



# QRO

MONTHLY NEWSLETTER OF THE PALOS VERDES AMATEUR RADIO CLUB

MAY 2019



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## Digital Mobile Radio (DMR) from an expert

**Michael Rickey, AF6FB**

**Thursday, May 2, 2019**

6:30 pm: 1) "What's Next?" group...all ham radio questions welcome, and 2) separate DMR Basics group

**7:30 pm: Main meeting**

Fred Hesse Community Park  
(McTaggart Hall)  
29301 Hawthorne Blvd.  
Rancho Palos Verdes, CA  
*Visitors always welcome*

## PVARC's upcoming meeting topics...



Michael Rickey, AF6FB

Speaking at our **May 2** meeting about Digital Mobile Radio (DMR) is **Michael Rickey, AF6FB**, the PAPA System's technical expert. Unique among the linked repeater systems in southern California the PAPA System has 16 DMR and 11 D-Star repeaters besides traditional analog FM. The PAPA System also provides its members (and the general ham community) extensive DMR knowledge resources.

Michael has also been behind the PAPA System's Multi-Mode Voice Modems on several PAPA repeaters. These modems recognize which type of digital signal (DMR, D-Star, or other) is being received and then re-transmits the signal in the correct mode—leveraging existing hilltop repeater sites.

As with our June 2018 meeting when Carl Luetzelschwab, K9LA, spoke via Skype video from Ft. Wayne, IN, our **June 6** monthly meeting at Hesse Park anticipates another fascinating Skype presentation.

Kristen McIntyre, K6WX, is presenting from the San Francisco Bay area "Grounding is a Myth" at our June meeting...removing much of the mystery and hype about grounding antennas or equipment. Kristen is an MIT graduate in electrical engineering and currently a senior software engineer at Apple. She previously worked (in her words) "at many of the usual suspects in Silicon Valley."

In January 2019 Kristen was named Vice-Director for the ARRL Pacific Division after serving as Technical Coordinator for the ARRL East Bay Section. She also has been president of the Palo Alto Amateur Radio Association for 11 years and is a licensed amateur in Japan as JI1IZZ. Kristen frequently speaks at ARRL conventions on technical topics and you might have seen her talks at HAMCON 2015 or HAMCON 2017 in Torrance. Also in 2017 she was inducted into the **CQ** Amateur Radio Hall of Fame.



Kristen McIntyre, K6WX



On **July 4** Hesse Park's building is closed and we won't be holding a July meeting. Please enjoy Independence Day with your families, neighbors, and friends.

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## PVARC's upcoming meeting topics

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Due to 4th of July we'll have a rare August meeting at Hesse Park. On **August 1** we will show two highly-illustrated features: a new video by your **QRO** Editor about 2019 Field Day at the PVARC's site and 17 others in the ARRL Los Angeles Section, plus a presentation leading to amateur radio's International Lighthouse and Lightship Weekend in mid-August.

In many respects our Lighthouse Weekend operation is like doing Field Day again...but just eight weeks later.



The **September 5** monthly meeting will be devoted to Digital Mobile Radio (DMR) and our club's experiences in the five months since K6PV became a dual-mode repeater. We will also have members show DMR radios and present useful knowledge or tips for becoming more proficient with DMR. ■

PHOTOS FROM 2018 EVENTS: DIANA FEINBERG, AI6DF

## PVARC Field Day planning meeting, May 18



ARRL Field Day is June 22-23 and a PVARC Field Day planning meeting will be at 10 am Saturday, May 18, in the RPV home of Rocco Lardiere, N6KN. Any PVARC member who worked at previous Field Days (or would like to be at their first) is welcome at the meeting to help shape our plans.

Rocco volunteered to head our 2019 Field Day efforts and recommended increasing our band-pass filter fleet to enable simultaneously operating on different bands from common or nearby antennas without interference.

If you can attend the May 18 meeting please advise Rocco by email at: [roclar4321@gmail.com](mailto:roclar4321@gmail.com) ■

## Catalina Phantom in FT8

### (An FT8 primer and cautionary tale for IOTA DXpeditions and Field Day)

By Jerry Kendrick, NG6R

This article is for FT8 advocates. If you haven't yet been lured into and trapped in the web of this very popular HF digital mode, the subtle absurdity we'll be discussing later might not make a lot of sense. Yet, FT8's advantage of having a steep learning curve means that what appears as daunting and virtually indecipherable in the morning can become your favorite HF QSO mode by mid-afternoon.

The specific issue discussed in this article was uncovered during the Club's recent Islands on the Air (IOTA) DXpedition to Santa Catalina Island. It led to a great deal of angst until we solved the mystery (or at least convinced ourselves that we had!). Understanding the solution to the mystery embodies the concept of why FT8 is so powerful. Please read on, even if you haven't yet embraced—according to ARRL—this “latest bright shiny object of the amateur radio digital world.” [1]

#### FT8 digital mode

Nobel laureate and astrophysicist Joseph Taylor K1JT (creator of JT65 amateur radio digital mode) teamed up with Steve Franke K9AN to collaborate on FT8, just one of the weak-signal digital modes in the suite of modes known as WSJT (which stands for “weak signal/Joe Taylor.”) [2][3][4] The FT8 mode is fairly easy to set up and use and works quite well under noisy band conditions, so it's become quite popular (especially during these times of low sunspot activity). It's a semi-automated mode so making contacts is pretty easy. Software to use this digital HF mode is free to download. [3] As with other digital modes such as JT65 and PSK31, there must be three key interface exchanges between the transceiver and the host computer: connection to the transceiver's CAT/DATA port to control the radio; PTT so the computer can put the radio into transmit mode; and, connections for input and output audio (usually via the computer's sound card). Of course, as with other digital modes, good timing (fraction of a second or so) is important. Since computer clock drift is common, measures must be taken such as downloading a free application that periodically adjusts the computer clock to an atomic standard. [5] In order to understand the issue we experienced at Catalina recently, we'll first look at a typical FT8 on-air exchange.

#### QSO'ing in FT8

Before dissecting the typical FT8 on-air exchange, we need to specify the minimum exchange of information needed to complete a bonafide QSO. The generally accepted norm for a valid HF contact or QSO is basically a real-time-confirmed exchange of signal reports by two identified stations. I.E., station A calls station B and provides a signal report; station B acknowledges receipt of that signal report, acknowledges the calling station's call sign and provides a signal report in return; then, to complete the QSO, station A acknowledges receipt of station B's signal report. That's it. Basically, both stations' call signs and signal reports have been exchanged and acknowledged, so a valid QSO can be logged.

