LARK NEWS October 2022

Livermore Amateur Radio Klub LARK is an ARRL affiliated club dedicated to Public Service Volunteer Emergency Communications.

Meetings are once a month on the 3rd Saturday 9:30AM

NEW VENUE: City of Livermore Meeting Hall

1016 S. Livermore Ave., Livermore CA 94550

Available live via zoom by invitation only. Visitors Welcome

Editor: Roberto Sadkowski K6KM

Top of Mount Houghton in NV. 10490ft. 10 point SOTA peak.

Dave Leddon's K6DHL Homebrew 2kW Power Meter & SWR

Devil Mountain Run 2022

Content:

President's Message

I want to take this time to thank Bernie NJ6W for making the coffee and picking up the refreshments for monthly meetings, it is appreciated by all who attend.

I wanted to let you know that the Events Chairperson (me) is following the upcoming events for 2022, and I have an update: the following events will be happening, the Devil Mountain Run on Sunday, September 18th in Danville, LARK has also been invited to assist with the Mt. Diablo Challenge on Sunday, October 2nd , please contact Larry Loomer if you can help, and Pacificon SWAP MEET on October 16th. Make sure to sign up on the LARK website for these events for which LARK supports. Make sure to watch for the schedule of the dates and topics coming out in the Newsletter. I wanted to thank Ron AD6KV and VE Team for continuing to provide a way for hams to get their testing completed.

Ian W6TCP continues to work on enhancing the repeaters for use by all of us so please report any issues to Ian by email.

I encourage you to check in with the LARK Monday, Wednesday (10.10 Windfarms Net), and Thursday night nets, held every week. There are other nets available, and they can be found on the LARK website It is good experience getting on the air. I want to thank Ed Diemer for coordinating the weekly nets. By participating in the nets, you'll hear what is going on in our Ham community We are meeting In-Person at the Livermore City Meeting Hall each month on third Saturday, and we are also offering the meeting on Zoom for those who prefer that way to attend. Wishing you all stay healthy and stay safe.

KG6GEM George Moorehead

Notes from the Editor

Great participation in the last LARK monthly meeting. Over 50 members and 6 visitors. Gordon West drew a crowd with his recorded Ham emergency calls in major catastrophic events.

One of the aspects of Ham Radio that attracts many people is helping during emergencies. There are several organizations that train operators for such events. According to "Gordo", it is not unethical nor controversial to belong to multiple Ham emergency communications Groups. If you are not called by one, you are still available for another. Also their nature of the training, being different, allows you to acquire many diverse skills very valuable when the big one happens. And it will happen. Not a matter of "if" but a matter of "when". Like last week, some of the LARK members who are also members of the NCCC (Northern California Contesting Club) were in a Zoom meeting when suddenly a participant who lives in San Rafael exclaimed: Earthquake!!! According to Saraj KU6F, her arm shook from the chair and the house was moving. We witness her testimony first hand. Fortunately, the shaker wasn't strong enough to produce serious damage or casualties.

Emergency communications does not mean just VHF/UHF as we learned. HF is a very valuable resource for long distance or short distance (Via NVIS) communications. Hams need to be resourceful and nothing better than to upgrade your license to have access to these other parts of the spectrum.

Go for it! While at it, explore the fun of CW, DX, contesting, outdoor activations and much more.

Hope to catch you on the bands.

Roberto K6KM

Board of Directors Meeting Minutes

LARK Board Meeting | September 13, 2022 | Minutes

Attendees: George, Chris, Bernie, Ryan, Jerry, Roger, Nate, Var, David
Absent: Ian

Call to Order

1. Meeting called to order by George at 7:03 PM.

Treasure's Report – Bernie

1. Club funds are good.
2. Post office box paid.

501(c)3 Application – Chris/Bernie

1. Roger: 501(c)(3) progress made on draft of new bylaws to help with 501(c)3 status. Bylaws shared with other members of the Klub for proofreading and possible modifications, additions or deletions.

Repeater Update – Nate

1. No complaints heard.
2. Battery voltage held up in heat wave.

Meeting Update/Activities for 2022 – Jerry

1. No new updates on tech meetings.
2. The Speaker set up for September is Gordon West. His presentation will be about "LA Area Hams and ARES". No meeting in October. Our November meeting will have the President of USS Hornet Radio Club presenting working ham radio on the hornet. December is the Holiday meeting. January: " How do you know if you're really getting out on HF".
3. I am looking into a Field trip to the Hornet to see the radio room and other features of the hornet.
4. Meetings topic covered though March 2023.
5. Any ideas can be sent to Jerry.

Events – George

1. Devil Mountain Run Sunday 9/18, 16 have signed up, would like one or two more people.
2. George forwarded a request from Larry KI6LNB to support the Mt. Diablo Challenge on Sunday, October 2nd.
3. Pacificon SWAP Meet (10/16) volunteers continuing to sign up but need 2 more volunteers for the early shift.
4. Rich Combs offered to help with the table inside and Var is available to assist as well.

5. Cinderella 2023 is scheduled for Saturday, April 15th, 2023 which is the same day as the monthly club meeting and annual elections. We need to consider if we should cancel our regular meeting.

Membership - Var

1. Membership for 2023 efforts will begin soon.

LARK Badges

1. Bernie showed an example template with and without ARRL logo.
2. Create a signup of people that would like a new updated badge.
3. Cost will be $10 except for a club member's first badge when they join LARK.

Insurance - Chris

1. Bernie says we have liability insurance through ARRL that covers members.
2. Chris would like to see a copy of the policy to see when ARRL coverage comes in.
3. Volunteer Act of 1977 from the Federal covers except damages caused by vehicles that requires an operator.
4. We need to see if events that LARK supports have a release of liability as part of their registrations.
5. More updates on this topic to follow at future board meetings.

501(c)3 Application –Chris/Bernie

1. Roger: 501(c)(3) progress made on draft of new bylaws to help with 501(c)3 status. Bylaws shared with other members of the Klub for proofreading and possible modifications, additions or deletions.

Adjournment

1. George adjourned the meeting at 8:21 PM.

Minutes submitted by:

_____

Ryan Mahoney (W6RAM)– LARK Secretary

Monthly Meeting Minutes

LARK General Meeting | September 20, 2022 | Minutes

Call to Order

1. Meeting called to order by George KG6GEM at 9:30 AM.
2. George started introductions, first of In-Person attendees and then Zoom attendees.
3. 34 In person / 17 on Zoom / 6 guest (51 total)

Presentation

1. Jerry N5KA introduced a video presentation of Gordan West WB6NOA talking about Ham Radio Operators are ready for emergencies, are you ready?
2. Presentation concluded at 10:13am. Took a meeting break and reconvened at 10:32am

Treasure's Report – Bernie NJ6W

1. Not a lot of recent bank account activity
2. Paid for the club's annual post office box fee

Activities – Jerry N5KA

1. October: No meeting because of Pacificon
2. November: Jeff will come talk about the USS Hornet radio set up in November.
3. December: will be the annual Holiday White Elephant Gift Exchange Party so there will be no speaker
4. January: Gary NA6O will talk about how do we know if we are getting out.
5. If you have any suggestions for future meetings, please email Jerry.

