller"). The TNC listens for packets that want to go through the digipeater. Once it has fully received such a packet, it listens for the radio channel to go idle and then retransmits it. This mode of operation is called "store and forward", because the TNC stores the message briefly before forwarding it on to the next station. The TNC in a digipeater is only listening (to store incoming packets) or transmitting (to forward them on) at any given time. It never needs to transmit and receive at the same time.

There is one obvious disadvantage to the store-and-forward mode. Every packet has to be sent twice, once by the original station and then again by the digipeater. This not only adds a little bit of delay to every communication, it also takes up twice the capacity on the channel. That is, there's only room for half as much data. That's a big deal, because standard 1200-baud packet radio is already pretty slow. It can be pretty speedy compared to users typing back and forth on keyboards, but for most practical applications giving up half the throughput is painful.

Unfortunately, it's actually much worse than that.

It all comes down to how packet stations share the channel. Packet stations listen before they transmit, except for some APRS trackers that get by without a receiver. If there's a signal present already, the station waits until the signal is gone. If it didn't do that, there would be two station transmitting at once -- a "collision". Very likely, they would interfere with each other and neither packet would be received. Remember, the packet has to be received perfectly with no errors in order to be used at all. After the channel sounds clear, the station waits an additional random interval, called a backoff. Provided the channel is still clear, the station then finally transmits its packet.

This all works pretty well, provided that every station can hear every other station. But in a typical metropolitan area network, that is not the case. Each station has its own area of coverage, depending on its antenna, the local terrain, the local noise and interference levels, and so on. The coverage might be different on receive and transmit. A low power station will have a smaller coverage area on transmit than on receive, while the opposite would be true for a high power station. You can think of these coverage areas as circles of various sizes, but a real-world coverage map looks more like the shape of a bug splattered on a windshield. The network consists of a crazy patchwork quilt of all these unique coverage areas. Each station can hear some subset of the other stations. If Alice can hear Bob and Carol, there's no guarantee that Bob and Carol can hear each other.

Consider the case of a mountaintop digipeater. It has an excellent location, high up on a mountain, and a good antenna. Its coverage area might blanket the county. For simplicity, let's just assume that the digipeater can hear everyone else just fine, and everyone can hear the digipeater. That'll never be exactly true, but close enough. No problem, right? When the

version of this sort of application.

* Photo User Terminal. A system could be set up to send and receive photos locally, providing a superset of the capabilities built into the Yaesu transceivers. A variant would use the camera and screen of a connected smartphone.

There are two obvious main approaches to this sort of integration: use the C4FM capabilities of Yaesu transceivers, or go directly to the on-the-air signals with whatever radio hardware is convenient. Unfortunately, the Yaesu radios treat the photo capability as part of their closed system. The available interfaces are the proprietary jack that the camera microphone plugs into, the 10-pin mini-DIN radio interface connector used by the HRI-200 (on the FTM-400D), and the microSD card slot with its file formats and conventions. The pin assignments for the 10-pin mini-DIN are documented, but the other two interfaces are completely undocumented by Yaesu.

There is a serial RS-232 interface on the 10-pin mini-DIN. The radio menu lets you choose the baud rate (4800 to 57600) and one of four modes: Off(camera), GPS Out, Packet, and Waypoint. Setting the mode to Off disables the port (and is documented as disabling the camera mic as well, but this is clearly a misprint.) In GPS Out mode, the port transmits NMEA sentences GGA and RMC, containing position fixes from the radio's GPS receiver. In Packet mode, the manual says that the port "Outputs the AX.25 packet communication data received using the in-built modem function." In Waypoint mode, it "Outputs the position information of other station beacons obtained from the APRS packets received as WAYPOINT data." None of these documented functions lets you send and receive data using C4FM, which is a shame. Yaesu could and should expose data communications features on this interface, but so far has not.

The HRI-200 and WIRES-X software also connect to that 10-pin mini-DIN port, and are able to do things that are not otherwise possible. The software controls the radio's frequency, for example, and transmits and receives C4FM digital data to implement the WIRES-X protocol operations. To enable all this, the radio has to be put into a special mode by pressing two buttons while turning it on. In this mode, none of the regular user features of the radio work. The radio becomes a dedicated slave to the software. This mode might be useful for other applications, but it is completely undocumented. Some reverse engineering work on a working HRI-200 system would help here.

We have already spent some time trying to reverse engineer the camera microphone jack. It is encouragingly labeled "Data" on the transceiver, but even the pin assignments on this connector seem to be unpublished. We've written up our results in some detail and are waiting to hear from ARRL about whether they want to publish it. We found what appears to be a USB interface, or something very much like a USB interface, on several of the pins. That's consistent with the Yaesu menu text, where the camera microphone is called "USB Camera". If this interface is indeed standard USB, or close enough, it should be possible to interface it with other hardware. It may be possible to partially confirm this with a logic analyzer. Gathering more details on how this interface works will depend on getting access to a non-invasive USB analyzer. The least expensive such instrument I was able to find costs $1200. Even if we knew everything about this interface, the most we could hope to do is emulate the camera microphone to store pictures to the radio's SD card.