A recent typical FT8 QSO that basically follows this recipe for minimal exchange of information is depicted in Figure 1 (Left) in which the author called CQ several times. A transmission period is just about 13 seconds long; there is an approximate two-second gap of radio silence; and then the station will listen for the next 13 seconds, followed by another two-second gap; and then the whole automated process repeats in 15-second segments. So, basically, any given station will transmit at most only every 30 seconds and for just half that time; then listen for the other half.

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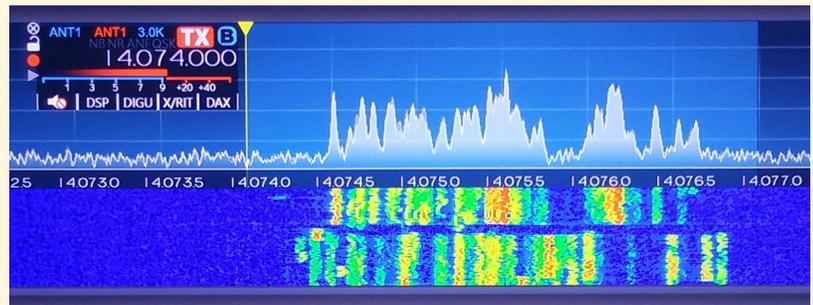
## Catalina Phantom in FT8

### (An FT8 primer and cautionary tale for IOTA DXpeditions and Field Day)

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Analyzing this exchange in Figure 1, note NG6R called CQ several times before being answered. Examining just the first row of this typical sequence, the first set of six numbers is the UTC time or GMT in the format hours-minutes-seconds, i.e., 19h39m00s. The second column indicates “Tx”, i.e., that a transmission occurred. Since a typical bandwidth for the whole collection of ALL FT8 stations is about 3000Hz, the third column indicates where in that 3000Hz the left edge of the author’s ~50Hz-wide transmission occurred, i.e., at 2643Hz over from the allocated left band edge. The last data item in the row—DM03—represents the 4-character Maidenhead grid square for NG6R’s QTH. [7][8] Figure 1 (Right) illustrates a typical panadapter and waterfall view from the author’s Flex Radio 6600 display for the 20m FT8 band segment from 14.074 to 14.077MHz. Note the myriad 50Hz signals that can fit into the available 3kHz of allocated bandwidth. Each one of those “fingers” is a single station’s frequency shift keyed (FSK) signal—50Hz wide—composed at any instant of just one of 8 different tones (8-FSK), with these eight tones spaced 6.25Hz apart (Note:  $8 \times 6.25\text{Hz} = 50\text{Hz}$ ).

193900	Tx	2643	~	CQ	NG6R	DM03
193930	Tx	2643	~	CQ	NG6R	DM03
194000	Tx	2643	~	CQ	NG6R	DM03
194030	Tx	2643	~	CQ	NG6R	DM03
194045	-2	0.3	1699	~	NG6R	AK1K FN42
194100	Tx	2643	~	AK1K	NG6R	-02
194045	-11	0.1	2644	~	NG6R	N7CWM GN87
194115	5	0.1	1701	~	<C6A/K4CFG>	KK2I
194115	9	0.3	1800	~	NG6R	K0VM EN42
194130	Tx	2643	~	AK1K	NG6R	-02
194115	-2	0.3	1699	~	NG6R	AK1K R-06
194130	Tx	2643	~	AK1K	NG6R	RR73
194145	0	0.1	1701	~	<C6A/K4CFG>	KK2I
194145	-8	0.3	1699	~	NG6R	AK1K 73



**Figure 1. (Left)** Complete FT8 exchange initiated by NG6R calling CQ (yellow/green). Two different stations answered (red) at the same time at 194045Z (and still a third station shortly thereafter) yet only one (AK1K) was selected automatically for QSO by the computer. AK1K is located in grid square FN42 (Boston and surrounding communities). [7][8] At the next 15-second Tx opportunity (194100Z), NG6R sent a signal report to AK1K of “-02”, which indicates a fairly strong signal. Signal strength level is determined automatically by the computer software so no judgment by the station operator is required. You’ll note that AK1K replied at his very next opportunity (194115Z) with a report of “R-06”, meaning “Roger, I got your report and my report to you is -06dB.” At NG6R’s next Tx opportunity, I respond “RR73”, which means, “Roger roger, I also got your report. Best Regards.” Note one final relevant exchange: at 194145Z, AK1K replies with one last “73”. There are some who believe that this last reply is merely a courtesy and not essential for actually logging the QSO (and they’re technically correct). But, if my previous response to AK1K (of RR73) had been obliterated by QRM and he didn’t actually receive it, he’d have no way to know that I received his acknowledgement of my report and might not actually log it or enter it into LoTW. One last point: Note the two white/blue rows that show transmissions by AK1K meant for NG6R—and they’re quite strong. This demonstrates the power of FT8, that it can dig out the relatively weaker signal from AK1K that is virtually covered over by the stronger signal from KK2I on nearly the same frequency. The multiple-frequency-shift-keying (MFSK, where M in this case = 8), as well as the high degree of redundancy and forward error correction (FEC) inherent in FT8, account for the “weak signal” performance of this robust digital mode. [11]

**(Right)** Panadapter at the top and waterfall below show a typical display of the 20m FT8 band segment with vigorous activity. Note the nearly two full 13-second transmission periods in the waterfall with the ~2-second gap between the periods. Colors of the waterfall signals provide some indication of strength, with red being the strongest.

Continuing with this examination, note that two stations (as is sometimes the case) both answered the CQ at the same time, at 194045Z: AK1K and N7CWM. At the next receive time opportunity (194115Z), still a third station (K0VM) called, but by this time the exchange with AK1K was underway. Since a small fraction of 15 seconds isn’t a lot of time to be analyzing and making quick decisions, an option is to just let the computer decide which of the two stations to answer. (That’s done by checking the “Call 1<sup>st</sup>” box in the setup section. So, since AK1K shows up first in the computer’s left-to-right frequency scan of the band, the computer picked it for automatic reply.)