Newsletter – Roberto K6KM

1. Deadline is Monday 9/19 for submissions for this NL

Events – George KG6GEM

1. Rain forecasted for the Devil Mountain Run on Sunday, September 18th so volunteers please come prepared
2. Recruiting volunteers for Mt. Diablo Challenge on Sunday, October 2nd, contact Larry KI6LNB
3. Need more people to assist with Devil Mountain Run in Danville on 9/18
4. Spaces available for Pacificon Volunteers for the Swap Meet Early and Late shift available.
5. Pacificon Table: Var KM6TAB and Rich KN6HSR will be heading up a table for the club and looking for volunteers to help break up the day.

Membership – George KG6GEM

1. Renew memberships now to make it easier for Var for the 2023 Membership Drive

Old Business

1. Minutes approved unanimously from previous meeting

VE Sessions – Ron AD6KV

1. One person taking a test today

ARES – Ron AD6KV

1. Looking for a few more volunteers for Livermore ARES and will have a coffee meeting to help start it up

Klutz Award Nominations

1. Ron AD6KV was presented his Klutz Award Certificate for his Field Day antenna

Operating

1. Roberto K6KM: October 1st is CA QSO party; 10 meters was booming the other day, Japan 5/9 and Fiji on 10 meters.
2. Ron AD6KV: October 1st Livermore Airport Open House and he will reach out to Livermore to see if we can have table at the event

Adjournment

1. George KG6GEM adjourned the meeting at 11:06 AM

Minutes submitted by:

_____

Ryan Mahoney (W6RAM)– LARK Secretary

LARK members watch Gordon West WB6NOA present audio recorded during amateur radio communications during real emergencies.

Community Events Supported by LARK

PACIFICON - October 14-16, 2022
San Ramon Marriott

PACIFICON Swap Meet - Sunday, October 16th, 2022
The Swap Meet is held on Sunday morning at PACIFICON. LARK has hosted this event for the MDARC Radio Ham Club in the past years and have been requested to support the event again.
There are two shifts available:

LARK Ham Coordinator: George Moorehead KG6GEM kg6wiu1@comcast.net

Sign Up online here:
https://www.signupgenius.com/go/10c0844aead28a6fa7-pacificon1

Ron AD6KV receives the famous LARK Klutz Award for letting his antenna fall over during the 2022 Field Day. By the way, the antenna worked better after it fell over!

Devil Mountain Run - George: KG6GEM

Devil Mountain Run Thank You and Report

The Devil Mountain Run was held on Sunday, September 18th, 2022, in downtown Danville. The runners for 5K and 10K groups started at Railroad and School and finished at the designated finish lines (both locations were covered

by ham radio operators). The races went around and through downtown Danville. There were other races as well involving dogs and children. The total number of runners for all groups were over 833+. The total number of hams that volunteered for this event was 20 hams and they did a very professional job. All major areas and intersections of concern for the race were covered for safety for the entire event. There were no injuries. Net Control operations were performed in the San Ramon Valley Fire Protection District Communications Support Unit CS-131 with volunteer staffing from three communications

reserves (who are ham operators also) performing as Net Control operators. I want to thank the following LARK and

other ham volunteers for helping today: Peter AI6RG, Bernie NJ6W, Larry KI6LNB, Alan KM6BRQ, Mark

KK6UKU, Bill N6SGT, Mike W6KX, David K6WOO, Bill AJ6UU, Annegret K9CWA, Rich KN6HSR, Geoffrey KK6SKZ, David KG6WIR, James N6JRQ, Mark N6MIN, Brian KF6ONF, Steve K8YIP, Rand W6TRM, and Chris W6CJQ.

Thanks for putting up with the last-minute assignment changes and for your help for this very worthwhile public event.

George KG6GEM

Patterson Pass Road Race - George: KG6GEM

MORE PICTURES


SAN RAMON VALLEY
SAN RAMON VALLEY
FIRE DISTRICT

Jeep’ing and Ham Radio

Nate: N8MOR and Rich AD6X were having some off-road fun in the Sierras and combined it with some Ham fun. They were too busy to tell us details about it but the picture speaks 1000 words, as they say.

Editor’s note: Now I know who I have to make friends with… :-)

Roberto

K6KM

Yet Another SOTA North Tahoe - ROB K6KM

Third trip to the North Tahoe area for SOTA activations. Last time I failed to activate the KU6J Memorial Peak. This peak has been

named after KU6J (SK). He was the Northern Sierras SOTA Manager and one of the most impactful contributors to the program. He also developed RBNGate which later was called RBNHole to help activators self spot in CW without cell phone coverage. He passed away at an early age and this mountain, near his QTH, was named in SOTA after him. Last time I could not find the route, it was gloomy weather, full of mosquitoes and it started raining on me. This time I came better prepared but no mosquitoes and sunny. It's pretty much a bushwhack to the top but very nice activation zone with glorious views all around.

Next was Carpenter Ridge and Sagehen. Both are pretty much drive-ups with short hikes, except the roads are a challenge. Up to the bifurcation that leads to Carpenter Ridge, the road is maintained by the Forest Service. Not great but 4x2 with reasonable clearance makes it. Passed that, it was a challenge. Some areas were used by loggers and have very narrow passages between logs, overgrown bushes, etc. Not a very comfortable drive.

Depending on your car conditions you could reach the top of Carpenter with a 4x4. I chose to hike up from a large opening where most people park. The top is also a bushwhack with some interesting hiking on the edge of the ridge.

From the three activations, Sagehen seemed to have reached a propagation

null. I could not make contacts on 20m for some reason. Moved to 40 and got 3 and finally called KX0R for an S2S and completed my 4 needed contacts. That was it. Sometimes that happens and blows your bubble. After so much driving and hiking only 4 contacts. Memorial and Carpenter were much better activations.

Next day I headed for a long 10 point hike. Mount Houghton in the Mount Rose area. This is the second highest peak there with about 10490ft of elevation. Mount Rose is 10770 ft. The hike is long, 10 miles round trip and 6 of those are on a service road that doesn't add much to the enjoyment. After that the switchbacks commence and you can start seeing Relay Peak with its antennas. Once you reach a false summit, there are still 0.7 miles to get to the top.

You are there at the top of the world.

Everything else looks similar height or under you. The activation zone is a long ridge. Unfortunately it was very windy. I supported my pole inside some small bushes and I spent some time making sure it was well trapped in there. Close to the end of my run on 20m the pole finally collapsed with the wind and the top snapped. I managed to finish the QSO but the pile-up disappeared. I decided then to pack up and move to my next activation. Mt. Chickadee, another bushwhack to the top. Next day I was too sore to try Mt. Rose and was content to activate a 6 pointer: Prosser Hill.

Overall I came back with a bunch of points, some stories to tell and some equipment to fix. Nothing out of the ordinary in the life of a SOTA activator.