We have also spent considerable time reverse engineering the microSD card interface. If Yaesu had chosen to comply with DCF, the standard

that all digital cameras follow when they put the pictures into a directory named DCIM, and if Yaesu had paid more attention to compatibility with different kinds of SD cards, it would have been possible to use an Eye-Fi wireless-enabled SD card to at least get images out of the radio. However, they chose to invent their own directory structure, and managed to be incompatible with both of the Eye-Fi cards I was able to test. With some specialized hardware, it would be possible to emulate an SD card or eavesdrop on the radio's communication with an actual SD card, and thus to extract all the photos taken by the camera mic or received over the air. That would enable the Photo Channel Logger application described above, but none of the others.

Yaesu may be planning a firmware update to enable data communication and other features that seem possible with the existing hardware, but as far as I can tell they have made no such promises. We can only wait and hope.

In the mean time, it might be possible to bypass the Yaesu radios completely and make our own C4FM stations, at least for data. Doing C4FM voice would require the proprietary AMBE voice codec. Yaesu publishes a document titled "Amateur Radio Digital Standards" (Revision 1.01 April 18, 2013). This dense 38-page document appears to specify the technical details of the transmitted signal, perhaps in sufficient detail that a third-party implementation would be possible, with access to Yaesu radios for reference. GNUradio already has code to receive C4FM modulation as used by the P25 system, as part of the DSD (Digital Speech Decoder) package. This may not be directly compatible, but should give a starting point for demodulating the symbols. The rest of the processing would have to be created from scratch using the Yaesu document as a guide, but the more complex parts of it should be buildable from available building blocks. Nonetheless, it would be a non-

trivial amount of highly technical work.

The question, then, is whether the work to create an independent implementation of Yaesu's version of C4FM is justified by the photo capability. Yaesu has two products, a mobile and a handheld, that could be useful as photo terminals. Many amateurs may be buying these products to use with the System Fusion repeaters that are being deployed by many clubs, including ours. Is it worth the trouble of a big development project to make these radios a little more useful?

Ms. Ohm! Where in the world are we?

I don't know, Mr. Tor! But I think we should find out!
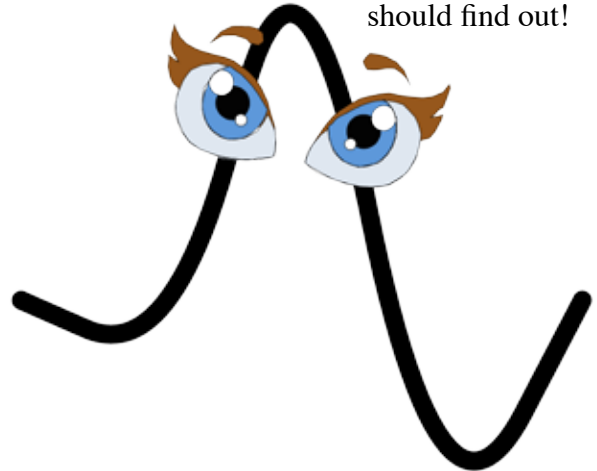
Successful Amateur Radio Demonstration

Amateur radio was demonstrated to Scouts from San Diego County at the Scout Fair held at Qualcomm Stadium. Members from PARC bought down KD6TUJ's trailer to help demonstrate. Conrad KG6JEI, one of the most public faces of amateur radio for these events, made a presentation to the Scouts that helped capture their interest and helped them desire to earn the radio merit badge.

"Hello,
I just wanted to let you know how much I enjoyed the class yesterday at the scout fair. Thank you very much for for your time teaching about radio. I would like to complete the merit badge when you do the follow up at Camp Balboa next month. Hopefully it will not conflict with the weekend of the 16th and 17th of May. That Saturday I have a mandatory high school orientation, and on Sunday an annual Karate tournament. Can you please email me when the date of the follow up is confirmed.

Much appreciated, Ben G."

(a letter from one of the Scouts at the Scout Fair)

Scouts at Qualcomm Stadium Scout Fair, in front of PARC's radio trailer. Photo from Dennis KD6TUJ.

Club HF Remote Station? Let's Install One!

There are at least three reasons for the club to get involved in the HF remote movement. The first one is technical. The challenge of making a quality remote installation is fun and rewarding. The project involves backhaul establishment, HF equipment selection, remote access protocol development, command channel identification and establishment, testing and tuning, documentation, and training, among other things.