You’ll note that AK1K selected his own unique frequency to reply to my CQ call; he placed his transmit cursor at 1699Hz. Whereas, N7CWM opted to simply call me on my frequency of ~2643Hz. This choice of either working “split” or working “simplex” can be made, again, by checking a box in the setup section. [By the way, it’s generally accepted as a much better practice to use “split” operation on FT8, but some operators still persist in operating simplex and potentially colliding with other callers on the CQer’s calling frequency.] [6]

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## Catalina Phantom in FT8

### (An FT8 primer and cautionary tale for IOTA DXpeditions and Field Day)

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#### Catalina IOTA ops

At Catalina, we usually set up two and sometimes three stations that operate simultaneously. Long ago, we learned that curbing out-of-band (OOB) phase noise (noise that is unintentionally created within the transceiver in adjacent bands and not completely filtered out before being sent out to the antenna) is essential to help isolate other nearby Club receiving stations from RF interference on adjacent bands due to the close proximity of the transceivers and the high-power signals from various antennas located only tens of feet apart. We do that by employing band-pass filters (BPFs), as discussed in previous QRO articles. [9][10]

One of the consequences of this current low sunspot period is the lack of spirited activity in the CW and SSB portions of the various HF bands. On the other hand, there is a great deal of activity in the FT8 sub-bands. Because of this, we quickly concluded that the single station we had planned for constant FT8 operation simply wasn't enough. We decided to frequently operate at least two stations on FT8 (on different frequency bands, of course) so as to increase our QSO rate. When doing so, we discovered a very strange and, at the time, totally inexplicable phenomenon. In operating 20m FT8 and 17m FT8 respectively on two separate stations (that are physically separated by maybe 20 feet, with their respective antennas separated by at least 50 feet) we would see a display similar to that depicted in Figure 2. (Note that this is not an actual photo of a row of the FT8 on-screen readout, but instead a computer-generated facsimile of what we would occasionally see.)



190130 15 0.1 1200 K6PV K6PV DM03

**Figure 2.** Computer-generated facsimile of what we would occasionally see displayed at the station set up for FT8 and just monitoring (not operating) 20m when our second nearby station was actually operating (i.e., transmitting) FT8 on 17m (and also vice versa).

The sudden appearance of this red display at the 20m station was totally surprising (erroneously indicating that we were being called, even though the 20m station wasn't even on the air—just monitoring) and seemed to come from a station with our same call sign, K6PV. The first reaction was that the “interfering signal” was coming in through the antenna due to OOB phase noise from the adjacent room's 17m station. However, even adding an additional 17m band-pass filter in series with that station's existing 17m BPF didn't stop this phenomenon. After some time stewing about this phenomenon, the idea of totally disconnecting the 20m antenna from the transceiver was implemented. However, this red row still would be displayed, indicating that either a VERY weak OOB signal (i.e., on 17m from the other station) was getting through the 20m pass-band of this station's transceiver OR the interfering signal was somehow getting into the computer sound card through some other means (perhaps via the USB cable) and tricking the software into decoding the signal as if it was real.

Earlier we said that this was an occasional phenomenon, that it wasn't happening all the time, even when both stations were on the air working other stations. We concluded that since there is a setup option when calling CQ to pick either a transmit “even” time (a time period that ends in 00 or 30) or an “odd” time (a time period that ends in 15 or 45), we needed to have both the stations transmitting in the same time slot (could be either even or odd, but they needed to be the same). When both stations transmitted at the same time, there was no opportunity for an interfering signal to cause a weak “phantom” receive signal in the software-based decoder. On the other hand, when one station was transmitting while the other was receiving, the interference was decoded and displayed as depicted in Figure 2. What a revelation! It says that two or more FT8 stations operating in relatively close proximity are constrained to both/all transmit on the same time slot selection (could be either even or odd, but must be the same) to prevent this phenomenon.

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# Catalina Phantom in FT8

## (An FT8 primer and cautionary tale for IOTA DXpeditions and Field Day)

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### Conclusion

For all IOTA DXpeditions and ARRL Field Day activities in which multiple (two or more) FT8 stations are operating in close proximity on separate bands, the stations must constrain their transmit signals to be on either even or odd time slots (both/all stations must select the same convention). Also, during those times when one station is operating (i.e., periodically transmitting) but the second station is simply monitoring (not transmitting), the “phantom” signal from the first station may still be displayed on the second station’s computer screen as depicted in Figure 2 above. But this anomalous characteristic will just need to be tolerated and ignored, as it appears to be an inevitable consequence of close proximity operation in FT8. The very feature that gives FT8 its high degree of error correction and ability to dig out weak signals buried deep in background noise might actually be the cause of this “negative” aspect of close proximity multiple station operation. We will have to be particularly diligent and aware of this constraint as we proceed to use this mode in future IOTA and Field Day activities. ■

### References:

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### Thinking ahead to Field Day, 22-23 June 2019:

Sample ARRL Field Day FT8 exchanges\* (K6PV transmissions are shown in **bold**):

#### K6PV in Running mode

**CQ FD K6PV DM03**

*K6PV W9ABC 6A WI*

**W9ABC K6PV R 2A LAX**

*K6PV W9ABC RR73*

#### K6PV in Search & Pounce mode

**CQ FD K1ABC FN42**

**K1ABC K6PV 2A LAX**

*K6PV K1ABC R 2B EMA*

**K1ABC K6PV RR73**

\*Source: page 3, [https://physics.princeton.edu/pulsar/k1jt/Quick\\_Start\\_WSJT-X\\_2.0.pdf](https://physics.princeton.edu/pulsar/k1jt/Quick_Start_WSJT-X_2.0.pdf)

## Hold onto your hats: FT4, a faster HF digital mode, has just been announced

Just when you thought a weak-signal HF digital mode couldn't be any faster than FT8, Joe Taylor K1JT and his crew have again pushed the state of the art in rapid QSOs.

FT4 is like FT8 on steroids and likely destined to be “the next big thing” in HF digital mode amateur radio. On the other hand, since it was designed with the contester in mind, its appeal might not be as widespread as FT8—only time will tell.

The table below highlights some of the features of FT4 compared with the very popular HF digital mode FT8, the biggest benefit being an FT4 QSO can be completed in about 30 seconds vs. typically 75 seconds for an FT8 contact. FT4 is reportedly comparable to RTTY speeds on the HF bands...and RTTY is a very popular contest mode.

FT4 vs. FT8			
Feature	Characteristic In Common	Comparison	
		FT8	FT4
HF digital mode software	Structured messages, error correction, optimized for minimal QSOs	Released	Experimental; Gen. release mid-July
Primary focus	Quick QSOs	DX and local	Contesting
Bandwidth of signal	Very narrow	50 Hz	90 Hz
Modulation	M-ary FSK	8 tones	4 tones
Duration of alternating Tx/Rx periods	Short	15 sec	6 sec
Actual time in Tx mode	Short	12.64 sec	4.48 sec
Approximate QSO time	Rapid	1.25 minutes	30 sec

The FT4 development team plans a series of on-air tests using experimental mode software to work out any remaining bugs prior to the general public release in July. And, this team is trying to elicit help from the ham radio community to speed that process.

