SCOPE

Palomar Amateur Radio Club June 2017

Inside this issue:

2017 Field Day

This year PARC will be working with the Escondido Amateur Radio Society for Field Day. Come Join us

at beautiful Lake Dixon in Escondido

(More Details Inside)

It Appears By Spears

It's time for Field Day. Although PARC is not having our own field day, we are assisting EARS with theirs. If you have some time, please offer to assist with setup, radio staffing or everyone's favorite activity tear down. More information is on Page 30.

Also this month we have the Mini Maker Fair in Vista. Michele, W5NYV has a booth reserved. Please contact her if you can help staff the booth or have something interesting to showcase.

At our June meeting Mark, KF6WTN will be back with his "Rappin with Raptis segment. Our main presentation will be from David Hull, KC6N as he gives an overview of digital voice technologies.

This month Michele, W5NYV has written an article on ATV and Bernie N6FN is back with another interesting article on EchoLink.

Wishing all you fathers a very happy Fathers Day.

73 de KM6CXW
Keith Spears
Editor

"Let's get some more activity on the repeaters! If !"

IEEE Distinguished Visitor by Bob KM6BMX

What do Satellites, Music, and the IEEE Computer Society have in common?
Our long-time member, Michelle W5NYV, that's what.

Recently, the Institute of Electrical and Electronic Engineers (IEEE)
Computer Society elevated our fellow ham and tech geek, Michelle W5NYV,
to its Distinguished Visitor Program (DVP). Michelle participates in numerous IEEE societies and groups: Computer Society, Women in Engineering, Information Theory, Communications Society, Microwave Theory and Techniques, and STEM activities to name a few.

Michelle joins an elite group of 17 IEEE Computer Society DVP members
world-wide. In the US/ Canada area, she shares this distinction with 6
others.

The Distinguished Visitor Program (DVP) provides professional and
student chapters with direct access to top technology leaders and innovators from every sector of the computing industry. The DVP provides funding to assist chapters in their service area with covering travel
costs for speakers from the program. In some other groups, the DVP is
known as Distinguished Lecturers.

Two of Michelle's topics include "Algorithmic composition of music" and "An Open Source protocol for amateur radio satellites". For more

(Continued on page 33)

Board Members and Committee Chairs

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Not on Board

Repeater Site Chair	Mark Raptis, KF6WTN	(Acting)

Committee Chairs

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Echo Link	Bernie Lafreniere N6FN	N6FN@niftyaccessories.com
HF Remote	HF Remote SIG	hfremote@palomararc.org
Mesh Networking	Michelle Thompson, W5NYV	mountain.michelle@gmail.com
Operating Day	Tom Martin K6RCW	k6rcw@amsat.org
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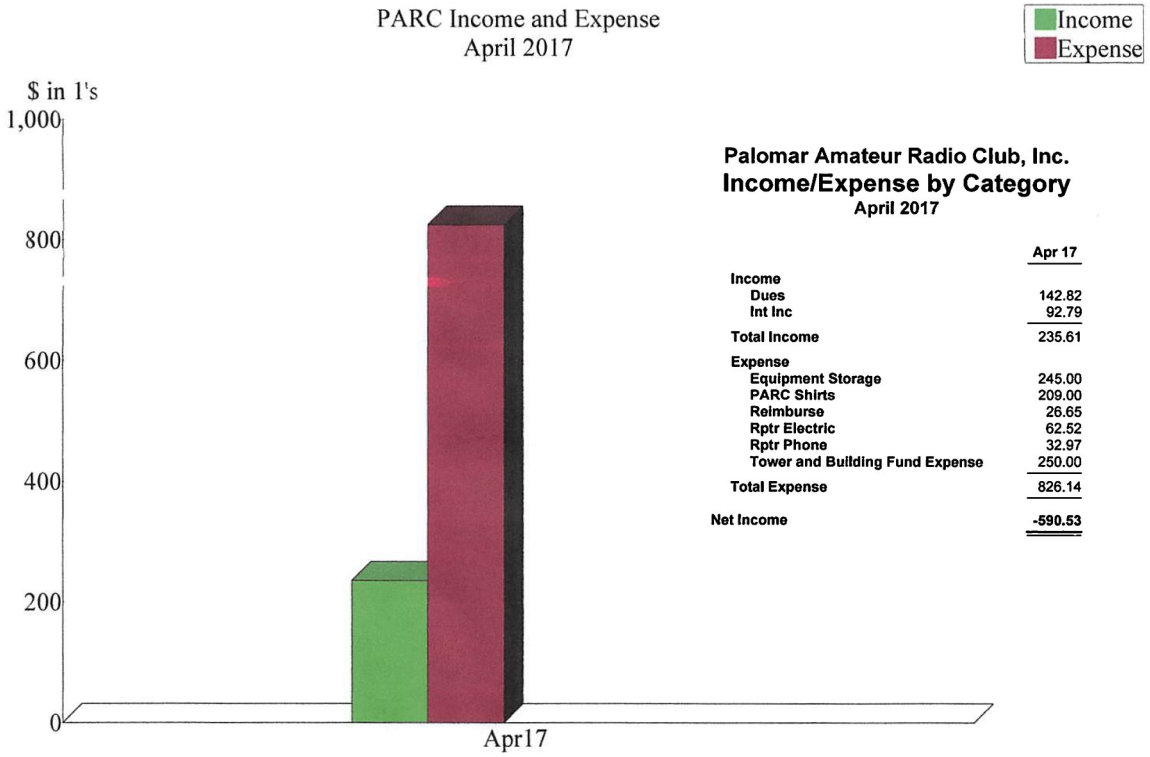
SANDARC Representative	Paul Williamson KB5MU	kb5mu@amsat.org
SD Microwave Group Liaison	Kerry Banke N6IZW	kbanke@sbcglobal.net

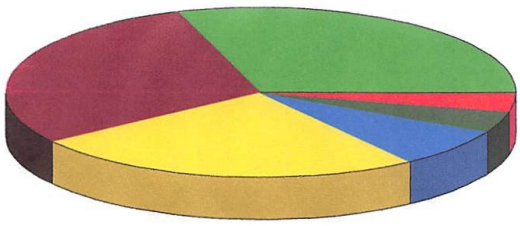


Palomar Amateur Radio Club, Inc.
Income/Expense by Category
April 2017

	Apr 17
Income	
Dues	142.82
Int Inc	92.79
Total Income	235.61
Expense	
Equipment Storage	245.00
PARC Shirts	209.00
Reimburse	26.65
Rptr Electric	62.52
Rptr Phone	32.97
Tower and Building Fund Expense	250.00
Total Expense	826.14
Net Income	-590.53

Expense Summary
April 2017

Tower and Building Expense	$ 250.00
Equipment Storage	245.00
PARC Shirts	209.00
Rptr Electric	62.52
Rptr Phone	32.97
Reimburse	26.65
Total	$826.14



By Account

June Program—June 5th

Join us as David Hull, KC6N gives an overview of digital voice technologies. The talk will be in two parts. The first part on the evening of June 7th will address the technical aspects of digital voice operation, what it does , why we might want to do it and how it works.

Dave will go over DSTAR, DMR and Fusion as well as provide an overview of the different radios available for the respective modes.

Dave Hull has been licensed since 1966 (originally in San Diego as WB6SHG) receiving the Extra as KC6N in 1979. Dave is recently retired from 45 years as an electrical engineer specializing in the fields of RF radio and digital modem design including the C$FM and GMSK modes will be discussing this evening. Dave holds a BSEE and an MSEE from SDSU and taught digital communications engineering the UCSD Extension for five years.

Upcoming Events

Wednesday, June 7th	7:30	PARC Meeting	Carlsbad Safety Center
June 2nd—4th	8-5	Sea Pac Convention	Seaside, OR
Wednesday, June 14th	7:00	PARC Board Meeting	Poway Fire Station #3
June 17th & 18th	TBA	Mini Maker Fair	AGSEM, Vista
June 18th	TBA	ARRL Kids Day	Old Poway Park
June 24th-25th	All Day	ARRL Field Day w/ EARS	Lake Dixon, Escondido
Wednesday, July 5th	7:30	PARC Meeting	Carlsbad Safety Center
Wednesday, July 12th	7:00	PARC Board Meeting	Poway Fire Station #3
Wednesday, August 2nd	7:30	PARC Meeting	Carlsbad Safety Center
Wednesday, August 9th	7:00	PARC Board Meeting	Poway Fire Station #3

SEA PAC

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- Friday Workshops
- World Class Banquet
- Banquet Entertainment
- DX Luncheon
- YL Luncheon
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- Giant Flea Market
- ARRL Forum
- VE Testing
- Pin Design Contest
- Prizes, Prizes, Prizes
- Wouff Hong
- & More!

Seaside Convention Center

415 First Avenue, Seaside, Oregon

Become a part of the *SEA-PAC* experience. We are looking for volunteers on Friday, Saturday and Sunday.

Email us at volunteers@seapac.org

Phone: 503-882-7388
Website: http://www.seapac.org
Email: info@seapac.org
Mail: SEA-PAC Ham Convention
PO Box 7263

Repeater Status

This list includes W6NWG repeaters operated by PARC and other repeaters open to use by PARC members. All W6NWG repeaters are located on Palomar Mountain and are open to all amateurs.