Secondly, autopatch and casual repeater usage has declined due to the increase of cellular coverage. Exploring new services that can be offered from club equipment on the Palomar Mountain property is an important responsibility. A new broadband repeater has been installed, and fresh hardware for the voice repeaters is under active investigation. Adding an HF remote station would expand the services provided by the club. This is an exciting time to get involved with renovating equipment on the site.

Third, many members are negatively affected by CC&Rs and other limitations on putting up HF antennas on their San Diego properties. We live in an urbanized area where antennas may or may not be allowed. Plenty of us live in valleys or in places that are not good for radio. Having a remote station that members can reserve and use would go a long way towards making the hobby possible for people that live in places where radio is limited.

If you would be interested in helping explore a club remote HF station on Palomar Mountain, then please join up by writing me at scope@palomararc.org and I'll add you to the mailing list!

Mailing list archive located at http://palomararc.org/pipermail/hfremote/

This special interest group for HF remote will write a proposal for the Palomar Amateur Radio Club board of directors to vote on. If the vote is successful, then fundraising will begin immediately.

Current state: We think PARC needs to be 501c3 in order to get the required equipment, and we might need to use a base station in addition to Valley Center Wireless (ISP) to get audio up to the mountain.

PARC Repeater Site Work Party
May 23, 2015-146.700 Packet Repeater

John WB6IQS and Rich NI6H

The day started at 6 am, with NI6H pre-testing the intermittent functionality reported for the last few weeks. Two (2) 20 k packet files were successfully passed thru the XE2BNC-13 and KG6HSQ-13, radio internet, gateways; hmmm, we might have to call off, the work party.   I queued up a 105 KB file to XE2BNC-13 and after 18 minutes it choked, it killed the repeater, repeated connects were not successful, NI6H contacted our friend N6KZB in Tijuana, who manages XE2BNC and he tried several times and confirmed it was dead. NI6H arrived at the WB6IQS bench about 8:30 AM and demonstrated the intermittent functionality, sometimes it just stops hearing or passing tones and stops repeating; John is not sure but has his truck loaded for bear and wants to head up the mountain to check things out. We take a moment to call Ron KG6HSQ to see if he has been monitoring and he has. He too scratches his head as to a definite cause but will keep an eye on the traffic while we test again at the site.   We arrived on the repeater site about 11:30 AM, we were in the clouds with light drizzling.

John opened the repeater, checked the power supply and the VSWR on the transmit antenna. After the cavities its' best VSWR was 1.3:1 at 145.70 and was about 1.5:1 at 146.1 to 146.7. Not too bad, should not be a problem! Because the receive antenna is shared with our main repeaters, we did not test/disturb the receive side. John inspected the connectors in the repeater and the T connector at the cans to the antenna. He did not like how the center connector appeared, spread out too much so he replaced the T connector. Also the brass PL259 on the antenna feed was very dark and corroded so it was cleaned with sand paper and reinstalled. Another suspicious right angle BNC connector was replaced.   John pulled and inspected the hang time card and moved the jumpers to increase the repeater's hang time because he thought it might help.

At this point, Rich set up his portable Winlink station and put on a dummy load, while John set up his service monitor and started inspecting various aspects of repeater operation: TX frequencies, TNC tones, TNC tone distortion, TNC keying the transmitter, TX deviation, power output and all looked in order.   We passed two 20 kb files and four 87 kb files thru the two internet gateways mentioned above, to my cell phone and all went well. We consulted by phone with KG6HSQ, who concurred the packets looked good.   We searched for the 146.700 repeater documentation in the files onsite and John removed several files so he can build a working spare MFJ 1270 or Tucson Taper TNC repeater controller back at his QTH. John treated the repeater cards connections with Blue Stuff (contact clearer). We then secured the site and headed back down the hill.