One week after the April 22, 2019, announcement introducing FT4 the experimental software was released to those signed up to help conduct the on-air “beta” tests. By the time this **QRO** issue is published on-air testing of FT4 will just be starting and conclude in early June. Tests will be conducted on a different portion of each HF band from that used by FT8.

The beta-test software has a timeout function built in to prevent its use after June 7 (so it can't be used for 2019 Field Day on June 22-23, for example.) The FT4 general release for free public download is expected to become available in mid-July. Further details about this exciting new mode can be found at: [http://physics.princeton.edu/pulsar/k1jt/FT4\\_Protocol.pdf](http://physics.princeton.edu/pulsar/k1jt/FT4_Protocol.pdf). ■

—Written by Jerry Kendrick, NG6R

## Just a reminder about new K6PV DMR Usage Guidelines

K6PV is an open repeater. As with all repeaters—open or private—the repeater owner and trustee may set usage rules. We have just a few rules besides abiding by FCC regulations and common decency standards.



**K6PV analog or digital usage is on a first-come, first-served basis...use the mode you wish if the repeater frequency is clear.** Look for any signal bars in your radio's display as someone else might be on K6PV using the other mode. Any RF received on 447.120 MHz will show up as signal bars. Push your MONI (Monitor) button or turn the Squelch dial to open the squelch—you might hear an analog or DMR signal...or maybe just the other 447.120 MHz repeater in SoCal located on 8,000-foot Snow Peak above Banning.

**Please note these additional rules: Do not use DMR on K6PV during the following times when analog-only nets are operating...**



- ◆ **Monday evenings, 6:45-7:30 pm**, during weekly analog City of Rancho Palos Verdes PVAN nets
- ◆ **Tuesday evenings, 7:15-8:00 pm**, during analog PVARC Weekly Nets
- ◆ **When the Rancho Palos Verdes Emergency Communications Center is activated** for a disaster, scheduled training event, or scheduled public service event using analog FM such as the Palos Verdes Half Marathon.



**...and do not use Analog on K6PV during the following times when DMR nets are operating**

- ◆ **Tuesday evenings, 8:00-8:45 pm** during PVARC Weekly DMR Nets ■

### K6PV DMR Repeater Information

**Model:** Hytera RD982i-U1, dual-mode DMR/analog with network connectivity

**Purchased new** by the Palos Verdes Amateur Radio Club, February 2019

**Duplexer:** Celwave 633-6A-2 six-cavity UHF duplexer, donated to PVARC by Gary Lopes, WA6MEM

**K6PV DMR fully operational:** March 22, 2019

**Repeater site:** One of higher points on the Palos Verdes Peninsula

**DMR Network:** Brandmeister (<https://brandmeister.network/>)

**Radio settings (in a DMR transceiver you will want both Analog and Digital channels):**

**Analog FM:** 447.120 MHz, -5.0 MHz TX shift, Tone Squelch (a.k.a. Encode-Decode), PL 100.0 (same as always.) Bandwidth is 25 kHz (single channel), i.e., "Wide FM"

**Digital Mobile Radio (DMR):** 447.120 MHz RX, 442.120 MHz TX, Color Code 1

Time Slot 2: PVARC Talk Group (TG 31060)

Time Slot 2: Local (TG9)

(Note: Time Slot 1 will be configured at a later date)

Bandwidth is 12.5 kHz (two separate and simultaneous channel capability)

## We say again: PVARC currently supports three DMR radio models

<p><b>PVARC Supported DMR radio models</b></p> <p><b>Features:</b></p>	<p><b>TERA TR-7400</b></p> 	<p><b>Any-Tone 868UV 878UV</b></p> 	<p><b>TYT UV-380 —also MD-380* (UHF), now discontinued.</b></p> 	<p><b>Only for comparison</b></p> <p><b>Motorola XPR-7550</b></p> 
<p>Price (base unit), excluding sales tax</p>	<p>\$249</p>	<p>\$160-220, depending on accessories</p>	<p>\$95-130</p>	<p>\$1,100</p>
<p>Storage:</p>	<p>Channels: 1,024 Zones: 64 Talk Groups: 800 DMR database holds: 100,000 ham radio IDs</p>	<p>Channels: 4,000 Zones: 250 Talk Groups: 10,000 DMR database holds: 150,000 ham radio IDs</p>	<p>Channels: 3,000/1,000* Zones: 250 Talk Groups: N/A DMR database holds: Not stated</p>	<p>Channels: 1,000 Zones: 64 Talk Groups: In Channels DMR database holds: 1,000 ham radio IDs</p>
<p>Display type</p>	<p>OLED (easy to read in bright daylight)</p>	<p>TFT LCD</p>	<p>LCD</p>	<p>“Color display” but not otherwise specified</p>
<p>Frequencies covered</p>	<p>403-470 MHz</p>	<p>136-174 MHz and 400-480 MHz</p>	<p>136-174 MHz and 400-480 MHz</p>	<p>403-527 MHz</p>
<p>Transmit power levels</p>	<p>4.0/1.0 W</p>	<p>6.0/4.0/2.5/1.0 W</p>	<p>5.0/1.0 W</p>	<p>4.0/1.0 W</p>
<p>Frequency stability</p>	<p>±1.0 ppm</p>	<p>±2.5 ppm</p>	<p>±1.0 ppm</p>	<p>±0.5 ppm</p>
<p>Weather protection</p> <p>Ruggedness: Military Standard tests claimed for vibration, shock, dust, water, temperature, humidity, etc.</p>	<p>IP67 waterproof</p> <p>MIL-STD 810 C/D/E/F/G</p>	<p>None</p> <p>(None stated)</p>	<p>None</p> <p>(None stated)</p>	<p>IP68 waterproof</p> <p>MIL-STD 810 C/D/E/F/G</p>
<p>Battery capacity (Li-ion)</p>	<p>2200 mAh</p>	<p>3100 mAh</p>	<p>2000 mAh</p>	<p>2,250 or 3,000 mAh</p>
<p>Rated audio output</p>	<p>1.5 Watts</p>	<p>1.0 Watt</p>	<p>1.0 Watt</p>	<p>0.5 Watt</p>
<p>Warranty</p>	<p>2 years</p>	<p>1 year</p>	<p>1 year</p>	<p>2 years</p>
<p>Reported quality of customer technical support</p>	<p>Excellent</p>	<p>Varies...Excellent from BridgeCom, none from Amazon.com</p>	<p>Depends on seller</p>	<p>Excellent if bought through authorized dealer</p>
<p>Other features</p>		<p>Optional addition: 500 hours of voice recording or Bluetooth audio</p>		<p>Built-in WiFi, Bluetooth audio and data; optional IP Site connect</p>

## Can't reach the K6PV repeater from your location? Some of these ideas might work for you

By Diana Feinberg, AI6DF  
QRO Editor

Our club repeater has a great location high atop the Palos Verdes Peninsula with an ironic aspect: K6PV often has better signal paths away from the Palos Verdes Peninsula than on it or nearby.