Frequency	TX	Tone	Call sign	Remarks
52.680	-	107.2	W6NWG	Back on the air. Performance tweaking in progress
146.730	-	107.2	W6NWG	System Fusion enabled. See Note 1
147.075	+	107.2	W6NWG	System Fusion enabled. See Note 1
147.130	+	107.2	W6NWG	System Fusion enabled. See Note 1
447.000	-	107.2	W6NWG	FM only for EchoLink
224.380	-	107.2	KK6KD	Americas Unidos. Down for repairs
224.900	-	107.2	WD6HFR	Convair/220 ARC
224.940	-	107.2	KK6KD	Sharp Hospital coverage
146.970	-	107.2	KA3AJM	Vista-Sponsored by MetroNET
146.175	+	107.2	N6FQ	Fallbrook ARC; linked to 445.600
445.600	-	107.2	N6FQ	Fallbrook ARC; linked to 146.175
145.050	s	N/A	W6NWG-1	Packet node; linked to metro 9600 net 1
146.700	-	N/A	W6NWG-3	Packet duplex repeater; Duplex 3

PARC operates an armature fast-scan television repeater. It's currently off the air. Currently there are not links to other ATV sites.

- ATV in: 915 MHz WBFM audio subcarrier 5.8 MHz
- ATV in 2441.5 MHz WBFM, audio subcarrier 6.0 MHz
- Intercom: 146.415 MHz NBFM simplex (tone 79.7). Currently not working.
- ATV out: 1241.25 MHz VSB, NTSC Standard

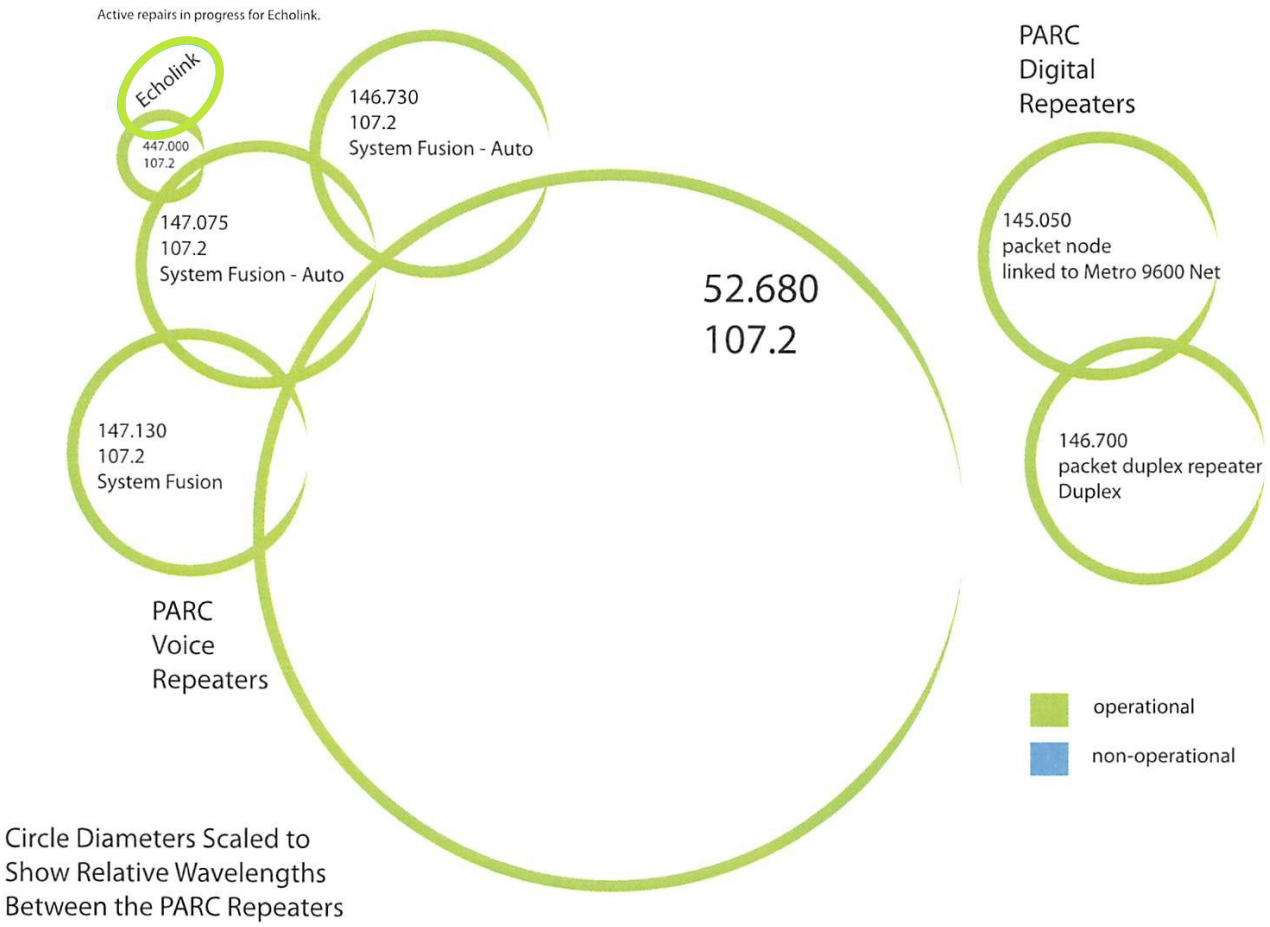
The PARC repeater site on Palomar Mountain is located at 5560 feet above mean sea level and 2132 above mean terrain. It covers most of San Diego County and beyond into Mexico and out to sea, and is shielded from the North.

Note 1: All Fusion enabled repeaters require a CTCSS tone of 107.2 Hz to access the repeater and also transmit a 107.2 Hz tone. Since the repeater output has a 107.2 tone you can enable CTCSS receive tone squelch on your transceiver which will eliminate interference from spurious noise and other repeaters. Control operators have the capability of setting the Fusion Repeaters to FM only operation. Consequently if you can't bring up the repeater in C4FM digital mode, try using normal FM mode. When in FM mode all Fusion repeaters have a 3 minute maximum transmit time, after which the repeater will cut off transmission until after the received signal drops. To prevent timing out the repeater after someone finishes talking, wait until you hear the courtesy beep which indicates that the 3 minute time ahs been reset. If a transmit timeout happens the repeater will provide a voice message indicating that the maximum transmit time has been exceeded.

Note 2: PARC no longer operates an autopatch or packed BBS

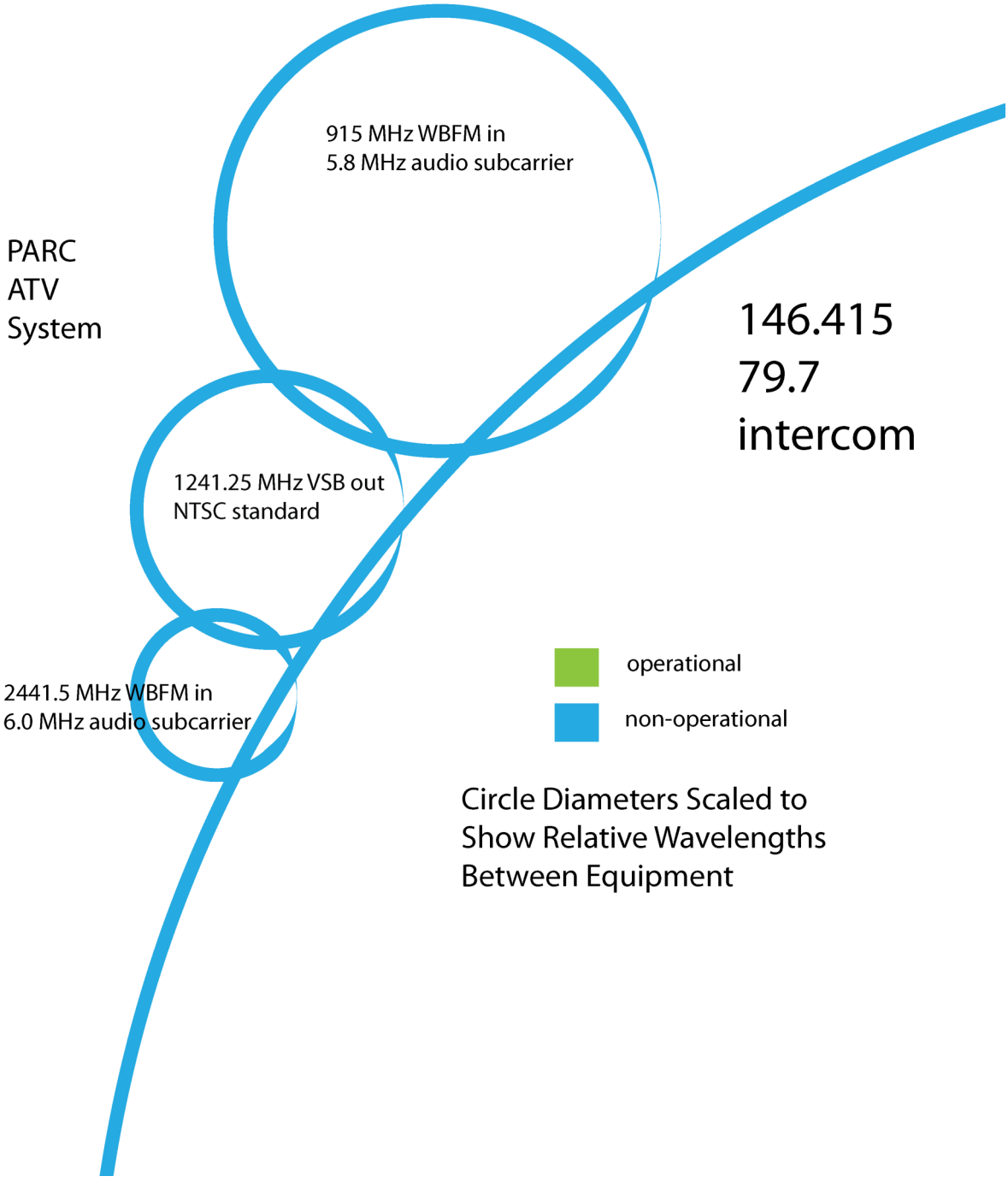
Another project is underway to investigate installing remotely-operated HF station at the repeater site as discussed. Join the Remote mailing list to participate.