Roberto

K6KM

SOTA South Tahoe for a change - ROB K6KM

Running out of easy peaks in the North part of Tahoe chose to hit the southern area which has been recently (in the last few years) hit hard with forest fires. On my way to South Lake Tahoe I drove to Big Hill. This is a drive up north of Placerville and a 6 point SOTA peak. The top has a heliport, small Ranger quarters and a slate of towers and repeaters. In fact, you could hear the repeater traffic from the bottom of the observation deck. There is a nice bench. The day was fixing to be a 114F experience for Livermore and even there, at 8:30AM the sun was hitting hard. I made a lot of contacts on 40m as it was early in the morning and 20m was not too exciting. Then headed to Tahoe Mountain

where I was going to meet a fellow SOTA activator, Derek W7DLZ. He would accompany me on 5 of my 10 activations for the 3 day trip.

The climb was short and swift and we had

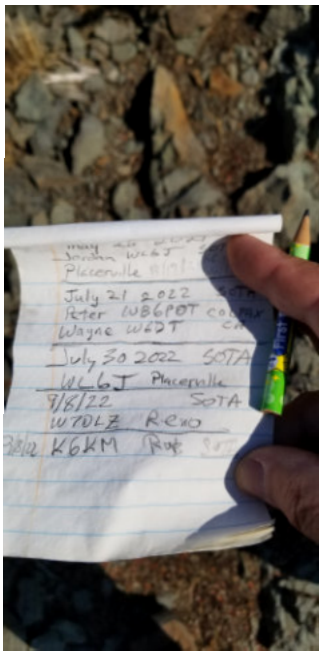
no problem with the activation. With good band coordination we never even stumbled on each other with interference.

Next and last peak of the day was w6/NS-248 which is an OHV trail. We climbed to the activation zone and then it was when I finally found out that 7000ft + 90F is a bad combination. I felt exhausted and dizzy almost to the point to give up. When checking how close we were to the peak we were in the activation zone. I set up shack and Derek moved a bit higher.

Next day I drove down to Leviathan Peak. This is a commercial tower peak with a high clearance dirt road to almost the peak. A short walk afterwards. Beautiful and peaceful morning. Activation was not that great but got my points.

Next, I met Derek to climb W6/NS-392. No trail on this one so mostly bushwhack. I studied the profile at home using different

tools but it always looks different when you are physically on the site. At the top and under a rock, there was a small medicine container with a list of operators visiting the peak. Derek and I stamped our mark there.



Derek and I took that selfie with Colorado Hill on the background which would be our next peak. Derek brought his 4x4 pick up truck to try to make the peak. Unfortunately there was a log on the way so we ended up hiking the last

part. At the top of Colorado Hill there was a fox greeting us. This peak was a former mining operation with several covered shafts at the top. The activation went well with Derek scoring some nice DX on 20m.

The last peak of the day was near Markleeville where several fires in recent years devastated the zone. Most of the trees were burned to the ground and the soil very sandy and eroding. The peak: W6/NS-269 is on a ridge near the Alpine airport. The hike is a bushwhack and just going straight up. Being later in the afternoon the activation wasn't that great with very few QSOs but enough to put the

peak in the log. I could not find reservations for that night at the Silver Creek campground as it was First come

First served. However, there was a dispersed and free campsite just south of Markleeville and turned out to be all empty

with reasonably good restrooms. No water on either camp so, knowing that I brought enough for the night and next day.

Final day I scheduled 3 peaks on Highway 4. The first one was a hike up 1200ft to a rocky summit. Very early in the morning to beat the heat and smoke and the activation was good. Next one was Bloods Ridge on Bear Valley. This is a short walk up a service road to where the gondolas are. Nice activation with good views in all directions.

Last activation was Bailey Ridge. I studied some reports and the road apparently was in bad shape making this a hike up on a Forest Fire road. I parked the car where the pavement ended and started my climb on the dirt road. The first quarter mile was very smooth with signs that it had been recently scraped. Some equipment was still there. For a moment I thought to go back to the car and drive up. Good thing I didn't. After a cattle guard the road went from good to horrible. Good enough for a 4x4 with very high clearance but not for a regular SUV.

On the positive side, there was a lot of shade. Getting close to the top of the ridge there was a fence running along the side of the road. I knew there was a green gate leading to the ridge and that the activation zone spilled to the gate so no need to cross the gate. However, when I reached the green gate, one side was open with a cattle guard and there were signs allowing motorcycles and OHV to go through. I crossed and set on the edge of the ridge. Very pleasant activation with some bees trying to disturb my operation but nothing major.

In the whole hike up/down I didn't see a human being. No complains there.

I came back home and uploaded my activations and finally made it to 500 points. Half Mountain Goat.

One more milestone on my way to achieving SOTA Mountain Goat, but still many more activations to go.

Roberto

K6KM

Power, SWR, Frequency Meter (2kW, 160-6m) - Dave K6DHL

Specifications:

Power range 10 Milliwatts to 2 Kilowatts

Selectable Power Display:

Instantaneous

Peak 100 millisecond period

Peak Envelope

Average 100 millisecond period (default)

Average 1 second period

Frequency 1.8 MHZ to 54 MHz

VSWR

Frequency Counter 2 Hz resolution

Manual Frequency Drift Compensation

Individual power calibration for each band

This is a continuation of last month's article on 3D printing for electronic projects, so we'll focus on that aspect before looking at the electronics.

The first question you're likely to ask is "Why purple"? It wasn't my first choice. I started printing with black polycarbonate but experienced severe warping. Let me explain a little bit about warping, the bane of Fused Deposition Modeling. As each layer is laid down and the plastic begins to solidify, it shrinks a tiny amount, pulling against the previous layer which, by this time, has solidified. This pulling force causes the print to curl upward slightly at the edges. Normally this curling is constrained by adhesion to the print bed, but the stresses are cumulative so tall objects with more layers experience ever increasing warping which can cause the printed part to break loose from the print bed. When this happens, you start over.

There are numerous schemes to mitigate warping, most of which I tried, but sometimes it's easiest to just choose a different plastic. It should be noted that the higher the print temperature, the greater the deformation. Here's a list of properties for the three types of plastic I had at my disposal, ordered by decreasing print temperature:

PC (**Polycarbonate**)

Strength: Very High | **Flexibility:** Medium | **Durability:** Very High

Difficulty to use: Medium

Print temperature: 270-310°C

Print bed temperature: 90-110°C

Shrinkage/warping: Considerable

ABS (**Acrylonitrile Butadiene Styrene**)

Strength: High | **Flexibility:** Medium | **Durability:** High

Difficulty to use: Medium

Print temperature: 210-250°C

Print bed temperature: 80-110°C

Shrinkage/warping: Considerable

PLA (**Polylactic Acid**)