Some PVARC members are impaired by either HOA antenna restrictions, backyard hillsides, ridgelines, buildings, or other shielding that limit using K6PV and other repeaters around Los Angeles/Orange Counties. Our K6PV repeater has a great signal into the Los Angeles Basin, Orange County, and coastal areas of Ventura, Santa Barbara, and San Diego Counties...even to parts of San Bernardino County. But nearby exceptions due to shielding are the north side of Palos Verdes Estates, some areas on the Peninsula's ocean side, Torrance's lower Hollywood Riviera neighborhood, many streets in RPV's Miraleste section, and parts of San Pedro.

So what to do if K6PV or another repeater can't be reached? Here are some recommendations...plus on Page 13 a truly "off the wall" technique: signal bouncing off "denser" mountains around Los Angeles (but only with analog FM and at least 20 watts of transmit power).

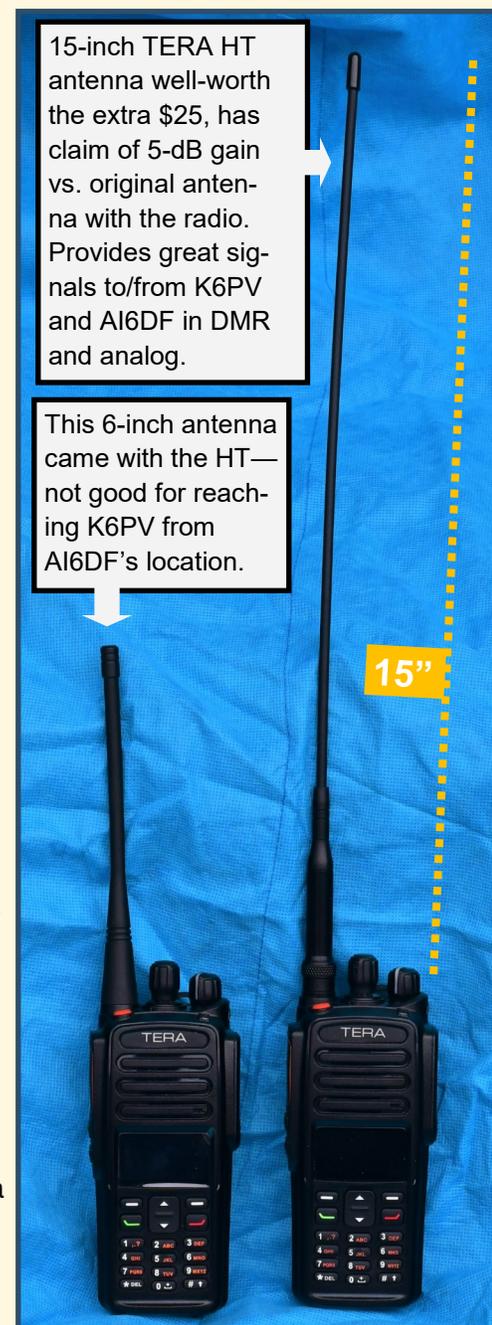
First, try improving your vertical antenna, especially for emergency communication. If you have just a 5-watt handheld radio get a longer HT antenna with some gain (see photo, right, with TERA TR-7400 HT and TERA's optional 15" antenna.) Or use a short jumper coax to connect your HT into a mobile antenna, whether indoors or on your vehicle.

Better yet is mounting an external vertical antenna atop your home, even if at roof level. This has worked very well for many hams, including our members deep in the lower Hesse Park area. But a building-mounted antenna isn't portable in emergency situations.

If "better" vertical antennas still do not suffice consider directional (i.e., beam) antennas. Because vertical antennas radiate in 360-degrees just a fraction of your transmit power goes toward the repeater of interest—and some remaining power can cause multi-path distortion by bouncing off nearby ridgelines, hills, or buildings. A directional VHF/UHF antenna typically sends 70-90% of transmit power in the direction pointed. I have used the very portable Elk log-periodic antennas for 2-meters, 220, and 440 to aim at specific repeaters, plus bouncing signals off mountains around L.A. Our fellow members Chris, W6YBW, and Hugo, KM6DQU, have also used these antennas for satellite and hilltop contacts.

As shown on the next page Elk antennas pack into small bundles for storage/transport and assemble/disassemble in a few minutes. Rotating into vertical polarization for FM signals requires a non-metallic mast within a couple of feet below the lowest elements. I use inexpensive PVC pipe with rotating PVC couplings that allow tilting the beam at an angle to rise above nearby obstructions.

*Continued on next page ►*



15-inch TERA HT antenna well-worth the extra \$25, has claim of 5-dB gain vs. original antenna with the radio. Provides great signals to/from K6PV and AI6DF in DMR and analog.

This 6-inch antenna came with the HT—not good for reaching K6PV from AI6DF's location.

15"

# Can't reach the K6PV repeater from your location? Some of these ideas might work for you

**Right:** Compact Elk log-periodic antennas for 2m/440 (top) and 440-only have just a 24" mast.

**Center right:** The Elk antennas fit onto 1" PVC pipe and may be angled or turned to achieve directivity. Tape to hold in place.

**Bottom right:** At Los Angeles Marathon finish line an Elk 440 is angled slightly upward and directly pointed to a repeater above Hollywood, clearing near-by buildings.