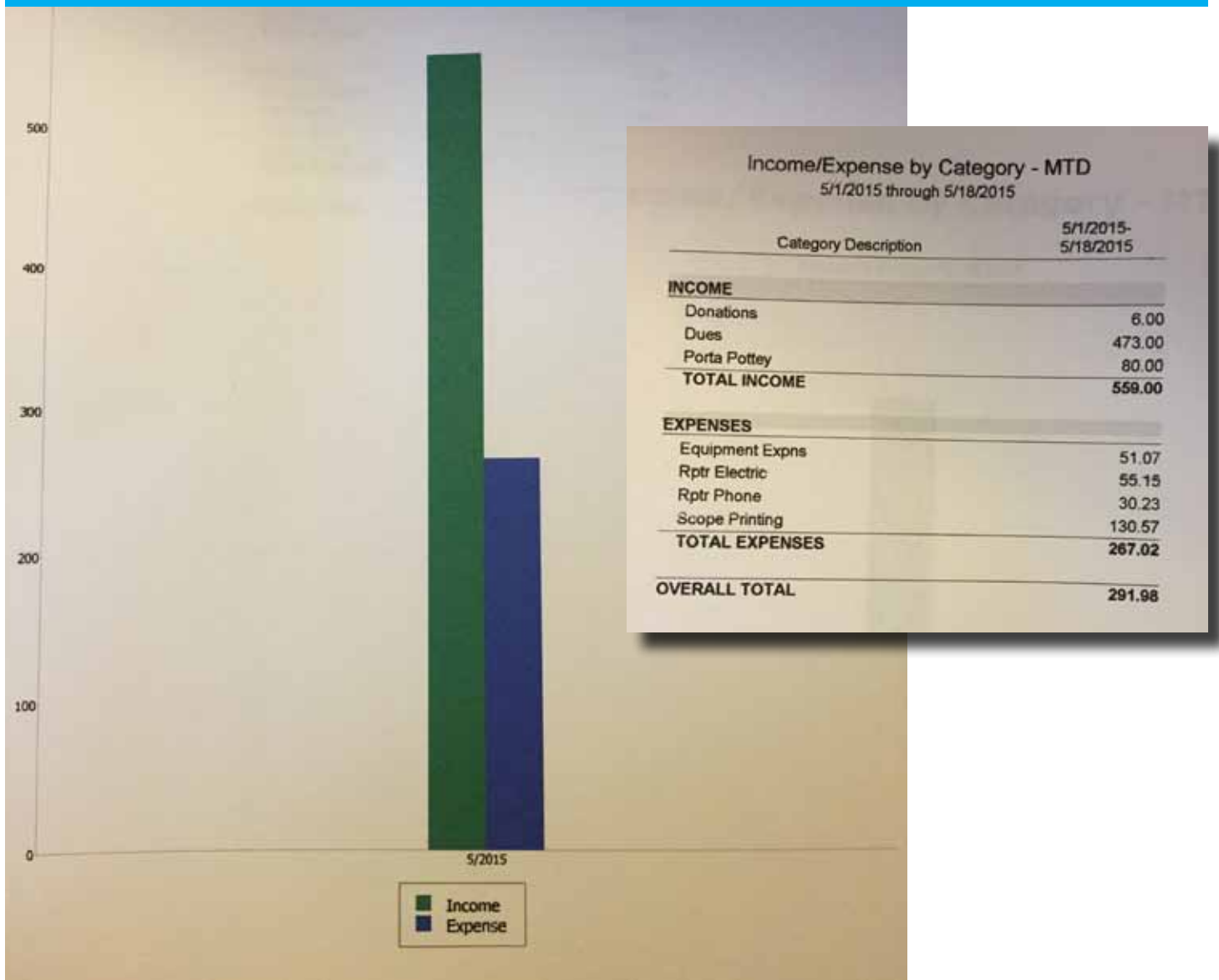We can't be sure how much we did to improve the efficacy of the repeater but we will be testing for the next few days/weeks. It's an intermittent problem, so we did what we could. When we left it was working very well, having successfully passed about 500 kilobytes of data files, without incident.
Rich NI6H
John WB6IQS

WB6IQS adjusts 146.700 repeater hang time

146.700 T antenna/can connector

Club Finanical Update

Income/Expense by Category - MTD	
5/1/2015 through 5/18/2015	
Category Description	5/1/2015- 5/18/2015
INCOME	
Donations	6.00
Dues	473.00
Porta Pottey	80.00
TOTAL INCOME	**559.00**
EXPENSES	
Equipment Expns	51.07
Rptr Electric	55.15
Rptr Phone	30.23
Scope Printing	130.57
TOTAL EXPENSES	**267.02**
OVERALL TOTAL	**291.98**

Friday, May1, was a beautiful Southern California day, a great day to be outside in the sunshine. However, many of us were outdoors for the saddest of reasons. It was time to pay respects and say "73" to our good friend, Art McBride, KC6UQH.

I'm sure that Art would have been pleased and touched by the attendance of many ham friends of long standing. Several spoke of his knowledge, skill, and willingness to share that knowledge and those skills with so many of us. The many eulogies given by people who knew Art from different aspects of his life all centered on his creative problem solving skills and great knowledge of electronic theory and practice.

Some of the hams who attended were Don, WB6FWE; Tom, W0NI; Tom, KG6RCW; John, WB6IQS; Jim, NE6O; Tom, KI6IET; Ted, KD6AKT, and Ron, K2RP. I'm sure there were others; my apologies to any I missed.

Art's leadership, enthusiasm and skills were instrumental in the success of PARC for many years. To say that he will be sorely missed understates the reality.