Strength: Medium | **Flexibility:** Low | **Durability:** Medium

Difficulty to use: Low

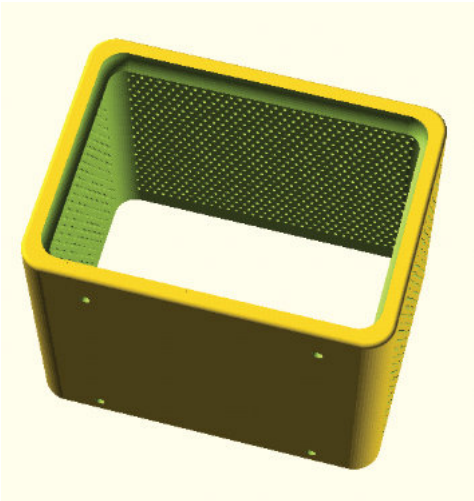
Print temperature: 180-230°C

Print bed temperature: 20-70°C

Shrinkage/warping: Minimal

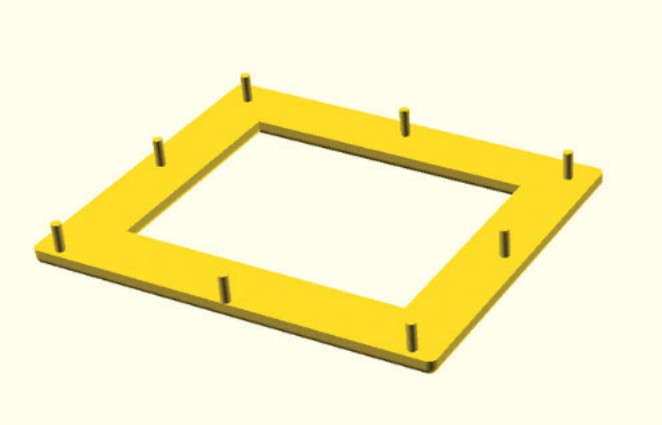
The enclosure box already had two strikes against it, large size and low contact area with the print bed. The box is printed face down which gives it a slightly greater footprint due to the added width of the bezel and you can't print it horizontally because unsupported filament droops before it solidifies. Starting out with black polycarbonate, the enclosure broke loose from the print bed at a printed height of about one inch. So I switched to gray ABS which also broke loose, but this time at about two inches. And then printing with some white PLA, the most forgiving of the three, it broke loose at about four inches (print 88% completed). Close, but no cigar. So I cranked up the print bed temperature another 10 deg. C which makes it stickier, applied fresh bed adhesive and grabbed my last spool of PLA (purple) and gave it another shot. Finally, success. I can live with purple and I can always print it in another color later now that I have the process dialed in.

It's interesting to note that PLA is becoming the filament of choice for projects not subject to high temperature environments or requiring great mechanical strength. The largest manufacturer of this bioplastic is located in Nebraska using sugar extracted from, what else, corn. PLA is completely compostable, unlike petroleum-based plastics that live on forever at a microscopic level, eventually finding their way into the food chain.

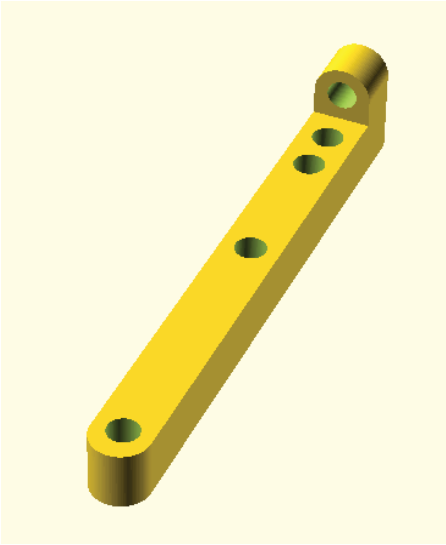


The printed enclosure is 130 mm (5") deep,

156 mm (6”) wide and 116 mm (4.5”) high with a wall thickness of 6 mm (0.25”). It required 29 hours of printing time and weighed in at 380 gm which brings the cost of the plastic filament to $7.60. Add to that about $3 for the aluminum in the chassis and this becomes an incredibly cheap project box (ignoring the $1000 spent on the printer).



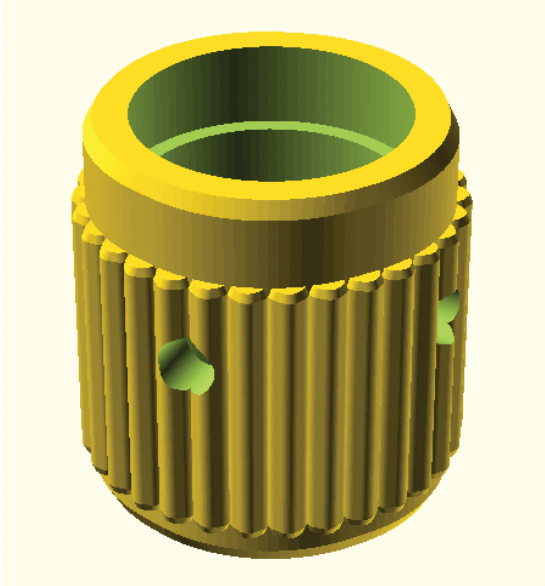
I decided to print my own bezel to replace the black one supplied with the Bridgetek display. This simple piece turned out to be the most challenging part to get right. Those pegs on the backside mate with holes in the display frame that hold the bezel in place solely by friction. This requires accurate peg diameters and placement. I started out by measuring the relative peg locations using a digital caliper and, after five failed attempts to get acceptable registration, was about to give up until I recalled that the datasheet for the display included scaled mechanical drawings of the mounting frame. So I imported the frame drawing into CorelDraw and brought the scale up to 1:1 and then copied the x/y coordinates of each hole into OpenScad. The next attempt was a perfect fit. Such is the power of a code-driven 3D editor. It is also a testament to the accuracy of the Voron printer.



To increase packing density I decided to mount the circuit boards vertically using printed supports. These supports were easy to lay out and a few constants at the top of the code define the support height and hole placement so it’s simple to customize for any board.

Threaded inserts are the easiest way to add durable threaded holes to printed plastic, requiring only a printed hole of the correct diameter and a soldering iron to press the insert into place. Since I use this technique frequently, I purchased a set of specialized soldering iron tips which are designed to maximize the contact area with the insert for rapid heat transfer, hold the insert straight, and to lift out cleanly once the insert has reached the correct depth. Tapered solder iron tips are slower to transfer heat and sometimes grab the insert pulling it back out of the plastic.

I decided make a color coordinated knob. The most challenging part of this design was the placement of the flutes around the outside of the knob which I finally solved by co-opting the technique used to generate printed gear teeth. There's tons of information on the web on how to do this, another advantage of using code, cutting and pasting algorithms written by others. For durability I added a core of ½-inch brass rod drilled out to the diameter of the rotary encoder shaft with two radial holes drilled and tapped for 6-32 grub screws. A snug fit and a drop of cyanoacrylate glue hold the core in place.

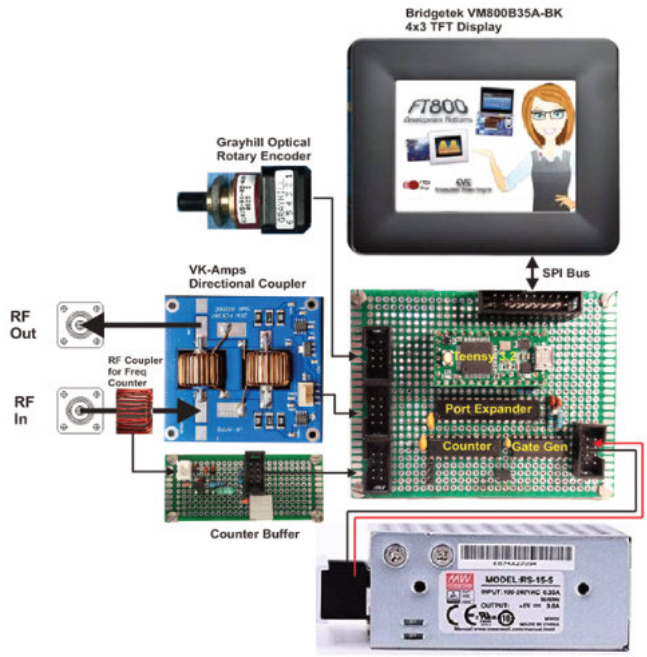


The chassis slides in from the rear up to the bezel and is held in place by the screws which attach the rubber feet.