Reported Repeater Status



Thanks to Michelle Thompson, W5NYV for the repeater status graphics.

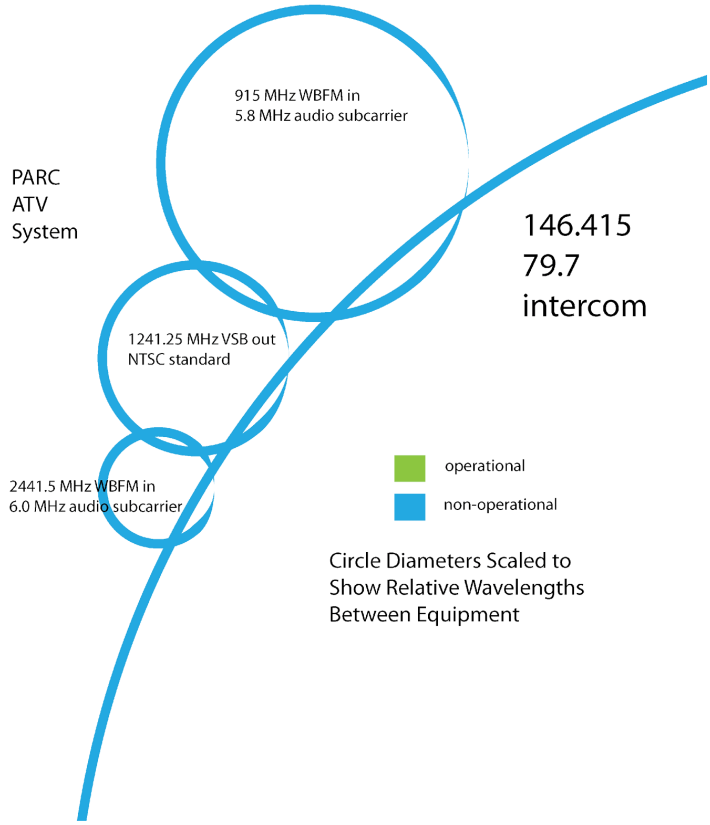
Reported ATV Status



ATV Prototyping Update

by Michelle W5NYV

Below is a graphical summary of the current status of PARC's amateur television repeater.



Right now, nothing is working good! NWG! We want to change that by replacing the creaky old analog ATV system with a spiffy new digital ATV system. Right now we're experimenting with available SDR techniques that we hope will make the digital system affordable and easy to use. I'll start with some explanation, and then describe in detail the latest experimental results.

Our Amateur Television (ATV) coordination is through an organization called SCRRBA[1]. SCRRBA is the Southern California Repeater and Remote Base Association. Our old system design coordination can be summarized as follows.

1 http://scrrba.org

ATV in: 915 MHz WBFM, audio subcarrier 5.8 MHz
ATV in: 2441.5 MHz WBFM, audio subcarrier 6.0 MHz
Intercom: 146.415 MHz NBFM simplex (tone 79.7)
ATV out: 1241.25 MHz VSB, NTSC standard

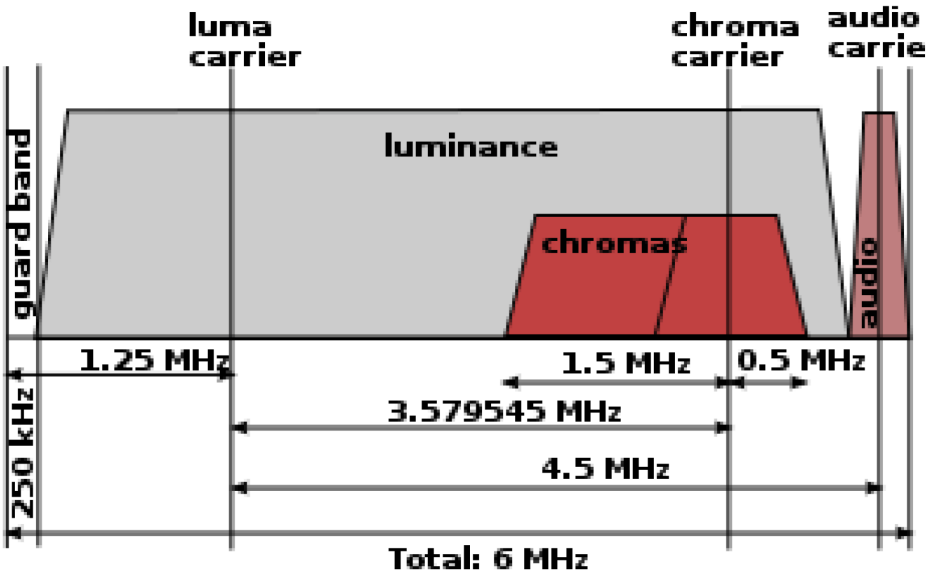
None of these services are working. Some are not currently installed. When we switch to a digital signal, we expect to use the same frequencies and channels, but we will have to update our coordination because the type of signal will change.

Where are we coming from? What types of signals did we transmit under the old system?

Let's start with the output first. VSB stands for vestigial sideband. VSB is a type of amplitude modulation that encodes data by changing the amplitude of a single carrier frequency. When this is done, two sidebands are produced. For VSB, portions of one of the two sidebands are removed. A vestige of the sideband remains, hence the name.

NTSC is named after the National Television System Committee. It is the analog television system standard that was used in the US for 70 years. The majority of NTSC transmissions were shut down around 2010. An NTSC signal occupies 6MHz of bandwidth.

Below is a diagram of an NTSC signal, by Jmgonzalez, used with permission.



The video signal is generally considered to be transmitted between 500 kHz and 5.45 MHz above the lower bound of the channel. The very lowest 250 kHz is a guard band.

The black and white (luminance) video carrier is 1.25 MHz above the lower bound of the channel. This video carrier generates two sidebands, one above and one below. The sidebands are each 4.2 MHz wide. The entire upper sideband is transmitted, but only 1.25 MHz of the vestigial lower sideband is transmitted.

The color (chroma) carrier is 3.579545 MHz above the video carrier. This carrier is quadrature-amplitude-modulated with a suppressed carrier.

Above that is the audio carrier. This signal is frequency modulated, like commercial FM radio, but with a 25 kHz maximum frequency deviation instead of 75 kHz as is used on the commercial FM band.

This means that analog television audio signals sound softer than FM radio signals if you tune in and try to receive them on a wideband receiver.

The two input channels are Wideband FM with audio subcarriers specified. Why the difference? In general, below 1.24 GHz it was traditional to use Vestigial Sideband and above 1.24 GHz, it was traditional to use FM and other modulations. We don't seem to have followed this tradition precisely, as the 2GHz input signal is listed as Wideband FM.

The intercom has never worked as long as I've been active with ATV. It's my understanding that the point of the intercom is to provide an accessible and reliable channel to coordinate and troubleshoot amateur television transmission and reception.

The history of NTSC is very interesting. A lot of engineering and development and decisions were made all along the way. It's not every field that has something that was in daily heavy use for seven decades. Television is so ubiquitous and influential, yet required very little work on the part of the viewer to use.

With the dawn of digital communications, new video formats emerged. Standards such as Digital Video Broadcasting (DVB),

Advanced Television System Committee (ATSC), Integrated Services Digital Broadcasting (ISDB), Digital Terrestrial Multimedia Broadcasting (DTMB), and Digital Multimedia Broadcasting (DMB) were developed, tested, adopted, and deployed.

The United States, Canada, Mexico, South Korea, Dominican Republic and Honduras adopted ATSC. Europe, Singapore, Australia and New Zealand adopted DVB.

DVB is what PARC is developing for the next generation of our ATV repeater system. See June 2016 PARC Scope for a brief explanation and video demonstration of receiving first-generation DVB-T video. Now we're evaluating DVB-T2. The T stands for terrestrial and the 2 for second generation.