Ron K2RP

March 2015 Club Meeting Photos

Rare DX! W5NYV in front of the lens. Photos by KB5MU.

June Presidential Address

Greetings all. This is the long awaited Field Day month! Your club will carry out FD operations from a new location. As you may be aware, we lost our longstanding FD location because the site finally is being developed with very large construction. See the FD note on the cover of this Scope for full details about FD.

I am happy to be back in town after a fantastic Dayton Hamvention. Was pleased to see several PARC members at the Hamvention, and was delighted to even see KD6AKT having a grand time browsing through all the goodies. Lots of interesting things to see this year.

As always, there were a myriad of vendors. The "usual suspects" (ICOKENYAE, Flex, and K3) were there, along with a host of new and interesting players. Yes, some surprises, at least for me. ICOM highlighted the ICOM 7851 HF/VHF/UHF transceiver. Mighty fine looking radio. Probably works pretty well too. Nice built-in output for a full PAN display with point and click capability. I am not schooled in ICOM, so maybe this is common. At a price of $15.5 K it must be astounding!

Yaesu was in full C4FM/Fusion marketing, with a very fine display and presentation at one of the forums. The real surprises to me were the various newcomers to the SDR world. For example, ELDA, an Italian company, was highlighting and selling their QRP Full SDR Transceiver. An HF transceiver that even has "knobs", since the unit DOES NOT need a computer to operate It is standalone capable of CW/SSB in the "old way" if you happen to be communicating when the big one hits. But operated with a laptop, you achieve full SDR performance similar to FLEX. You only get 5

Watts output, but the radio is powered through the USB port that communicates all usual digital commands to the laptop, and has built into the radio itself all the software: Digital processing, logging, display, etc. All it uses on the laptop is the laptop's sound card for digital signal generation, and the laptop is the source for commanding the radio when not commanded with knobs. And for a price of $1200.00, it even gives you 4 slice receivers compared to the 2 slices you get with a FLEX 6300. Most intriguing!

So, there is a lot to look forward to in order to have fun in ham radio.

See you at FD.
73 de NN3V

Club Members ONLY!
PARC has a tube bank that includes many 6 & 12 volt receiving tubes (and some transmitting types) for use by club members to repair their own personal equipment. Not for commercial use or resale. If we have your requests, we will pre-check the tubes and deliver them to you at the next club meeting.

Contact John WB6IQS WB6IQS@att.net

Hamvention Report

by Howard KY6LA

Weather was the usual muggy and rainy Dayton crap weather. glad I no longer live near the center of the continent

Dayton. usual FILTHY disgusting arena with overflowing toilets. As an American I am shamed that Foreign visitors have to see Ham Radio's Mecca as such a worse than 3rd world place.

FLEA MARKET

Flea market was clearly down about 25% less vendors this year and virtually everything for sale was garbage that you would not normally pull out from your own trash. Even the usual hat embroidery places were down to one vendor. I suspect old age plus a lousy weather forecast was a contributing factor.

FORUMS

I attended 2 Forums = Ham Law. which was terrible this year without Fred Hopengarten. and SDR - which was excellent with a number of new ideas and concepts being shown.

JAPANESE

The Japanese had their usual Legacy HF radios which clearly are no longer selling very well. Kenwood and Yaesu HF Both areas were totally dead. Icom - who are better showmen. had some interest in the Overpriced IC-7851 - but it still lacked a modern display capability. they were misrepresenting the 7851 as an SDR. which it obviously is not as it is legacy Superhetrodyne technology with a DSP. Circa 1980 design. albeit they have tried to address the phase noise issues they had with the 7800.

It was pretty obvious that the Japanese have almost given up on selling HF equipment in the face of superior US Offerings from Elecraft and Flex Radio. The Japanese seem to moved heavily into the VHF/UHF and various incompatible digital modes. Talking to HRO. they admitted that they hardly ever sell a Japanese HF radio anymore but the VHF/UHF Radios sell well.

CHINA

However the star of the VHF/UHF were the Baofeng Chinese Radios selling for $24.95. Hard to justify $400 for a Japanese radio that does the same thing. Needless to say the Baofeng were selling like hot cakes.

STEPPIR

SteppIR introduced a portable Antenna analyzer for $389 which is visibly superior to the MFJ269@$399. Several of us bought the SteppIR analyzers. Rob WA3IHV and Ben N6MUF bought the CrankIR portable vertical Antennas for DXpeditions.

ELECRAFT

Elecraft introduced the K3S which is the old K3 with a new synthesizer board to fix the poor RMDR issues that had the K3 down on the Sherwood List. Like the Japanese, Elecraft tried to misrepresent the K3S as an SDR but clearly it is a Legacy Superhetrodyne Radio with a DSP audio stage. Circa 1980 design. With the new synthesizer board the K3S still ranks second to the Flex 6700/6500 on the Sherwood list. The sales table at Elecraft had 3 sales stations and were lined up 3-5 deep waiting to place orders. Clearly Elecraft still make winning products.