There's not much in the way of connections, RF IN and OUT, AC power and a USB port for software modifications and potential remote monitoring.

Now let's look at the electronics.

Pictorial Block Diagram



Parts List

VM800B35A Display

VK-Amps 2KW Directional Coupler

Grayhill Rotary Encoder Optical 16ppr

Meanwell RS-15-5 Power Supply 5V 3A

Input buffer and controller boards described below

Design Overview

The heart of this meter is the directional coupler. It pays to use a good one, like the board from VK-Amps which uses large ferrites, shielded windings and a pair of AD8307 logarithmic amplifiers which provide a dynamic range of 92 dB. These boards are a bit pricey and, after adding shipping and tax from Australia, costs about $120. If I had known, up front, that I would eventually end up buying 5 of these things, I would have taken the extra effort to lay out a circuit board and fabricate a clone. I estimate that I could do this at a cost of about $40 each. I bypassed the on-board 12 volt to 5 volt regulator so that I could use a single output 5 volt supply for everything. The Forward and Reverse voltages are processed by the Teensy 3.2 which displays the results as power and vswr. The meter also includes a frequency counter used to automatically select power calibration parameters optimized by band.

I've used this directional coupler and frequency counter design in several other projects. When I started writing code for my 1.3 KW LDMOS amplifier project, I was looking for inspiration on power and swr

measurement schemes that involve both log amplifier and diode detectors when I stumbled upon the work of Loftur Jonasson TF3LJ who had designed a power meter that could be coded to use either methodology. Although I didn't use much of his design I did hijack the part of his code that calculates the powers and VSWR using a directional coupler equipped with AD8307 logarithmic amplifiers feeding the analog inputs of a Teensy 3.2 Arduino which, by coincidence, was the scheme I had in mind.

The Teensy 3.2 is ideal for this application because it has two 13-bit A/D converters that can be configured to simultaneously measure two inputs which is useful when trying to make an accurate calculation of the ratio of the forward and reflected powers. Other Arduinos use a single A/D and a mux to get multiple channels which introduce considerable latency when switching between channels. Unfortunately this model of Teensy is not currently available due to the great chip drought and NXP has delayed the delivery of the ARM Cortex-M4 chips to the Teensy manufacturer until March 2023.

The touch screen display comes from Bridgetek (spin-off of FTDI) and is also somewhat expensive at ~$76, but you get a lot of bang for your buck as it comes with built-in audio, interfaces via SPI bus and can operate with 3.3 or 5 volts all of which makes it very easy to interface to the Arduino. Central to this family of displays is the Embedded Video Engine (EVE) graphics controller IC from FTDI which does all of the heavy lifting, greatly reducing the demands placed on the host processor. But the real piece de resistance is the EVE display editor which is a PC-based WYSIWYG drag and drop application that utilizes widgets to rapidly lay out your screen and when complete, exports your screen directly to Arduino code. Using the supplied Arduino library plus a little cut and paste work, a new display is up and running with very little effort on the part of the programmer.

I also included an optical rotary encoder which is used to select the type of power measurement displayed on the main screen, allows adjustment of the frequency on the Freq Cal Screen and to manually select a band on the Bands Screen. You could make all of the same adjustments using the touch screen but I like having at least one knob. The gate generator uses a cheap crystal oscillator ($.28) which drifts with temperature but if one wants to display a more accurate frequency, you can tweak it in. If a more accurate frequency meter with a stable time base is desired, you could replace the crystal with a TCXO or replace the whole gate generator with one of these:

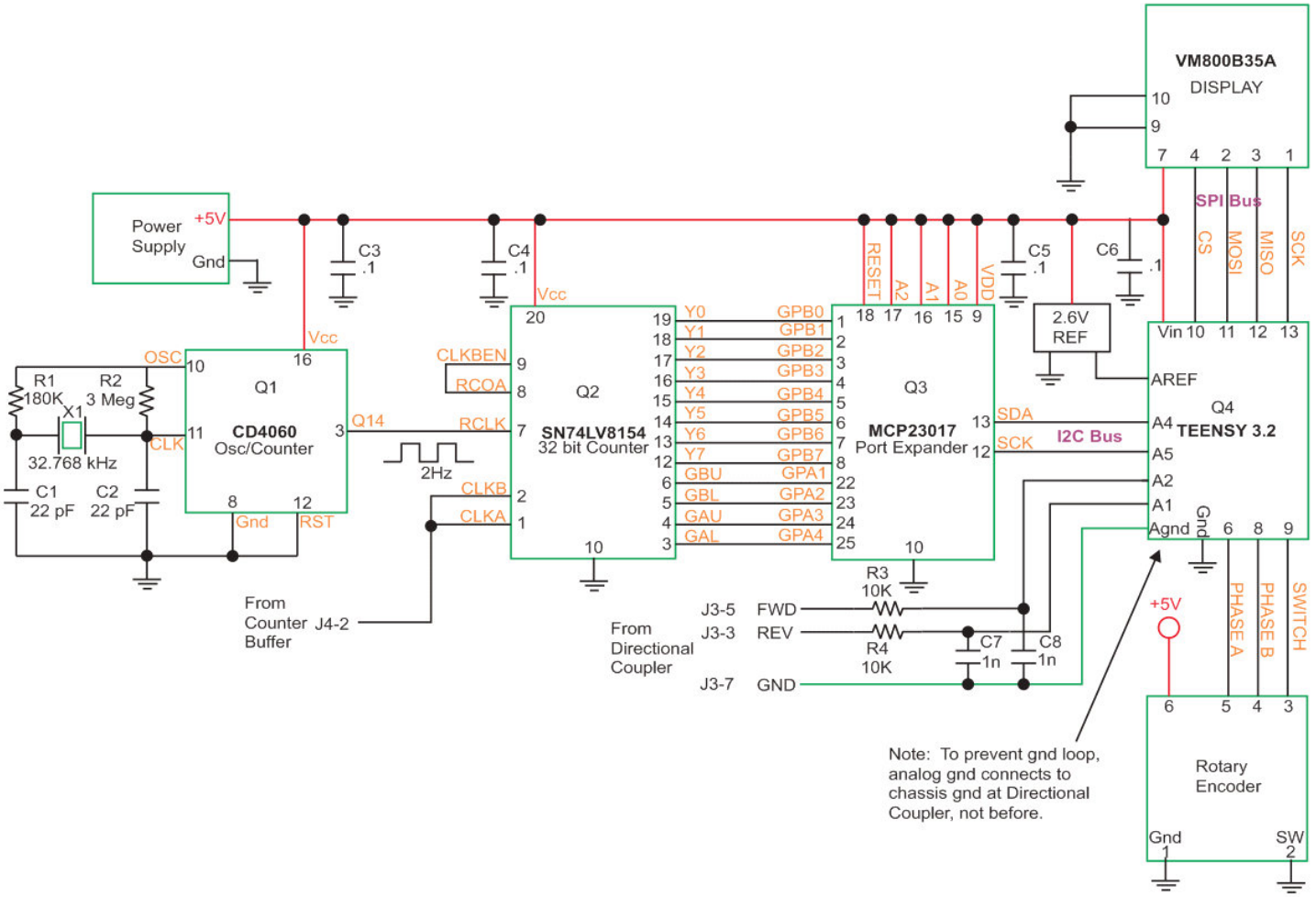
This $13 module generates a

precise 1 pps gate pulse derived from GPS. The only reason I didn't go with this is because it can be difficult to receive the satellite signals when used indoors and you would likely need to attach an external antenna which I chose not to incorporate. Besides, for this application we only require enough accuracy to identify the band.