The Amateur Television Network (ATN), located primarily in California and Arizona, uses DVB-T. It may be to our advantage to also use DVB-T in order to more closely coordinate and network with ATN. However, a significant advantage of DVB-T2 over DVB-T is that T2 uses improved coding and allows something called generic stream encapsulation[2] (GSE). This protocol allows any type of data to be carried over DVB. First generation DVB was designed for transporting MPEG video. Second generation DVB is much more flexible and efficient.

A big advantage of both DVB-T and DVB-T2 is the existence of very inexpensive dongles that allow reception of DVB-T/T2 signals. This means there is a very low barrier to entry to receiving. The devices are small and convenient. There's an active open source community around them because the functionality of the dongle has been opened up to allow full use of the receiver. When the dongles are used this way they are called or are known as an RTL-SDR[3]. At 2017 Hamvention, RTL-SDR was featured at the AMSAT/TAPR banquet! Regardless of the selection of DVB-T or DVB-T2 (or both!) the RTL-SDR dongle is the target receive device.

Transmitting can most easily be done with an SDR capable of accessing either the 915 MHz or 2441.5 MHz inputs. This opens up

2 https://www.dvb.org/resources/public/factsheets/dvb-gse_factsheet.pdf

3 http://www.rtl-sdr.com

possibilities including the HackRF[4], the BladeRF[5], the LimeSDR[6], the USRP B200 series[7], and many others including homebrew. The HackRF is half-duplex. The BladeRF is full duplex. The LimeSDR is full duplex with a dual transceiver.

While the receiving dongles can be very cheap, one can spend a couple hundred dollars up to many thousands on equipment for transmit. One of our challenges is to bring the cost of transmitting down for club members.

Experiment

A BladeRF, a Linux computer, and GNU Radio were used to develop the prototype design of a fully functional ATV rig and a repeater for PARC.

GNU Radio[8] was installed by using PYBOMBS[9] on an Ubuntu[10] machine of recent vintage. The field programmable gate array (FPGA) in the BladeRF was updated with the most recent image from the BladeRF FPGA image homepage[11]. Since this is a recent BladeRF, the 115 version was the right one to use.

In GNU Radio, one of the ways to design a sofware radio is with flowgraphs. Flowgraphs are a graphical representation of a radio system. The source and sink blocks are the receiver and transmitter ports, respectively. In this case, we're using Osmocom source and sink blocks. These blocks have BladeRF interfaces built in. Osmocom blocks come along with a lot of other radio interfaces such as HackRF and RTL-SDR.

The flowgraph is similar to a software flowchart or a circuit diagram. Signals flow from block to block. Each block does a particular task. The smaller and simpler the task, the better.

Sources for signals can be real signals, captured off the air,

4 https://greatscottgadgets.com/hackrf/
5 https://www.nuand.com
6 https://myriadrf.org/projects/limesdr/
7 https://www.ettus.com
8 https://www.gnuradio.org
9 https://github.com/gnuradio/pybombs
10 https://www.ubuntu.com
11 https://www.nuand.com/fpga.php

Continued on Page 16

Membership Report

From the Membership Table. You can check the status of your membership 24/7 at Member List or go to the club's website and navigate to Join and click on "here" at the top of the page. Enter your call sign into the box and click the "Look up my membership status now" button.

To renew your membership or extend your membership, fill in the form on the Join page. Make sure you select the correct value from each of the drop-down menus (Type of Membership, How many years, I'm an ARRL Member, Newsletter option and License Class). If you want to receive an email when your membership is coming due for renewal, please make sure that I have a valid email address for you. To do that, please send an email to Membership@palomararc.org.

"

Callsigns for already expired memberships or those that will be expired before the June 6th General Membership meeting. (click on your call to check your status)

AA6BP AB6O AC8Q AD6LP AE6HF AE6O AF6UA AG6MQ AI6KO AI6NY AI6QA AK4XK AK6AK K0CSD K6BLL K6DEX K6DRH K6EQ K6GOR K6ISS K6JQE K6OT K6PJH K6PLR K6SC K6SML K7WYV K7YMG KA6AAG KA6KIW KA6OYD KB6CPZ KB6CUT KB6NXC KB6PCF KC6HUK KC6YSO KC9IYR KD1BD KD6AEB KD6EKQ KD6YJB KE6AFH KE6GNH KE6LGY KE6MYA KE6NPL KE6PHE KE6UYI KF4LL KF6C KF6MPI KF6SMB KF6UPP KF6XA KF6YWE KF7SJE KG6MDQ KG6OMH KG6QWR KG6RCW KG6RLA KG6TTZ KG6TUL KG6UTS KG6VVN KG6WJD KG6WWY KH6GK KI6AUP KI6AZQ KI6DBL KI6EZJ KI6FKB KI6JMH KI6LEX KI6NCA KI6SYM KI6YEW KJ6DPE KJ6EDU KJ6KDM KJ6KLJ KJ6QQD KJ6TIM KJ6YPR KJ6ZBQ KK6BHA KK6CTF KK6CTI KK6DRA KK6EME KK6GHF KK6GO KK6IJN KK6IRZ KK6JDM KK6LJ KK6LNV KK6MBQ KK6MTF KK6MZF KK6NLS KK6NLV KK6NLW KK6NLZ KK6NMY KK6NON KK6QOS KK6RIP KK6RRW KK6RWK KK6SIA KK6TNO KK6TYQ KK6TYY KK6UYP KK6WOF KK6WPQ KK6YAU KK6YLO KM6ARO KM6BMX KM6CXV KM6CXW KM6CZK KM6DIG KM6DII KM6DIM KM6DIN KM6DIR KM6DLC KR6FU KV7I KW6Q N1BL N6APA N6ERD N6ISC N6IZW N6KI N6MDU N6NAU N6NCP N6PIH N6RY N6TBA N6TWO N6UWW N6XLZ N9JZ NA6DC NC7V NE6AA NE6O NN6X NU6L W6ADF W6AOZ W6BQZ W6DTO W6GDK W6GNI W6MDL W6OYJ W6XM W6YES WB6LMD WB6UIR WB6ZBP WB9COY WD6FZA WN6K WQ6V WX6AAA ZZ9CR ZZ9DM ZZ9DR ZZ9JJ ZZ9MJM

Polo Shirts

We're ordering Polo shirts! Some of you already have orders in with me from the last meeting, please be ready to pre-pay for them so we can get the order placed ASAP! We need 20 shirts to get the price I've been quoted. If we end up with 30+ then the price goes down and I'll have a little change for those who have pre-paid once your shirts come in!

Base price: $21.00 includes printing on the front, PARC logo on one side and your name/callsign over the pocket.

Add $2.00 for 2XL, $3.50 for 3XL, or $5.00 for 4XL

Add $5.00 if you also want the logo printed large on the back.

73 de K6JPE
Joseph Peterson

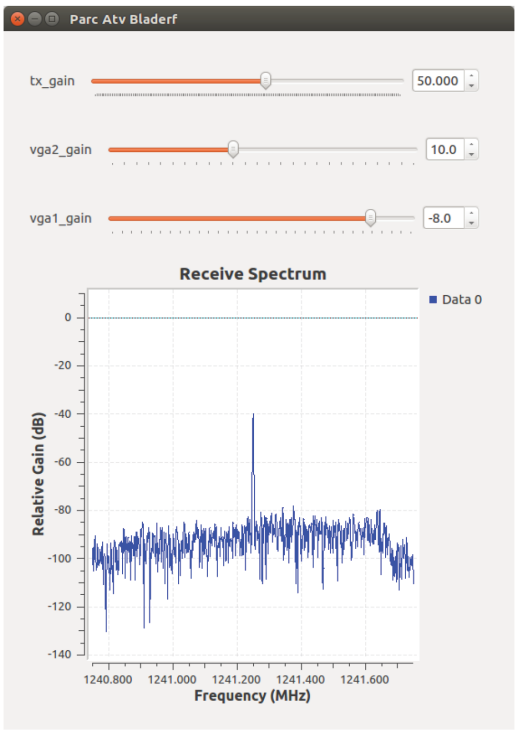
Continued from Page 14

and digitized by a supported SDR. The source block that matches the supported SDR handles the transition between the physical signal and the digital data moving through the flowgraph. Signals can also be from files, or mathematically generated on the fly.

The example DVB-T2 flowgraph, which comes with GNU Radio, was loaded and edited for experimentation.