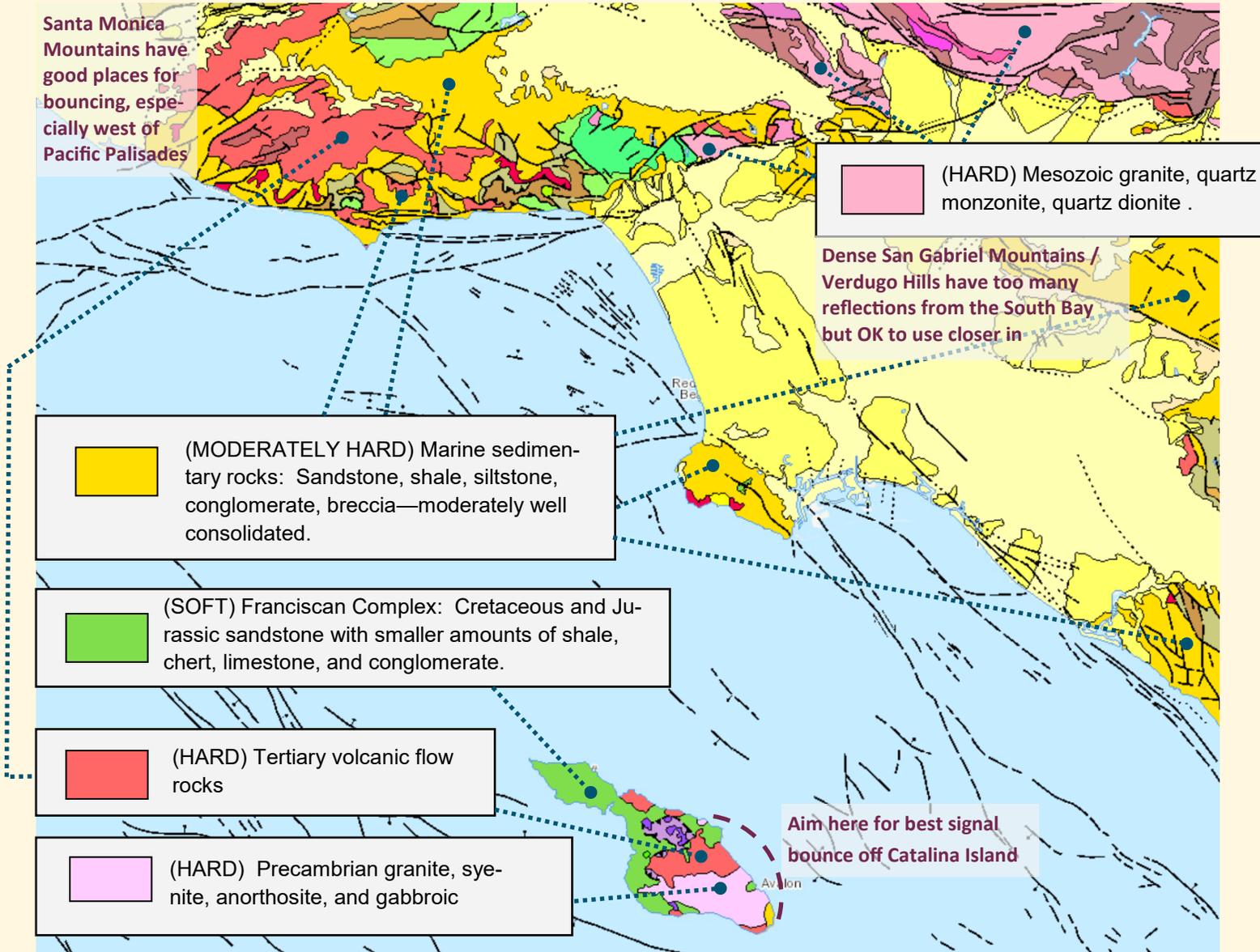
AI6DF's vehicle magnetic mount on steel pizza pan placed next to a bedroom window with 36-inch Comet SBB-224 triband mobile antenna. Works well into K6PV and other repeaters. Can take mobile transceiver higher power levels—but unattractive indoor décor for sure.



ALL PHOTOS:  
DIANA FEINBERG,  
AI6DF



# Some hams bounce signals off the Moon; here in L.A. certain mountains provide 2-meter/220/440 MHz analog signal bounce



**Map credit and data source:** California Department of Conservation, California Geologic Survey: Geologic Map of California (2010). <http://maps.conservation.ca.gov/cgs/gmcl/>



If neither a better vertical antenna or directed beam work try bouncing 2-meter/220/440 amateur signals off certain “geologically-hard” (dense) mountains to the desired repeater or simplex path. During World War II many military radars operated in the 209 MHz range. But radio bouncing is mostly only feasible with analog signals as digital ones are easily disrupted by multipath distortion and “flutter” from reflecting off multiple surfaces in urban areas. You will need 20 watts or more of transmit power, a very good directional antenna, and hopefully no fog or rain.

From Palos Verdes or San Pedro with a view to Catalina Island aim your beam to areas near Avalon where dense underlying rock enables bounce-back to the mainland. The Santa Monica Mountains also provide good bouncing with a clear path (left photo). Lastly, the granite/quartz-rich San Gabriel Mountains work great if closer-by but flutter with South Bay signals. Enjoy...and may all your signals reach their destinations. ■



Scene from the Purcell Room at a recent HF Enthusiast Group meeting.

PHOTO:  
DIANA FEINBERG,  
AI6DF

## Next HF Enthusiasts Group meeting at PV Library is Saturday, May 11

Whether you have an item to show or discuss...or just want to observe...all are welcome at the PVARC's HF Enthusiasts Group monthly meetings on 2nd Saturdays. The Group next meets on May 11 from 10:00 am to Noon at the Palos Verdes Library's main branch (701 Silver Spur Rd / 650 Deep Valley Dr.) in the Purcell Room in the corner behind the Reference Desk. There is plenty of free parking on the Library roof, in a parking structure on Deep Valley Drive, and a small inside parking area accessed from Silver Spur Rd. ■

## It's still renewal time for PVARC membership...also consider being an ARRL member

PVARC member dues are collected early each year...so please send your renewal if you haven't. You may also pay at our monthly meetings where we have renewal forms. Additionally, we have set up a PayPal link to renew but it doesn't have our renewal form attached. To pay by PayPal (\$20 individual membership, \$25 for family membership) log onto PayPal and enter as the recipient: [PVARC90274@gmail.com](mailto:PVARC90274@gmail.com) .