Schematic of the Controller Board

Parts List

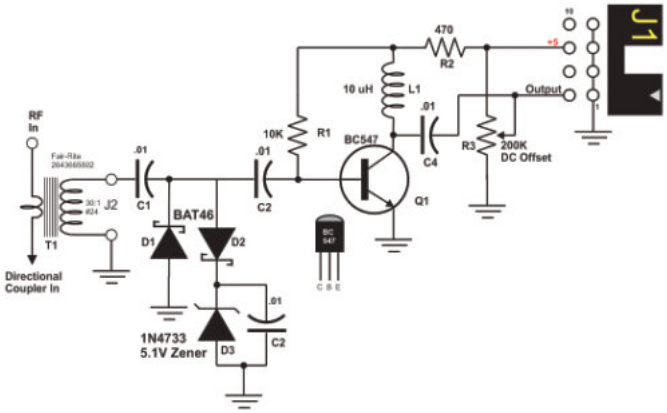
X1	Crystal Oscillator 32.768 KHz
Q1	CD4060 14 State Ripple Carry Binary Counter
Q2	SN74LV8154 Binary Counter
Q3	MCP23017 Port Expander
Q4	Teensy 3.2 Arduino
REF	ISL60002 FGA 2.6V voltage reference
C1-C2	22 pF Ceramic disk
C3-C6	0.1 uF Ceramic disk
C7-C8	1 nF Ceramic disk
R1	180K 1/4W



R2	3 Meg 1/4W
R3-R4	10K 1/4W

The CD4060 is a combination oscillator and counter in one chip. It divides the 32.768 KHz frequency by 2^14 which yields a 2 HZ gate pulse so the code multiplies the counter output by 2 to get Hz. The SN74LV8154 chip has a pair of 16-bit counters that can be cascaded to provide a 32-bit count. When the rising edge of the gate pulse is received the current count is copied into four 8-bit buffers and the count continues on. We have until the next gate pulse to retrieve the stored count before it gets overwritten. Since we never reset the counter to avoid having precise synchronization with the gate pulse, we subtract the previous count from the current count. The code still needs to know when the count has completed so it poles the least significant byte of the stored count looking for a changed value which signals a freshly stored count. There are 8 data lines and 4 buffer select lines which the Teensy could accommodate directly but I opted to use a 16 port IO expander chip which communicates with the Teensy via I2C. This is actually a very clean solution which allows the counter to be remote from the processor with only two wires connecting them together. This is a scheme I want to retrofit back into my LDMOS Amp and so this meter was my proof of concept. The display utilizes the SPI bus which is native to the Arduino, just hook up to the default pins and go. I used an optical, rather than a mechanical, rotary encoder because I had one and I didn't want to deal with switch bounce. The output of the AD8307 log amps should never exceed 2.58 VDC at 2000 watts so I used an external 2.6V reference on the Teensy A/D converter to maximize the precision of the conversion.

Schematic of the Frequency Counter Input Buffer

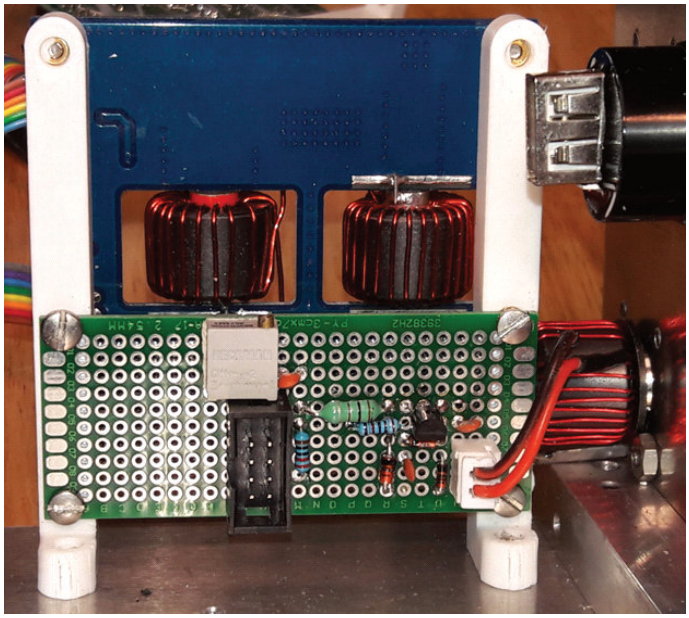


Parts List

T1	F50-43 Ferrite Toroid Pri 1 turn, Sec 30 turns #24 gauge
D1, D2	BAT46 Schottky Diode
D3	1N4733 5.1V Zener Diode
Q1	BC547 NPN RF Transistor
C1- C4	0.01 uFd ceramic disc
R1	10 K 1/4W
R2	470 ohms 1/4W
R3	200K trimpot
L1	10 uH 1/4W inductor

The counter chip can only tolerate an input pulse up to 5 volts so this buffer acts as a protection limiter while providing gain for weaker signals. To accommodate the wide power range of the meter and to provide some isolation, I used an RF coupler to sample the incoming signal followed by a pair of Schottky diodes and a 5 volt Zener to limit the input to the transistor to between 5.0 volts and -0.5 volts. The collector-feedback biased amplifier produces a nice TTL level signal at the output to drive the frequency counter. To improve sensitivity for power levels that fall below the clipping level, I added a DC offset to shift the output level up to the triggering threshold of the counter. It's a small shift and the only band where this is needed is on 6 meters where the output of the coupler falls off to about 2 volts. The counter seems to work well down to power levels of one watt on all bands and if power happens to be too low to drive the counter, the power meter will still function but you may not be using the best calibration parameters for the current band which could reduce the accuracy by as much as 2%. There is a menu selection which allows you manually specify the band which is especially useful when measuring QRP power levels too weak to count.

I grouped the RF components together, away from the controller, mounting the frequency counter input buffer on the backside of the directional coupler. Notice the RF coupler in the lower right connected to the input of the buffer. I used IDC connectors and ribbon cable to connect all of the sub components together which might not be the best choice in such an RF intense environment but it's just so easy to use. One trick I use to add a modicum of shielding to ribbon cable is to ground every other wire.



For more information on the operation of the meter, click here to view a User Guide.

If you have any questions please feel free to contact me at Dave@Leddon.net.

From the LARK Cave

This month we are featuring a recent acquisition.