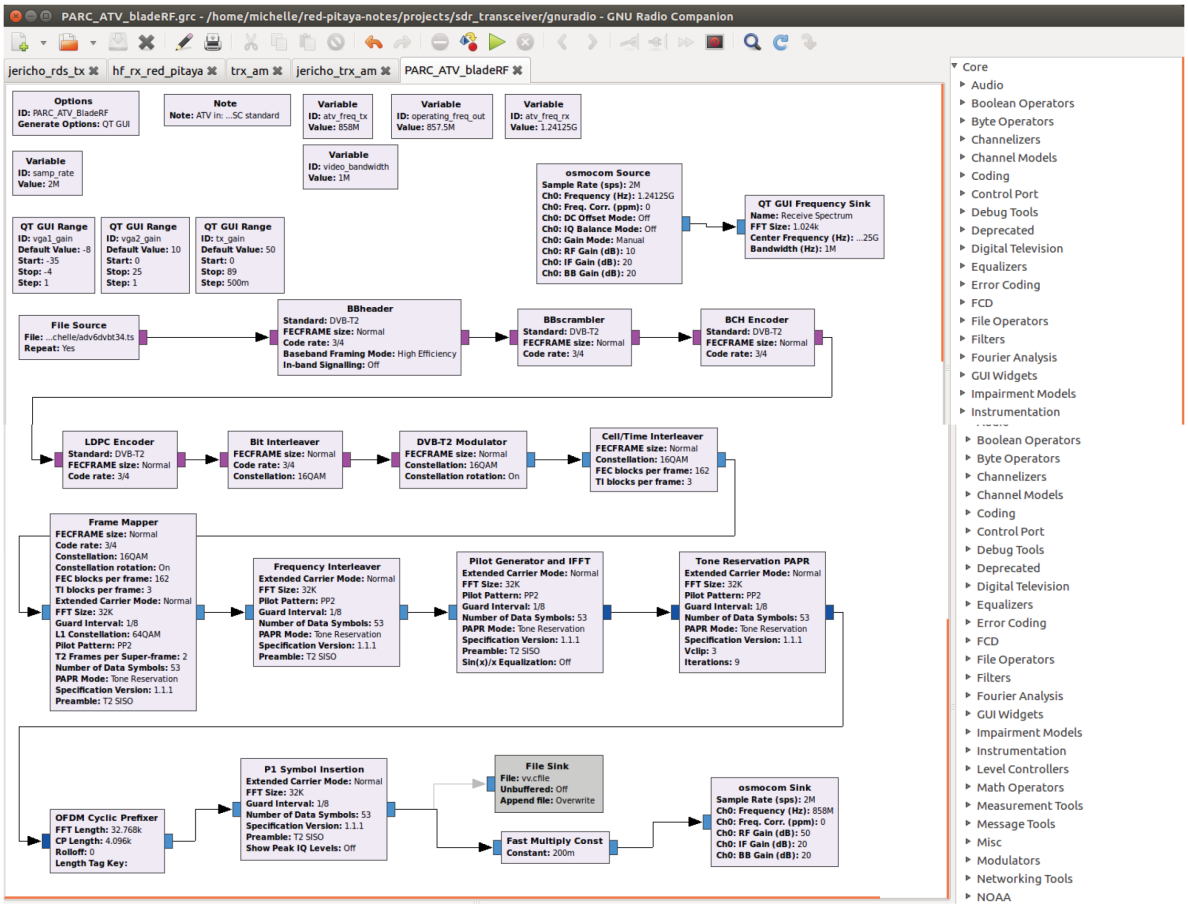
Unlike the DVB-T flowgraph, the DVB-T2 flowgraph didn't work right away. It took some editing and some reading and some adjusting.

A DVB-T2 dongle (pictured at right) was used with commercial receive software to test the transmit flowgraph.The channel list was set up in the commercial receive software by scanning. The flowgraph transmitter was adjusted to match station lists in Austria. A 858MHz test transmission was made to stand in for the 915MHz input channel to the ATV repeater, as the commercial receive software didn't appear to scan up to 915MHz.



The video signal was successfully received by the DVB-T2 dongle across the lab from the BladeRF running the GNU Radio flowgraph. The flowgraph for this experiment is at the top of the next page.

Besides the transmitter, there is also a graphical user interface element for the receiver (at left). This monitoring receiver scope is looking at the BladeRF's receiver port, which is tuned to 1241.25MHz. If you think of this setup as an ATV rig, it's transmitting operator video up to an ATV repeater on (nominally) 915MHz and listening for the downlink on 1241.25MHz. A flowgraph for the repeater would reverse this approach. Both flowgraphs will be tested and distributed.



Notice something in this receiver spectrum display? There is a spike. Is this an ATV signal? No, it's not. This type of spike is extremely common in SDRs.

Center frequency in the receiver block corresponds to zero Hz at the inputs of the part of the SDR that converts analog input to digital data. The peak comes from the DC voltage at the inputs of the analog to digital converter (ADC). This happens in systems where the RF signal is downconverted to 0Hz. Even the smallest offset in bias voltage at the inputs of the ADC will show up as a peak at the center frequency on a spectrum display. That's the bad news.

Now the good news! The vast majority of SDR programs can filter out this peak. Sometimes it's as easy as a "DC Removal" setting. In short, this spike is not a signal and is not a malfunction.

The BladeRF has built-in configuration functions for reducing DC bias. It also has routines for correcting quadrature gain and phase mismatch. This is when the two components of a quadrature signal (I and Q) are not exactly 90 degrees out of phase and are not exactly the same range of magnitude. These two types of adjustments are commonly encountered tasks in SDR.

The next step was to replace the canned test file with live video and a call sign overlay. This would bring the GNU Radio flowgraph up to a useful Amateur Television standard.

The first attempt was with Gstreamer[12]. Gstreamer is an open source multimedia management framework. Playback, streaming, mixing, and video processing are the primary functions supported. Gstreamer approaches these functions by setting up pipelines that carry the video data from one modification or transformation to another.

A webcam that was recognized under Linux was used. The webcam showed up in the results from the command `lsusb` and also showed up as a device in `/dev/`. Gstreamer was able to open the webcam and successfully display the video in a window.

The idea of opening a file in the flowgraph was preserved by using a special file type. This special file type is called a first in first out (FIFO) named pipe. This named pipe is created with the `mkfifo` command. Once the special file is set up, any process can open it for reading or writing, just like the saved video file we were using before. At least two things have to be kept in mind. First, file permissions have to be correctly set (just like any other file that needs to be read or written or both). Second, it has to be open at both ends simultaneously before input or output operations start working.

A script was written and tested. It's reproduced below.

```
#!/bin/bash
rm /home/michelle/webcam-pipe.raw
mkfifo /home/michelle/webcam-pipe.raw
rm /home/michelle/webcam-pipe.ts
mkfifo /home/michelle/webcam-pipe.ts
gst-launch-1.0 -v v4l2src ! video/x-raw, width=320, height=240,
```

12 https://gstreamer.freedesktop.org

```
framerate=20/1  ! textoverlay halignment=right text="W5NYV"
font-desc="Sans Italic 24" ! clockoverlay font-desc="Sans Ital-
ic 24" halignment = right ! x264enc bitrate=1000 ! mpegtsmux !
filesink location=webcam-pipe.raw
```

First, we remove the pipe from the webcam. Why? Because the mkfifo command that follows won't set up a pipe if the pipe is already there. If there's one from previous transmissions, we need to remove it and set up a new one.

Second, we set up a named pipe called webcam-pipe.raw.

Third, we launch Gstreamer. Here, we're using Video for Linux 2 library to detect the webcam source. The exclamation points are indications to Gstreamer that we want to pipe the output of that command to the next command. The next command is raw video and we specify a width, height, and frame rate. If we didn't set the width and height, the maximum resolution of the webcam would be used. Next we pipe (!) to a textoverlay function that puts my call sign on the righthand side of the frame and sets the font. Exciting! My name in lights! Now we add a clock overlay, also on the right, so we can show the time in the frame. We now have three elements. The raw video, the text overlay, and the clock overlay. The next pipe leads to a video encoder. Here we're using H.264 and setting the bitrate to 1000 bits per second. If we didn't set a bitrate, the default bitrate would be used. Next, we pipe the encoded video to mpegtsmux. This stands for MPEG transport stream multiplexer. This creates an MPEG transport stream, which is what I expect the DVB-T2 flowgraph to be able to handle without much (more) difficulty. Finally, we pipe the result of the transport stream creation to a file sink. This is where the magic of the named pipe takes over. We're streaming to a named pipe that looks like a file, and the GNU Radio flowgraph is going to read from this named pipe as if it was a file.

The script launched, the pipe was created, the GNU Radio flowgraph was launched, the BladeRF began transmitting, but no video was seen on the laptop across the lab. What had gone wrong?

Well, it turns out that specific DVB-T2 implementations need specific bitrates. My webcam just wouldn't fill up the channel on

its own. The DVB-T2 flowgraph was expecting a lot more frames than I was sending it. My assumption that the blocks would be able to adapt and transmit a lower rate input signal was not a good one!

Fortunately this is a solved problem. MPEG transport streams are designed to stuff the channel with null packets when the bitrate isn't fast enough. If you produce too many, then you simply drop enough to back down to the required bitrate. It might be obvious to conclude that stuffing a few extra packets in the stream is superior to dropping packets. Dropping packets means you lose information. Stuffing extra packets in the stream means you give up some amount of data capacity in order to have smooth working video.

Based on advice from Dr. MPEG, Gstreamer was not going to be the right tool for the job. That honor belonged to a program called ffmpeg. ffmpeg allows one to better control the bitrate of the stream, and insert the null packets much more easily.

ffmpeg has a similar feel to Gstreamer. Data flows from a source (webcam) to a sink (a radio). Along the way various functions are applied to the data.