Additionally please consider joining the American Radio Relay League (ARRL) if you aren't a member. The ARRL is the only national organization representing amateur radio and has another significance for the PVARC: We receive benefits from being an ARRL-affiliated club. But being an ARRL-affiliated club requires at least 51% of club members also be ARRL members. Annual ARRL membership costs \$49 and includes the monthly QST magazine as well as access to numerous web-based materials. Visit: [www.arrl.org/](http://www.arrl.org/) then click on the "Join/Renew" tab. ■

## PVARC Club News

### PVARC badges await pickup at May meeting...or another time

Gary Lopes, WA6MEM, has the following new PVARC badges ready for distribution at our May 2, 2019, monthly meeting at Hesse Park or by special arrangement.

- AJ6JG
- K6DKC
- K6MU
- KC6NNV
- KI6YMD
- KJ6RVU
- KM6YGQ
- NJ6I
- W6BMD
- WJ1P / DU1X

To make special arrangements with Gary contact him at: [gary@wa6mem.com](mailto:gary@wa6mem.com). ■

### Embroidered PVARC patches available at monthly meetings

PVARC club patches are available at our monthly meetings for \$4 each. You may sew these onto any cap, jacket, shirt, or bag.



The four illustrations in the patch center are emblems of the Palos Verdes Peninsula's four cities (clockwise from top left: Palos Verdes Estates, Rolling Hills Estates, Rancho Palos Verdes and Rolling Hills.) ■

## Palos Verdes Amateur Radio Club

An American Radio Relay League Affiliated Club

### Board of Directors:

President	Diana Feinberg, AI6DF
Vice President	Ray Day, N6HE
Treasurer	Peter Landon, KE6JPM
Secretary	Ron Wagner, AC6RW
Directors	Clay Davis, AB9A Gary Lopes, WA6MEM Bob Sylvest, AB6SY
Past Vice President	

### Appointed Offices:

QRO Editor	Diana Feinberg, AI6DF
Webmaster	Kel Vanderlip, W6KCV
Club Librarian	Bryant Winchell, W2RGG
K6PV QSL Manager	Jeff Wolf, K6JW
K6PV Repeater Trustee	Mel Hughes, K6SY
LAACARC Delegate	Jeff Wolf, K6JW
VE Coordinator	Dave Scholler, KG6BPH
VE ARRL Liaison	Jerry Shaw, KI6RRD
Net Control Operators	Malin Dollinger, KO6MD; Dale Hanks, N6NNW; Bob Sylvest, AB6SY; Ron Wagner, AC6RW; Dan Yang, K6DPY

### Contacts:

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Webmaster: 310-742-6123, [kelvinvanderlip@gmail.com](mailto:kelvinvanderlip@gmail.com)

Email us: [k6pv@arrl.net](mailto:k6pv@arrl.net)

Website: [www.k6pv.org](http://www.k6pv.org)

### Mailing Address:

Palos Verdes Amateur Radio Club  
PO Box 2316  
Palos Verdes Peninsula, CA 90274-8316

### Monthly Meetings:

1<sup>st</sup> Thursday (except July and December in 2019) at 7:30 pm at Fred Hesse Park, 29301 Hawthorne Blvd., Rancho Palos Verdes, CA. Visitors always welcome.

### Repeaters (Open, though often listed as "Closed"):

Club: K6PV, 447.120 MHz (-), PL 100.0, CTCSS  
"PV-West": K6IUM, 449.980 MHz (-), PL 173.8, CTCSS

### To order a Club badge:

Gary Lopes, WA6MEM, [gary@wa6mem.com](mailto:gary@wa6mem.com)

### To order a Club jacket or patch:

Dave Scholler, KG6BPH, 310-373-8166

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Front page photo — Pt. Vicente Lighthouse just before sunset on April 5, 2019. PHOTO: DIANA FEINBERG, AI6DF

## PVARC Club News

### PVARC upcoming dates in 2019

- ◆ **PVARC monthly meeting at Hesse Park, McTaggart Hall**  
1st Thursday each month, 7:30-9:30 pm, except in August and December. 6:30-7:25 pm, "What's Next?" group for newer hams.  
  
In 2019 only: No monthly meeting July 4 due to Independence Day; special meeting August 1.
- ◆ **HF Enthusiasts Group meetings at Palos Verdes Library, Peninsula Center main branch**  
2nd Saturday every month, 10 am to Noon in the Purcell Room.
- ◆ **Walt Ordway, K1DFO, Technician and General amateur radio license classes at Hesse Park**  
Saturdays, May 4 and 11, 2019; license exam session, May 18.  
Saturdays, November 2 and 9, 2019; license exam, November 16.
- ◆ **Public service events in 2019:**  
Ridgecrest 5K at Promenade Mall, **May 5**;  
Hills Are Alive 10K/5K Rolling Hills Estates, **August 10**;  
Conquer the Bridge run/walk at Los Angeles Harbor across Vincent Thomas Bridge, **Labor Day, September 2**;  
Palos Verdes Half Marathon-10K-5K, **November 16**.
- ◆ **ARRL 2019 Field Day**, Soleado Elementary School, Rancho Palos Verdes, June 22-23.
- ◆ **2019 International Lighthouse & Lightship Weekend**, Pt. Vicente Lighthouse, August 16-18.
- ◆ **PVARC 2019 Holiday Dinner:** Dec. 12, Los Verdes Golf Course, Rancho Palos Verdes

#### Non-PVARC Events of Note:

- ◆ **Dayton Hamvention**, May 17-19, Xenia, OH, at Greene County Fairgrounds.
- ◆ **Sea-Pac** (ARRL Northwest Division Convention), May 31-June 2, Seaside, OR.
- ◆ **PACIFICON** (ARRL Pacific Division Convention) October 18-20, San Ramon, CA ■

### WELCOME NEW MEMBERS OF THE PALOS VERDES AMATEUR RADIO CLUB IN 2018-2019

Thomas Wynne, KM6QVW  
 Frank Attenello, KM6QVU  
 Debra Shrader, KM6QVX  
 Daniel Shrader, KM6QXC  
 Baldomero Fernandez, KM6QVV  
 Brian Keen, KM6QWC  
 Emanuele Rodrigues-Berardini, KM6QVZ  
 Neal Pollack, N6YFM  
 Daniella Ward, KM6TRC  
 Talbot Knighton, KM6TDF  
 Dylan Brown, KM6TDI  
 Robert Cullinan, NJ6I  
 Ellen Tessitore, N6XJM  
 Michael Vulpilat, KJ6RVU  
 Brian Clebowicz, K6BRN  
 Warren Arata, KM6YGR  
 Chris Sundlee, N6CGS  
 Brad Rachielles, KC6NNV  
 Georgiann Keller, KM6GYM  
 Annalise Little, KM6YGS  
 Tim Couture, KM6QWA  
 Frank Brown, KM6YGG  
 Charlie Hansen, AJ6HZ  
 Diana DiDomenico, KM6IQN  
 William McClure, KN6ACQ  
 Rick Shigio, K6RTS  
 David Calloway, KN6ACP  
 Jon Kuroyama, K6LDQ

## ARRL News

### ARRL and FCC Sign Memorandum to Implement New Volunteer Monitor Program

04/16/2019

ARRL and the FCC have signed a *Memorandum of Understanding (MOU)* that paves the way to implement the new and enhanced Volunteer Monitor program. The memorandum establishes the Volunteer Monitors as a replacement for the Official Observers (OO) program. Current OOs have been encouraged to participate in the new program.