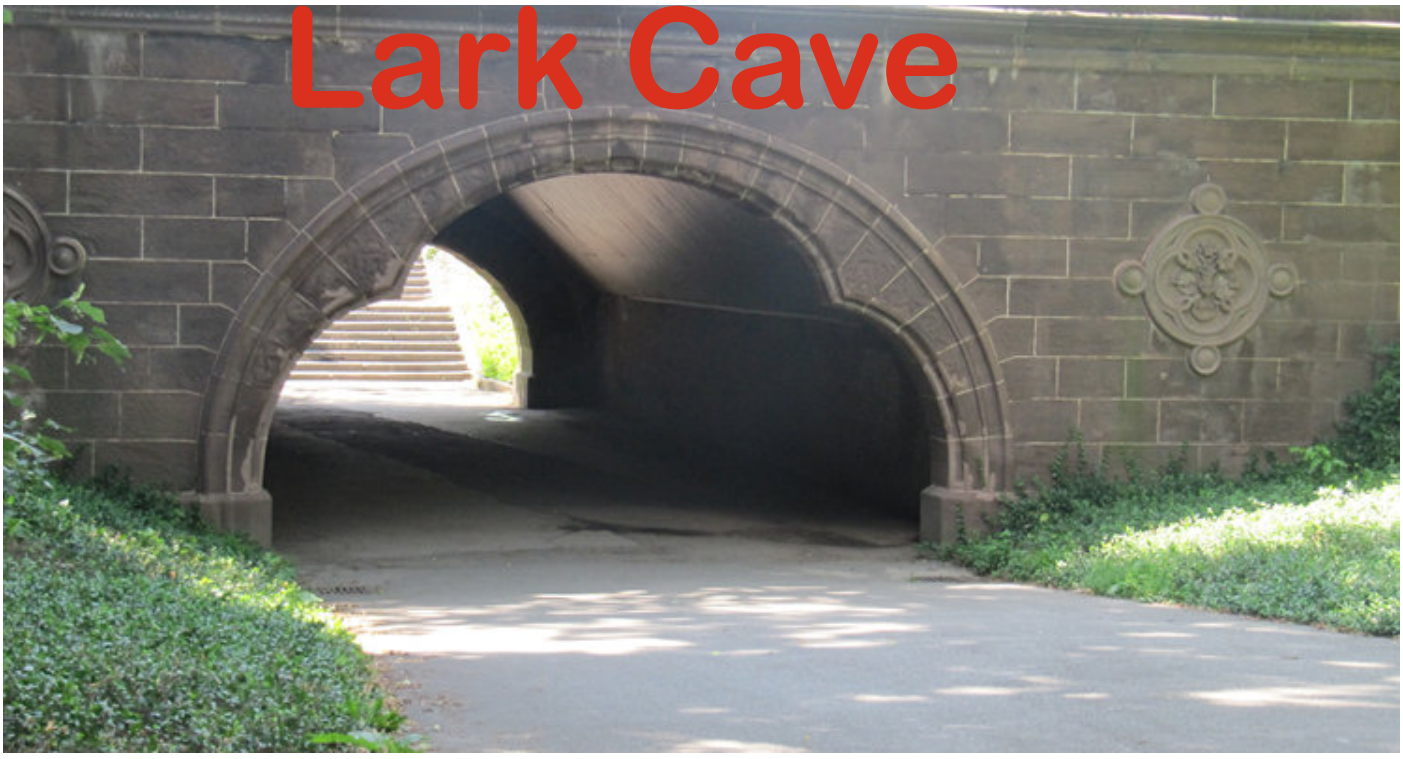
It is a Cushcraft ARX2 from the Ringo Rangers line.

This is a 2 Meter antenna, with a tripod.

Tested, works fine, set for 145 MHz. Give your HT a boost, just need an SMA to PL 259 adapter.

Priced at $50.

Contact Rich KN6HSR@ARRL.NET



Picture by K6KM

Arnold Kirkewoog - KI6OHU (SK)

Arnold Kirkewoog passed away on July 24 due to complications of lymphoma. Instead of the 48 hours predicted by doctors, he spent ten days gently drifting away, occasionally opening his eyes to see who was at his bedside, then perhaps reliving his world travels, connecting his electric car to his new photovoltaic system, planting a new crop of tomatoes, planning his next invention, painting local landscapes and, of course, dancing up a storm. In these final days, he never stopped living fully and deeply, too busy and too inspired to stop for anything.

A first generation, only son of Norwegian parents, growing up in San Francisco, Arnold never ceased to educate himself — navigating tugboats, installing sound systems, designing and using turn signals and seatbelts before they were standard issue, and taking watercolor classes at the Palace of Fine Arts. He met his wife, Margo, at a dance by the Russian River. Margo gave her phone number to Arnold, and this led to an amazing 64 years of marriage.

When he joined the Navy, tests revealed his gifts for science and technology, and he was trained in electrical engineering. During these years on duty in the South Pacific, he monitored nuclear testing, making dirty martinis on the deck of a military ship watching mushroom clouds. These experiences led him to Livermore and a career at the Lawrence Radiation Laboratory, where he participated in the development of solid-state transistor technology, experiments on satellites and more.

In their first house in Livermore, he buried a turret room, cut out of a destroyer, in his backyard as a bomb shelter, perhaps inspired by Margo's experience in Holland during WWII. Later, he and his wife, Margo, built their own house on the outskirts of Livermore, raised two children, built a cabin in the Sierras from which they took countless backpacking trips, and led the charge of renovating the Livermore Barn. For 50 years, Arnold and Margo were celebrated figures of Livermore, volunteering, painting and dancing wherever and whenever they could.

After he retired and after the passing of his wife of 64 years, Margo, Arnold resettled in Baywood Park/Los Osos. He quickly became one of the colorful characters of this eccentric community — wearing his Hawaiian shirts and plantation hats, letting his treasured hair grow down to his shoulders, dancing with anyone and everyone. Every time he was on the bay, he would smile and say, "Life doesn't get better than this." It did get better… He met his best friend Eleanor who introduced

him to vegetable gardening, meditation and exploring the sights and landmarks of the Central Coast.

In his final decade, he visited Norway and reconnected with the extended family of his mother Ellen. Upon his return to Baywood, he raised a Norwegian flag on his backyard and proudly put on a hand-knitted Norwegian sweater over his Hawaiian shirt whenever the fog came in. And right up to the end, he remained as intrepid, colorful and determined as ever. Just before being hospitalized, Arnold had accompanied his Dutch nephew on a hike up Black Hill and told his oncologist that he wasn't about to let chemo ruin his treasured full head of silver hair. And when he was barely able to speak, he motioned for us to come close for some final words. This followed: "I think I swallowed a magnet." No farewell, no mushy sentiment, just a nod to technology and his belief that anything can be fixed and improved.

Arnold is survived by his daughter Ingrid; son Eric; son-in-law Jan; daughter-in-law Sule; four grandchildren; and five great-three olives, plant a garden, take something apart, improve it and put it back together. In the memory and spirit of Arnold Kirkewoog, please choose one of the following and do it with gusto: dance to live music, hike, tell a joke, have a dirty martini with er, pick up a sketch book and learn to see, volunteer.