For testing the transmitter within the Linux box, I kept using Gstreamer. Here's the receive script:

```
#!/bin/bash
gst-launch-1.0 -vvv playbin uri=file:///home/michelle/web-
cam-pipe.ts
```

For setting up the named pipe for GNU Radio to use as a source, here's the source script:

```
#!/bin/bash
ffmpeg -y
-f v4l2
-s 640x480
-i /dev/video0
-vf "drawtext=fontfile='/usr/share/fonts/truetype/droid/Droid-
Sans.ttf' :text='W5NYV' :x=380:y=450:fontsize=20:fontcol-
or=0xffffff7f:shadowcolor=0x003f007f:shadowx=2:shadowy=2"
-c:v libx264
```

```
-preset ultrafast
-pix_fmt yuv420p
-muxrate 27588664
-f mpegts
-mpegts_original_network_id 1
-mpegts_transport_stream_id 1
-mpegts_service_id 1
-mpegts_pmt_start_pid 4096
-streamid 0:333
-metadata service_provider="W5NYV"
-metadata service_name="Silver Home BladeRF"
pipe:1 > webcam-pipe.ts
```

There's a lot going on here! Each of the dashed options in the script is a function[13] that has been applied to the data.

The abstract source of the data is -f v4l2, which is a "Video for Linux version 2" driver. The device that this source gets data from is /dev/video0. On Linux, the /dev directory is where all the devices are located. The sink, or where the data goes, is the named pipe at the end of the script, which is called webcam-pipe.ts.

After lots of adjusting and editing and trying different settings, the commercial DVB-T2 receiver did finally "notice" the webcam-sourced signal. The receiving dongle blanked the screen. No audio or video appeared, but the fact that the signal seemed to be received and processed at least part of the way was very encouraging.

Experiments will continue until solid video signals can be received! Then, we will need to filter and amplify the signal. Adding in functions to make ATV easy and fun to use will be by far the most important aspect of the entire project.

If you have an SDR that's capable of producing ATV signals and are inspired to try it out, or just want to keep up with the ATV updates, then please consider joining the PARC ATV group and mailing list! Drop me a line at w5nyv@yahoo.com.

13 This page has a good explanation of a complicated ffmpeg command line concoction: http://www.tannet.org.uk/using-ffmpeg-to-generate-a-transport-stream-more-details-and-how-to-add-text-overlays/

John's Garage Sale

List of things that need new homes. No panic, not looking for big money. Depending on quantity purchases & needs some of it may even be free.

- Wavetek 2500A, digital; RF Generator. 100 KHz - 1 GHz, FM OK but no AM modulation. Output level is 20 dB higher than indicated.
- Farnell SSG2000 digital RF Generator. 100 KHz - 2 GHz, FM OK but no AM modulation. Output level is 20 dB higher than indicated. Has an intermittent boot up problem with the microprocessor (it is from the U.K after all). Works OK after several power on cycles.
- Tektronix 650A, color studio 19" rack mount video monitor. Sony Trinitron picture tube. Top of the line NTSC standard video monitor for professional broadcasters.
- Tektronix 149A 19" rack mount video generator, some issues but generates NTSC video patterns.
- Sencore CM 2125 HDTV Video Generator. Has DE15 (VGA) and DB15 (Apple) video output connectors. Multi-mode HDTV signal generator for color bars, patterns and different scan rates. Used for testing high definition computer / TV displays.
- Isolation Transformer, 120 VAC - 120 VAC, 250 VA rating.
- Variac, non-isolated adjustable output, 120 VAC input, 0 - 140 VAC output, 10 Amperes.
- PTZ (Pan Tilt Zoom) CCTV cameras & remote controls. Pelco NTSC and B&W TV cameras, Outdoor housings in "bomb-proof" aluminum tubes.
- Most of the above electronic equipment has manuals either in paper form or on CD-ROM.

Make Offer, Cleaning House.

John Kuivinen, WB6IQS@att.net

Donate to PARC by Shopping at Amazon

As publicized earlier this year, PARC is now a not-for-profit charity, and funds donated to PARC are deductible for income tax purpose if you itemize.

PARC also announced that in cooperation with Amazon, it is now possible to shop on Amazon at NO cost increase, and have Amazon distribute a percentage donation to PARC.

This is done by shopping on www.smile.Amazon.com.

If you choose to avail yourself of this opportunity, when shopping on www.smile.amazon.com, specify Palomar Amateur Radio Club as your charity of choice for donation.

In the Beginning-Early Memories of Ham Radio Part IV

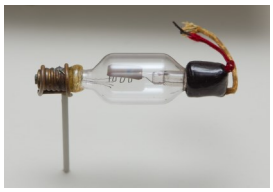
(*Editor's Note: Al Martin, W6SE provided this memoir from his father John Martin, W6SE about the early days of Ham Radio in North San Diego County. This is the final installment.)*

youngster I often stood at the bluff's edge for hours on end, looking out to sea and watching the sailing ships, hull down on the horizon, dreaming the romantic dreams of childhood all the while. Actually I attained a commercial radio telegraph license in 1937 or thereabouts, but was always too busy going to school or earning a living to try to find a sea-going job. When the war came I ended up in the radar business, although there was considerable sea duty involved in it. Well, in 1974 I thankfully retired from the Bench, which was about as bad as the practice of law, only to find that retirement didn't suit me. Accordingly I contacted the FCC and Coast Guard in order to become licensed properly. It happened and thereafter I spent about seven months aboard one of the Scripps Oceanographic Research ships as a radio operator, thereby coming up with the six months seagoing experience required of shipboard radio operators. Following that I signed on with the MEBA-AMO, which, translated, stands for Marine Engineers Beneficial Association - Associated Maritime Officers Union, and was quickly assigned to the SS Mount Navigator, KNAR, a rather decrepit old tanker berthed at New Orleans, from whence it was ordered to take on a load of wheat destined for the starving masses of Egypt. We loaded at a grain elevator situated on the Mississippi riverbank, thereafter proceeding downriver to the Gulf of Mexico and thence across the Atlantic via the "hole in the wall" in the Bahamas. Passing through the Strait of Gibraltar, we traversed the Mediterranean Sea and made port at Alexandria, one of the three great cities of antiquity. There I divided my time between the excellent museum and the bar at the Hotel Cecil. I remained on this old "Rust Bucket" for some six months, making two trips from the Gulf of Mexico to Alexandria, after which it made the circuit between Gulf Coast ports and ports on the Atlantic seaboard, loaded with oil. As I recall, on arriving aboard this ship I checked out the gear in the radio shack, finding that nothing worked. There were no tools and only a few parts in the spare parts locker. With the aid of a screwdriver and my Swiss army knife I managed to get it all going, although I'll now admit the auto-alarm receiver was not really operative until we hit the mid-Atlantic. The statute of limitations has run, so it's OK to tattle on me now. Oh yes, I had a knockdown drag-out disagreement with the Port Engineer over the defunct emergency lifeboat transmitter-receiver, finally telling him that I

(Continued on page 24)

John Martin in his Shack

"I was ordered to the Naval Research Laboratory at Anacostia, D. C., there to learn all about Radar and Radio Countermeasures."



In the Beginning-Early Memories of Ham Radio-Continued

"To keep anything working for very long on those rough-riding craft was an accomplishment. "

(Continued from page 23)

wouldn't sail unless a functioning device was aboard. I won! We sailed! There followed assignments to a number of ships. Among them was the SS Independence, KPHI, one of the last U. S. built ocean liners. She had long since been transferred to the Panamanian flag, had subsequently been laid up at Taiwan and was in sad shape. To make a long story short, I was sent out to Kobe, Japan, to oversee the installation of the communications gear as the ship was being prepared for return to the U. S. flag. Certainly the technicians out there were very competent, but the Captain was an old friend who wanted me to see to it that everything would be in working order on the day he was scheduled to take command. At my first glimpse at the old ship, then at the Kawasaki shipyard, I held little hope for her rehabilitation, for she was filthy and teeming with cockroaches. But the Japanese shipyards move with remarkable and admirable efficiency so, in the course of a few weeks she was converted into a thing of beauty, minus the bugs. I must say this for the Japanese yards - they move with great efficacy and one doesn't have to put everything under lock and key. The U. S. yards, I fear, are loaded with folks who will steal everything that isn't chained down. At any rate we made a test run in the Inland Sea, and thereafter departed for Honolulu with the ship's company, consisting of the crew and essential members of the hotel department aboard. Because I was the only "sparks" aboard at the time, and it turned out that massive amounts of traffic had to be moved in order that the ship's hotel department might be prepared to accommodate passengers aboard shortly after our arrival in Honolulu, I had piles and piles of messages to send, but didn't worry too much about this as we had SITOR gear in the radio shack by which the voluminous traffic might be moved by TELEX. For benefit of the uninitiated, SITOR is much the same as AMTOR. I had used the system on other ships so was well acquainted with it. Well, Murphy was at it again! Not 24 hours after we took departure from Kobe, the ARQ part of the system stopped working. ARQ means automatic error correction. That didn't stop me as the HF transmitter had a kilowatt output, so the FEC (forward error correcting) system remained operative and KPH could still copy my voluminous traffic relatively error free. Then the other shoe fell! The automatic antenna tuner failed! It was contained in a nitrogen filled enclosure located atop the wheel-house. There were no spare parts for it, and to repair it while under way was impossible. Now the output of the HF transmitter fell off