FLEX RADIO

Flex Radio introduced their $999 Maestro Portable Front Panel - Contest Optimized Knobs and Display for their 6000 series. Clearly it was the star of Dayton 2015. Flex is making a major push into the contest world. more on that later. Maestro's were selling spectacularly. both over the sales counter and online. in fact the order flow online was so heavy that the on line sales site clearly slowed down under the load. Flex had several stations set up that each include a Maestro Front Panel - One demonstrated close integration with N1MM+ Contest Software, One Demonstrated the Application Programming Interface where users are now connecting all sorts of interesting and cool things to the Flex 6000 series. WITHOUT WIRES. Since all the Flex 6000 series have 95 dB antenna isolation, Flex introduced a SO2R box to enable full duplex in all the 6000 radios. The major benefit is that now a Single Radio can now be used to SO2R contest at about 1/2 the cost and much less complexity of the comparable two K3S that would be needed to accomplish the same result.

Rob WA3IHV and I put in orders for the Maestro.

ITALY

Italy was very strongly represented. Begali Morse Code Keys are definitely still the #1 CW Key. Expert Amps had their 1.3K-FA Amp on display. only 16lbs and 1500 Watts. Only $4,695 Show Special.Backordered by shows end to at least January 2016.
I was particularly impressed with the $1099 Elad SDR-DUO. (I saw it also at Friedrichshafen 2014) with is a complete Second Generation SDR 5 W Transceiver in a very portable box with Knobs. it runs stand alone or with a computer. More impressive was when hooked up to a Expert 1.3K-FA it drove 1000W with only 5 W drive.

Charlie NN3V bought one.

FLEX BANQUET
We normally avoid events in Downtown Dayton. too yucky and dangerous
. But this year the draw was Ranko 4O3A and Craig K9CT - two renowned world class contesters who were the guest speakers. Top Contesters are like Formula One Drivers. They push the technological envelop to achieve better and better results. We all benefit from the technological improvements that trickle down from their competitive experience.

Gerald Youngblood, President of Flex, told us of his design process for the Maestro in which he visited with and listened to top contesters to try to understand what they needed to be able to perform better. With the help of Craig K9CT they design the Maestro box . with only the absolutely needed knobs and controls and put it in a small enough package that it could fit at the most ergonomically optimum angle for contesting for minimum operator fatigue He then went onto explain the rapid development process where they literally backed the molds in an oven to produce working models for the show in 4 weeks.

Ranko 4O3A's company is well known for making devices such as the Station Genius to integrate any and every possible peripheral device into a contest station.   Most important all the new devices are 21st Century Ethernet Speed Connected rather than 20th century slow serial ports.   He went over the joint development of the Flex SO2R box to give it the features of the Station Genius as well as enable the Flex 6000 operate as a Full Duplex SO2R station. Ranko's contest station set the new European Record for the 2014 CQWWDX CW contest. His plan is to use the Flex 6000 with the SO2R in the 2015 CQWWDX contest and hopes that the improvements will enable him to shatter the world record. He then surprised us all by revealing that Flex was working with him on the design a Full Legal Amplifier (using 2 - 1400W transistors) - This will be the first totally Ethernet Connected Amplifier. Flex gave NO PRICES or DETAIL or Delivery Dates. but likely the main stumbling block will be the usual bureaucratic regulatory approval delays associated with Amps .rather than engineering or production.

Craig, K9CT, started his talk by stating that "Elecraft should be worried that he was over at the Flex Dinner" He explained the concepts and designs behind K9CT contest station and how the new Flex Contest Suite would not only cut his costs of a SO2R station in 1/2 but more

important greatly simplify station configuration, design and contest work flow.   K9CT is committed to using the Flex Contest Station Suite in the Fall Contests.

FINALLY
Ken NN9P and I got a totally unexpected award at the Flex Radio Banquet at the Dayton Hamvention as the 2014 Top Flex Radio Elmer.

In case you are wondering, I am not paid by Flex nor do I own any of their stock. All my life I have worked at the Bleeding Edge of Technology and I really enjoy working with others who also invent new things. Flex has put fun back into Ham Radio for me by pushing me to consider new things all the time.

I appear to be able to poke through the side of these boxes!