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October 2022

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
					1 California QSO Party	2 California QSO Party
3	4	5	6	7	8	9
10	11	12	13	14 PACIFICON	15 PACIFICON	16 PACIFICON
17	18	19 Ham Breakfast	20	21	22	23
24	25	26	27	28	29	30 CQ WW SSB
31						

LARK MON. NIGHT NET ON: 147.120 MHZ + offset, PL 100 AD6KV.
Every Monday 7 PM local time.
Visitors welcome to join in.

Net Control Operator Schedules

Monday Night Net Control Operator Schedule

October

DAY	OP	NAME
03	AD6KV	Ron
10	EOC	
17	AE6D	Ed
24	N5KA	Jerry
31	WB6ETY	John

November

DAY	OP	NAME
7	WB6AEA	Jon
14	EOC	
21	AD6KV	Ron
28	AE6D	Ed

December

DAY	OP	NAME
5	N5KA	Jerry
12	EOC	
19	WB6ETY	John
26	WB6AEA	Jon

EVERYONE is invited to check in to the net. Please contact AE6D ae6d@sbcglobal.net if you need more information or would like to become a Net Control Operator. After the net please call Ed AE6D with the AC/DC statistics or send him the information by email.

Thursday Night Net Control Operator Schedule

10/6/2022	Thursday	Peter/AI6RG	Rich/KN6HSR	Easy Tech Discussion:
10/13/2022	Thursday	Nate/N8MOR	David/K6WOO	General Discussion:
10/20/2022	Thursday	Rich/KN6HSR	Jerry/N5KA	Advanced Tech Discussion
10/27/2022	Thursday	David/K6WOO	Peter/AI6RG	New Comer, General Discussion:
11/3/2022	Thursday	Jerry/N5KA	Nate/N8MOR	Study Night: General Exam
11/10/2022	Thursday	Peter/AI6RG	Rich/KN6HSR	Easy Tech Discussion:
11/17/2022	Thursday	Nate/N8MOR	David/K6WOO	General Discussion:
11/24/2022	Thursday	Rich/KN6HSR	Jerry/N5KA	NONE
12/1/2022	Thursday	David/K6WOO	Peter/AI6RG	New Comer, General Discussion:
12/8/2022	Thursday	Jerry/N5KA	Nate/N8MOR	Study Night: General Exam
12/15/2022	Thursday	Peter/AI6RG	Rich/KN6HSR	Easy Tech Discussion:
12/22/2022	Thursday	Nate/N8MOR	David/K6WOO	General Discussion:
12/29/2022	Thursday	Rich/KN6HSR	Jerry/N5KA	Advanced Tech Discussion

Regularly Scheduled Nets

LARK/LIVERMORE NET	Every MON.	1900 local 147.120+	PL 100
RACES Net 7pm	Every MON.		
Windfarms 10-10 NET	Every WED.	1930 local 28.485	USB
LARK TECH NET	Every THURS.	1930 local 147.120+	PL 100
LLNL Retiree Net	Every FRI 8:30 am	0830 local	7.2630 LSB
SWOT	Every Sun. & Tues.	2000 LOCAL	144.250 USB
THE NOON TIME NET	EVERY DAY	1200-1400 LOCAL	7.2685 LSB & 3970 LSB
RV RADIO NET	MON-FRI	0800-0930 LOCAL	7.2685 LSB

LARK CONTACTS 2022

LARK—LIVERMORE AMATEUR RADIO KLUB P.O. BOX 3190, LIVERMORE, CA 94550-3190. Web: http://www.livermoreARK.org. E-mail list: *livermoreark@groups.io*

GET YOUR HAM LICENSE OR UPGRADE. LARK conducts all levels of license testing (upon request) at the Livermore City Council Chambers following club meetings (3rd Sat. each month). Contact Ron Kane, AD6KV (AD6KV at arrl.net) 2 weeks in advance.

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Secretary	Ryan Mahoney	W6RAM	Ryan.andrew.mahoney@gmail.com	925-786-0640
Treasurer	Bernie Bernstein	NJ6W	nj6w@xemaps.com	(925) 858-4608
Board (PP)	Roger Deming	KK6RD	rogerdeming@yahoo.com	(925) 484-1285
Board	David Counts	KG6WIR	dlcounts@sbcglobal.net	925-895-4698
Board	Nate Moore	N8MOR	nate@nateandamy.org	(925) 577-4916
Activities	Jerry Benterou	N5KA	benterou@gmail.com	925-321-3263
Repeater Chair	Ian Parker	W6TCP	w6tcpian@gmail.com	
Web Site	Arnold Harding	KQ6DI		
Newsletter Editor	Roberto Sadkowski	K6KM	rsadkowski@gmail.com	
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RFI	Gary Johnson	NA6O	gwj@me.com	
T-Hunts	Rich Harrington	KN6FW		
Swap n Shop	Richard Combs	KN6HSR	KN6HSR@arrl.net	

Facebook—http://www.facebook.com/LivermoreARK
Twitter link : https://twitter.com/LivermoreARK

Special interests: Mesh Networking. Dave KK6DF http://mesh.sushisoft.com . https://www.youtube.com/user/fanninsushi/videos. View: AREDN!http://www.aredn.org. CERT NEWS: Tracy Hein CERT contact. Email: thein@lpfire.org or (925) 454 -2317 https://community.fema.gov/Register/Register_Program_View?id=a0xt0000000mAuzAAE

Meetings 3rd Wednesdays. Remillard RM 3333 Busch Rd. Pleasanton.

LARK Membership Form

LARK LIVERMORE AMATEUR RADIO KLUB.
P.O. BOX 3190, LIVERMORE, CA 94551-3190
An ARRL Affiliated Club

LARK MEMBERSHIP FORM - Print, fill out, mail in with check.

Circle all that apply: New / Renewing / Family **Today's Date: _____**

NAME: _____

CALL SIGN: _____

ARRL MEMBER? Yes / No

Address: _____

PHONE: ( ) -

UNLISTED? ____YES _____NO

Enter your E-mail here and stay connected: _____ LARK NEWS featuring upcoming club events and articles is available monthly via email. http://www.livermoreark.org/ Access the current and back issues on our website.

ADDITIONAL FAMILY MEMBERS (At the same mailing address, only $2. membership per person)

NAME	
PHONE	
EMAIL	
AARL MEMBER	

ANNUAL DUES #_____ PRIMARY ($20.00) ADDITIONAL MEMBERS # _____ ($2.00 each)

TOTAL: $_____ MAKE CHECKS PAYABLE TO: LARK. Thank You.

Membership is $20.00. per calendar year starting on Jan 1 through Dec. 31. To complete membership by mail: print and fill out this form, include a check payable to LARK, and mail to: LARK Membership Chairman, P.O. Box 3190, Livermore, CA, 94551-3190. Please be sure your complete mailing address, e-mail, and call sign are on your check. Questions? Contact the Membership Team via email: membership@livermoreark.org You may also complete membership application and payment by: Bringing this form filled out and pay by cash or check to either the Membership Chairman or Treasurer at any general meeting. Or: pay with a credit card or PayPal account on the Club's membership page: http://livermoreark.org/membership/membership.html.

Thank you and welcome aboard from LARK and the Membership Team.