(Continued on page 25)

In the Beginning-Early Memories of Ham Radio-Continued

(Continued from page 24)

tremendously and the remaining pile of traffic was daunting. Well, KPH copied a lot of the pile by manual telegraphy while, fortunately, propagation improved, enabling me to go back to the FEC mode. I told the ops at KPH to use their judgment on the readability of the copy, after which the hook was finally cleared a day or so before we made port in the Hawaiian Islands. To the good crew at KPH I owed a lot! It might be well to explain that KPH was the only SITOR equipped coastal station on the west coast at the time. KFS didn't have it until July of 1980. To shorten a long story, I served on a lot of ships and was able to see quite a bit of the world, some of which was great, Singapore among the best, and some of which I could easily do without. My service extended from "Rust Buckets" to fine vessels. Two of the ships had elevators to save my aging body the pain of climbing an endless number of ladders. (Translate that to stairs, son.) The largest was a super tanker which was hardly a ship, rather more like a floating oil tank. The thing was about a thousand feet long over-all and had a beam of 185 feet. Although the accommodations were grand, I never really could think of the monster as a ship. Because there was a satellite navigation system aboard, keyed into the automatic pilot, about all the Mates on watch had to do was to keep a visual watch and take an occasional sun-line or star shot, just to keep in practice, I suppose. But now I recall that the Mate on watch had to make a log entry of this event, so you may disregard my last remark. Oh yes, the Mates did have to answer the telephone which directed shoreside calls to the ship via the marine satellite in geo-stationary synchronous orbit. Practically all of the ship's communications were by telex and telephone via the satellite. Actually I didn't have a great deal to do, except to go along for the ride. The sea-going operators that remain active today tell me that the satellite systems have been greatly improved since my time. Retiring from the sea at age 70 in 1982, I came home to my Snug Harbor, having fulfilled a lifelong ambition. The experience was rewarding, and I had a lot of fun at it. My view of going to sea was not that of the archetypal mariner, for I was curious about people, places and things. It seemed to me that most merchant sailors, whether residents of the fo'c'sle, or of licensed quarters were not much interested in people, places or things, and when in port hardly ever got further from the dock than the nearest bar, or bordello for the younger ones. You may rest assured that I was over the side whenever lines were

(Continued on page 26)

John Martin's Shack, 1957

"the best a service man can hope to gain from a war is to come out of it with a whole skin"

In the Beginning-Early Memories of Ham Radio-Continued

made fast in a foreign port for there was nothing for me to do aboard, and being secure in the knowledge that the ship couldn't leave without me, it was true contentment. In foreign ports it was usually my practice to hire a cab for the day, one that had an English speaking driver, and take in all there was to see. Thus, if there was anything that interested me particularly, I could get back to see it in detail, provided that the ship remained in port long enough. In the late seventies and early eighties, the practice of hiring a cab for a day was relatively inexpensive in a lot of foreign ports.

All of this superb entertainment and enjoyment is due to my very good fortune, for the day of the licensed merchant marine radio-electronics officer is fast approaching its end, a thing that makes me so very grateful for the opportunity I had. It was truly a fulfillment, and an experience I will always cherish and recall with pleasure; an experience bringing to mind the words of John Masefield, the sailor poet:

I must go down to the seas again, to the vagrant gypsy life, To the gull's way and the whale's way, where the wind's Like a whetted knife; And all I ask is a merry yarn from a laughing fellow rover, A quiet sleep and a sweet dream when the long trick's over.

"I was privileged to see my first computer in the basement of the physics building at Harvard University. It was a block long device in relay racks requiring a special cooling system to carry away the heat "

Types of EchoLink Nodes

By
Bernie Lafreniere, N6FN

The EchoLink system allows you to link to remote nodes by either using EchoLink software on your computing devices (computer, laptop, tablet or smartphone), or by keying DTMF commands directly from your transceiver. Using DTMF commands from a transceiver requires communication with either an EchoLink equipped repeater or a Simplex Link.

When within operating range of an EchoLink equipped repeater (like our 447.000 machine) you can use your transceiver to key a string of DTMF command tones to connect to distant nodes. No advanced amateur radio license is required. You can access distant EchoLink nodes with your existing transceiver without downloading any software or registering for the EchoLink network. All you need to know is a few simple DTMF commands and the node number of the repeater or user you want to access.

As a reminder, EchoLink is now fully functional on our 447.000 machine. As our node's EchoLink usage log shows and increasing number of people are making use of this capability. Using EchoLink is a great way to extend your VHF/UHF transceivers range beyond our local area. In fact you can make contacts pretty much anywhere in the world. Some are using this to renew contacts (QSOs) with friends or family that no longer live in our area.

What kind of nodes can I connect to, and how can I find them?

DTMF command codes and the number (address) of the node that you wish to contact can be found by using EchoLink software on your computing device or by looking them up on the repeater sponsor's club or individual's web page. Node numbers can also be found on the *EchoLink Link Status* web page, by selecting the *Link Status* sidebar button on the EchoLink website's home page. **http://www.echolink.org/**

EchoLink Node Types

Contacts can be made from computers and DTMF equipped transceivers to four different types of nodes:

- Individual Users on computers N6XXX
- RF Simplex Links N6XXX-L
- Repeaters N6XXX-R
- Conference Servers *N6XXX* or *NAME*

Each type of node has a uniquely formatted callsign or name. Individual computer users use their basic callsign. Other types of nodes have a suffix appended to the callsign, indicating the type of node: **-L** for a Simplex Link, **-R** for a repeater, or in the case of a Conference Server, a callsign or server name bracketed on both sides with an asterisk. In addition to the callsign, which is generally the callsign of the sponsoring individual or club, each node is assigned a unique node number, which can vary from four to six digits.

Individual User Computing Device Nodes

Once individual users have installed and configured the EchoLink software on their computing device, whenever they are connected to the Internet and running the EchoLink program, they are visible as an active EchoLink node capable of initiating and receiving node connections. Individual users are identified by a node number and by their callsign, with no suffix attached.

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Bernie Lafreniere, N6FN

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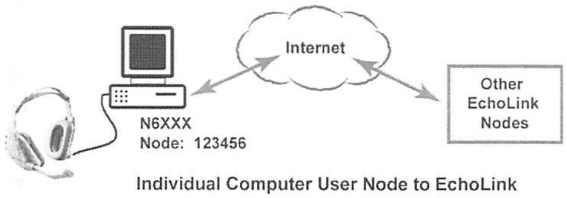
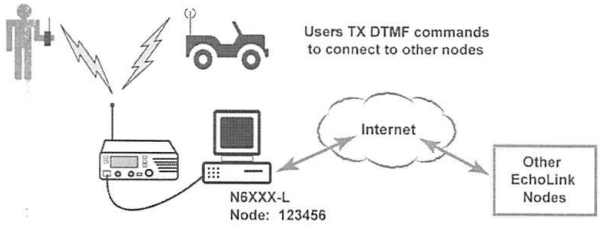


Individual Computer User Node to EchoLink

RF Simplex Link Nodes

Individual users can create an RF Simplex Link by interfacing a transceiver, tuned to a simplex frequency, to the microphone and speaker jacks of their computer's sound card. Even if you do not create your own Simplex Link, you can still access stations using other people's Simplex Links.

Stations within range of a simplex transceiver can access the EchoLink network, establishing node connections as desired by transmitting DTMF command strings. Once the link has been established, other stations within range of the simplex transceiver will also be able to communicate with the distant node.

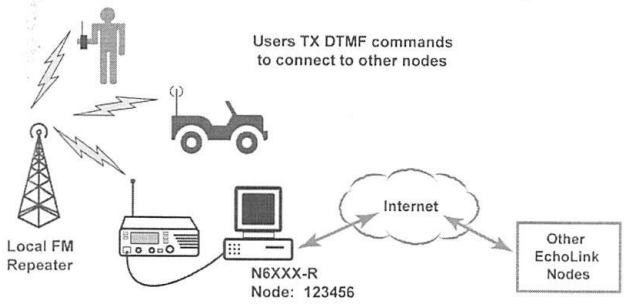


RF Simplex Link Node

Simplex Links are identified by the user's callsign followed by the **–L** suffix, and by a unique node number assigned during validation of the **–L** callsign.

RF Repeater Nodes

Repeater Nodes generally are created by interfacing a transceiver tuned to an existing repeater to the microphone and speaker jacks of a computer's sound card. In this way a transceiver and Internet connected computer can be used to link a normal FM repeater to the EchoLink network.



RF Repeater Node

Repeater nodes are identified by their node number, and by the sponsor or club's callsign followed by the **–R** suffix. Stations within range of the repeater can access the EchoLink network, establishing node

EARS Field Day 2017

What is Field Day?