Oh no!
I think I am trapped!
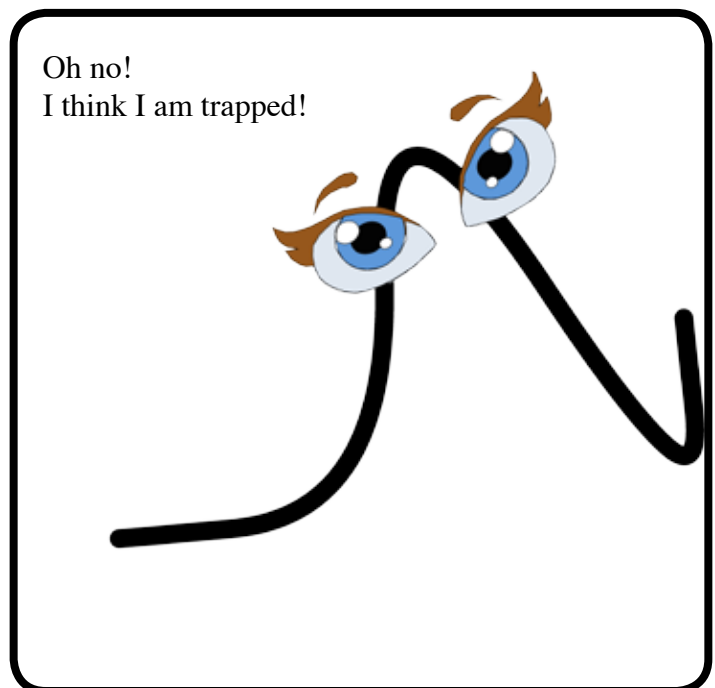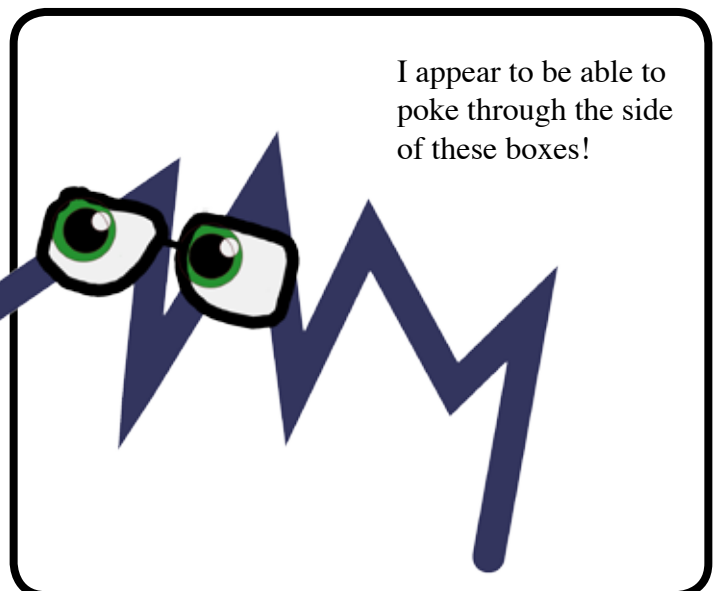
digipeater is transmitting, everybody hears it and waits. When the digipeater stops transmitting (and starts listening), any user station can transmit to it and be heard. But what happens if two users have a packet to send?

That's what the random backoff is for. Without the backoff, both stations would jump on the channel at the exact same instant, and interfere with each other every single time. With the backoff, the station that randomly chooses a shorter backoff starts to transmit first. The other station is supposed to hear that transmission and wait its turn. But if those two stations are low-level stations that need to use the digipeater to cover the county, chances are pretty good that they can't hear each other. The second station won't know that the first station has taken over the channel, and will happily start transmitting on top of it. The digipeater will hear both stations, which means it can't copy either one, unless one is very much stronger than the other (thanks to the FM capture effect). This is called "the hidden terminal problem", since the two low-level stations are hidden from each other.

I won't try to reproduce the math here, but this situation has been analyzed rather thoroughly. It turns out that the hidden terminal problem can really hurt the channel capacity. If nobody listens at all, and just transmits randomly whenever they have data, the best throughput you can expect is about 18% of the ideal channel data rate. Listening before you transmit is supposed to help. A network with listening but suffering from hidden terminal effects can be even worse than not listening at all!

There are various ways to address this problem. If the transmissions were much shorter than the backoff times, for instance, chances of a collision would be pretty small. We can't really use that technique, though, because our data rate is so slow. It can take several seconds to send a long packet, so backoffs would have to be many tens of seconds to have much effect on the collision rate. We don't want to wait that long, so just increasing the backoff times isn't a practical solution. It's also possible to add complexity to the packet protocol in ways that reduce the problem. For instance, stations might be required to transmit a short burst to request the channel, and then wait for a go-ahead from the receiving station before sending the payload. That technique is used by WiFi wireless networking with good results. However, we're pretty much stuck with the existing AX.25 protocol for short-term compatibility, so that's out too.