Field Day is an annual amateur radio exercise encouraging emergency communications preparedness among amateur radio operators. In the United States, it is typically the largest single emergency preparedness exercise in the country, with over 30,000 operators participating each year. Field Day is always the fourth full weekend of June (see schedule below). EARS will be operating from Lake Dixon at 1700 North La Honda Drive Escondido, CA 92027. Field Day is a great social event too.

Schedule:

Friday 23 June 2017

12:00 noon -- set up begins
6:00 pm -- Friday Night Set-up Dinner for Set-Up Helpers

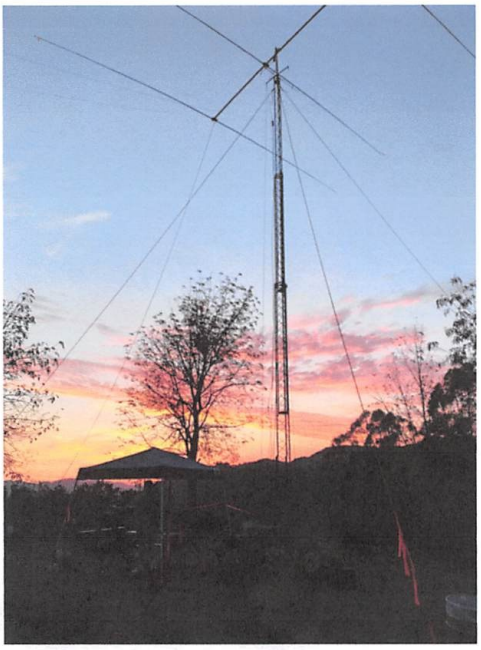
Saturday 24 June 2017

11:00 am -- Operating begins
6:00 pm -- Dinner

Sunday 25 June 2017

7:30 am (approx.) -- Breakfast
11:00 am -- Field Day Operating ends and tear-down begins
1pm - 2:00 pm – Tear-down complete

Contact the field day chair Mike Bohanan KM6MPB at 973-722-8460 or km6mpb@earsclub.org or the band captains listed on the last page.



Dixon Lake Information:

1700 North La Honda Drive Escondido, CA 92027.
EARS will have campground sites 26, 27, 28, 29, 46, and 47 *(*the Circle*)*.
The day-use entrance fee for Dixon Lake is $5.00 per vehicle on weekends and holidays, but mention you are with EARS and they may let you in for free. Senior citizen (60+ years) vehicles are always free.
There are 2 vehicles allowed per campsite (RVs and trailers count as vehicles). Check with the Band Captains or Mike KM6MPB for parking passes. If camping parking is full, the day-use parking lot will need to be used.
4 adults and 4 children maximum per camp site (overnight).
Charcoal is welcome, but any sort of wood-burning is prohibited.
Pets are not allowed at Lake Dixon unless it is a service animal.

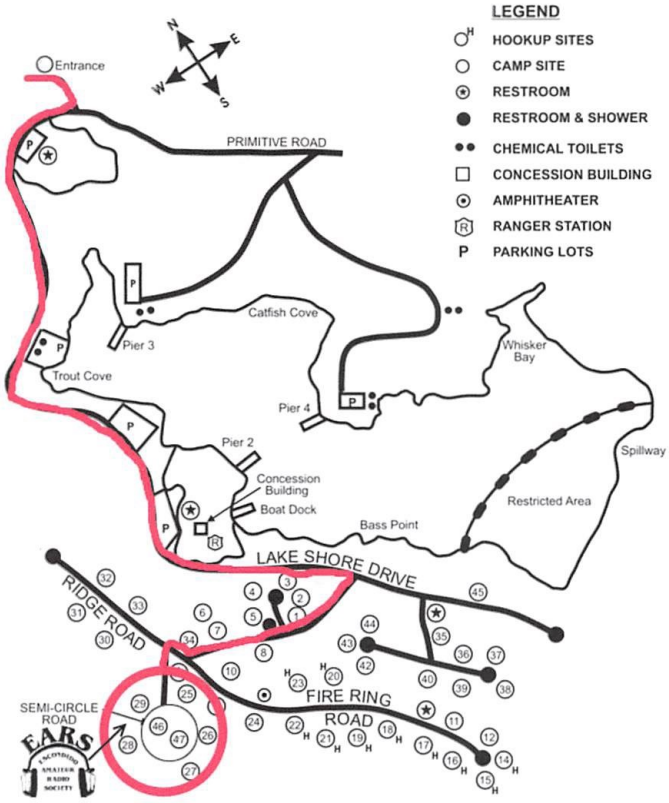
Food:

Come to Field Day for the emergency preparedness, but stay for the food!
Friday night - EARS will be providing dinner for the people who help set-up that afternoon (Menu: steaks and fixin's)
Saturday lunch – Provided by EARS (Menu: TBD)
Saturday night – Provided by EARS (Menu: pizza and beverages)
Sunday breakfast – Provided by EARS (Menu: TBD)

Location:

Lake Dixon is on the East side of Escondido. Head up La Honda Dr. from El Norte Parkway. 1700 North La Honda Drive Escondido, CA 92027
From the Lake Dixon ranger station, follow the road to the camping area, make a right and go up the hill to the SEMI-CIRCLE Road shown in red on

the map below. Talk in frequencies are 146.880, 107.2 PL (repeater) and 146.445 simplex



Stations and band captains:

Contact the band captain if you would like to work a station.

EARS will have four radio stations setup for Field Day.

- **Voice and Digital** - normal speech and digital protocols are used (Mike KF6SJ, mike@hightower.com)
- **CW** – Morse code is used (Matt N6EAJ, mail4tucker@gmail.com)
- **VHF/UHF –** Voice (Bud AE6BH, AE6BH@cox.net)
- **Get On The Air (GOTA)** – anyone licensed or not can operate with supervision. (Jim Cooper NE6O)

North County Mini Maker Faire®

Saturday & Sunday June 17th & 18th
Antique Gas and Steam Engine Museum
Vista, CA

Maker Faire is a gathering of fascinating , curious people who enjoy learning and who love sharing what they can do. From engineers to artists to scientists to crafters, Maker Faire is a venue for these "makers" to show hobbies, experiments and projects. We call it the greatest Show and Tell on earth.– a family friendly showcase of invention, creativity and resourcefulness.

PARC will have a booth at the Maker Faire so please come out and help us. Contact Michelle Thompson, W5NYV if you want to help. Feel free to bring any interesting projects you want to show off.

"Glimpse the future and get inspired!"

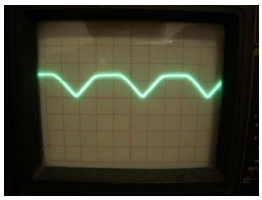
IEEE Distinguished Visitor - Continued

information on her IEEE Computer Society abstracts, visit this URL:

https://www.computer.org/web/chapters/michelle-thompson

Many of you might know that Amateur Satellites use 2 different bands, one for uplink and a different band for downlink. Michelle is helping the Phase IV Ground Terminal where the 2 bands are 5 GHz and 10 GHz. At these frequencies, you can hold an antenna in the palm of your hand!

Palomar Amateur Radio Club is most fortunate to count amongst its members a talented, thought-provoking, tech geek such as Michelle W5NYV. The next time you see her, congratulate her on the DVP elevation. Then ask her something about music or amateur satellites. You will be amazed at the depth and breadth of her knowledge!



SCOPE
PUBLISHED BY THE
PALOMAR AMATEUR RADIO
CLUB

EDITOR
KEITH SPEARS
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Editorial Policy

The Scope welcomes and encourages members to submit articles, photos, stories, equipment reviews and any other items of interest to ham radio.

The Palomar Amateur Radio Club reserves the right to edit all submissions for content and length.

Please submit documents in MS Word format and photos as JPEG or GIF. Flyers may be submitted in PDF.

All submissions need to be received by the 20th of the month.

Send submissions to:

scope@palomararc.org

The Back page is a place for ham radio humor. If you have a joke, cartoon or just a fun story about ham radio, please share it with me.

Computer Laws

Benford's Law: Passion is inversely proportional to the amount of real information available. (Gregory Benford)

Brooks' Law: Adding manpower to a late software project makes it later. (Frederick P Brooks Jr)

Clarke's First Law: When a distinguished but elderly scientist states that something is possible he is almost certainly right. When he states that something is impossible, he is very probably wrong. (Arthur C Clarke)

Clarke's Third Law: Any sufficiently advanced technology is indistinguishable from magic. (Arthur C Clarke)

Dilbert Principle: The most ineffective workers are systematically moved to the place where they can do the least damage: management. (Scott Adams)

Flon's axiom: There does not now, nor will there ever, exist a programming language in which it is the least bit hard to write bad programs. (Lawrence Flon)

Hanlon's Law: Never attribute to malice that which can be adequately explained by stupidity. (?Robert Heinlein)

Occam's Razor: The explanation requiring the fewest assumptions is most likely to be correct. (William of Occam)

Osborn's Law: Variables won't; constants aren't. (Don Osborn)

Spector's Law: The time it takes your favorite application to complete a given task doubles with each new revision. (Lincoln Spector)

Sturgeon's Law: Ninety percent of everything is crap. (Theodore Sturgeon)

Wirth's Law: Software gets slower faster than hardware gets faster. (Nicklaus Wirth)