The best solution is to make sure everybody can hear everybody else, and the way to do that on a metropolitan area scale is to install a full duplex repeater in place of the digipeater on the mountaintop. A full duplex repeater transmits exactly what it hears, with essentially no delay. Because everybody can hear the mountaintop repeater, and it can hear everybody, effectively everybody can hear everybody else through the repeater. There are no hidden terminals. Stations who can't hear the repeater will know right away, and choose another network, so our assumption that everybody can hear the repeater is self-fulfilling.

Notice that the full duplex repeater doesn't participate in the network as a station. Packets are not received and stored by the repeater. The repeater retransmits the tones in real time, without worrying about what they mean. There's no extra delay or extra complexity. Each station can hear every other station (through the repeater) and the standard channel sharing mechanism works well. The user stations don't have to do much special. They do have to program their radios for split frequency operation, just as on a voice repeater, but since this is automatic on most modern radios, that's easy and familiar.

There is one TNC timing parameter that might need to be adjusted for the full duplex repeater. It's called TXDELAY and it controls the delay between enabling the transmitter's push-to-talk and beginning to send the packet's actual data. This delay has to be long enough to let the transmitter turn fully on, plus long enough for the other receiver's squelch to open and demodulator to synchronize with the transmission. When operating through a full duplex repeater, this also has to allow for any delay in bringing up the repeater. Typically, default TXDELAY values are so generous that it works fine on the repeater without adjustment.

There are costs at the mountaintop, of course. Because it's a full duplex repeater, it needs cavity filters to isolate the transmitter from the receiver. Because it's transmitting whenever anybody wants to transmit, it has to be build robustly to take 100% duty cycle transmitting indefinitely. To guarantee availability in times of emergency, it needs substantial battery backup and maybe a fallback generator too. It needs a coordinated frequency pair. Just like a voice repeater.

And just like a voice repeater, it needs maintenance. Ours had to be repaired just recently (see page 10). Much more next month.

PALOMAR AMATEUR RADIO CLUB
FIELD DAY 2015

JUNE 26th – 28th

see palomararc.org for location

W6NWG
WHISKEY SIX NOTHING WORKS GOOD

2015 ARRL FIELD DAY
HAM **RADIO)))**

FD PICNIC DINNER PSYCHO Kitchen Saturday 6pm

FD SCHEDULE
(Tentative)
June 26th
-11AM Setup at site

June 27th
-7AM Breakfast
-8AM Crank up towers
-9AM Final Setup Test
-11AM CQ Field Day...
-1230PM Lunch
-6PM Dinner
-8PM NTS Message NET

June 28th
-7AM Final Breakfast
-10:59:59 Final Contact
-11:30 Tear-down

OPERATING 5 STATIONS

~20/80 M CW   ~20/80 M SSB

~15/40/10 M CW   ~15/40 M SSB

~GOTA and VHF 6 M

Category:
4A

Amateur Radio Emergency Data Network Demonstration:

AREDN™
AMATEUR RADIO EMERGENCY DATA NETWORK

Pictures of Past Field Day Fun on CLUB WEBSITE
WWW.PALOMARARC.ORG

DO NOT HAVE TO
• BE A PARC CLUB MEMBER
(Club Membership is encouraged)
• BE LICENSED or KNOW CODE

ALL ARE WELCOME INCLUDING GENERAL PUBLIC!
COME OPERATE, LEARN MORE ABOUT HAM RADIO!
VISIT SAN DIEGO COUNTYS GREATEST AMATEUR RADIO CLUB!
COME JOIN THE FUN!

Work Party at Repeater Site 7 June 2015

The next scheduled work party is for June 7, the Sunday after the meeting.
Needed are helpers to help clean off the flaking paint on the freezer building. After it is cleaned up, we will prime the freezer building. Plans are to follow up on the next trip with a moderate green paint keep blending in better for our neighbors.

There are also two trees that have been felled, one by choice, one by a superiors act. These will need to be cut and removed at some point in the near future. Should a club member wish then for personal use, I believe they are welcome to them. If not we will cut them and ask a small price for the service/goods to be given to the club.
The group will gather at Mother's Kitchen at 10:00 AM and proceed to the site from there. Those that wish may come earlier and enjoy the delight of the Kitchen before the party. Mother's is at the top of south grade and to the left.

This is a great time to provide the club with support and join together. Also a chance for new members to learn some about Palomar's equipment.
More hands make for easier work.

Dennis
KD6TUJ

Featured Program:

At 7:30pm on 3 June 2015, Palomar Amateur Radio Club will have a program about our upcoming Field Day. We look forward to seeing you at the Carlsbad Safety Center, 2560 Orion Way, Carlsbad, CA. Arrive at 7:00 for socializing.

Sign up for the PARC Email Lists:

http://www.palomararc.org/mailman/listinfo