“We are excited by the opportunity to codify our partnership with the FCC and to work together to achieve our mutual interests of protecting the integrity of our Amateur Radio bands,” said ARRL President Rick Roderick, K5UR. “This *Memorandum of Understanding* will serve as the foundation for a new level of partnership on this very important issue.”

ARRL has contracted with retired FCC special counsel and former Atlantic Division Vice Director Riley Hollingsworth, K4ZDH, to oversee the ARRL’s role in the development and implementation of the Volunteer Monitor program.

Approved by the ARRL Board of Directors at its July 2018 meeting, the new Volunteer Monitor program is a formal agreement between the FCC and ARRL in which volunteers trained and vetted by the ARRL will monitor the airwaves and collect evidence that can be used both to correct misconduct or recognize exemplary on-air operation. Cases of flagrant violations will be referred to the FCC by the ARRL for action in accordance with FCC guidelines.

The intent of this program is to re-energize enforcement efforts in the Amateur Radio bands. It was proposed by the FCC in the wake of several FCC regional office closures and a reduction in field staff.

“Under this program, the FCC will give enforcement priority to cases developed by the Volunteer Monitor program, without the delay of ARRL having to refer cases through the FCC online complaint process,” Hollingsworth said.

Hollingsworth has identified three phases to the program: Development, Solicitation and Training, and Implementation.

- The Development phase will include drafting a mission statement, clearly defining the ARRL’s and FCC’s requirements and needs as part of the program, writing a job description for volunteer monitors, and developing a training manual for volunteers.
- The Solicitation and Training phase will involve identifying the geographic locations where volunteer monitors will be most needed, soliciting applications and guidance from Section Managers in reviewing applicants. (Those currently volunteering as Official Observers are invited to apply for appointment as Volunteer Monitors.)

- The Implementation phase will involve having the volunteers provide field reports to ARRL, with staff offering guidance to volunteers to ensure that the information collected meets requirements for FCC enforcement action.

Hollingsworth has committed to FCC and ARRL officials to ensure the adequacy of training for the new positions, to review the quality and utility of Volunteer Monitor submissions to the FCC for enforcement actions, and to advocate for rapid disposition of cases appropriately submitted to the FCC.

ARRL officials estimate that within 6 to 9 months the first Volunteer Monitors will be in place and ready to begin their duties. ■

### IARU Argues for Protection from Wireless Power Transfer Spurious Emissions

04/24/2019

The International Amateur Radio Union (IARU) was represented April 8 – 10, when [CEPT Committee SE24 – Short Range Devices](#) met in Ankara, Turkey, to undertake further work concerning wireless power transfer/transmission (WPT). SE24 is considering WPT for electric vehicles (WPT-EV) and also for generic applications.

IARU already provided extensive input on the potential impact on radio communications resulting from spurious emissions from WPT devices, as detailed in [CEPT ECC Report 289](#), published in January. According to that report, given the planned density of WPT systems for electric vehicles operating in the 79 – 90 kHz range, it is calculated that there will be a widespread and serious impact for the Amateur Service in the vicinity of WPT systems, should spurious emissions, measured at 10 meters, be at the current limits of [ERC Recommendation 74-01](#).

At the Ankara meeting, IARU and other interested parties provided further input. SE24 will meet again in early July to focus on WPT issues.

Also at Ankara, IARU attended the Short-Range Devices Maintenance Group meeting (SRD/MG), where it was noted that further work was needed in SE24 before spurious emission limits for WPT devices could be addressed in a regulatory sense. IARU was represented in Ankara by IARU Region 1 President Don Beattie, G3BJ, who is spearheading the IARU’s work in this area.

The issue of WPT-EV is World Radiocommunication Conference 2019 (WRC-19) Agenda Item 9.1.6, for which studies are still under way. Broadcasters, land mobile services, and others have also expressed concern about spurious WPT-EV emissions. Further work remains regarding generic WPT systems for such applications as cell phone charging, power tools, and household appliances. ■

# PVARC Calendar

# May 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2 PVARC monthly meeting, Hesse Park. 6:30 pm, "What's Next?" and DMR Basics; 7:30 pm main meeting	3	4 K1DFO's Tech & General license classes at Hesse Park, 9:30 am—5:00 pm
5 Ridgecrest I.S. 5K run/walk around Promenade Mall area (PVARC public service event)	6	7 PVARC weekly net on K6PV repeater & cross-band, 7:30 pm (analog); 8:00 pm (DMR only)	8	9	10	11 PVARC HF Enthusiasts Meeting, 10 am-Noon, Palos Verdes Library Peninsula Center  K1DFO classes at Hesse Park
12	13	14 PVARC weekly net on K6PV repeater & cross-band, 7:30 pm (analog); 8:00 pm (DMR only)	15	16	17 Dayton Hamvention, Xenia OH	18 PVARC Field Day planning meeting at home of N6KN, 10 am  License tests at Hesse Park, 10 am
19 Dayton Hamvention, Xenia OH	20	21 PVARC weekly net on K6PV repeater & cross-band, 7:30 pm (analog); 8:00 pm (DMR only)	22	23	24	25 W6TRW Swap Meet, 7:00-11:30 am at Northrop Grumman, North Redondo Beach.
26	27 Memorial Day	28 PVARC weekly net on K6PV repeater & cross-band, 7:30 pm (analog); 8:00 pm (DMR only)	29	30	31	

Tell your friends and family about our upcoming ham license classes at Hesse Park

## Two Free Amateur Radio Courses

FCC **“Technician”** course (entry level)

FCC **“General”** course (2<sup>nd</sup> level)

Each course is 2 sessions

The sessions will be on 4 May and 11 May 2019

**Technician** 9:30 AM to 1:30 PM both Saturdays (bring your lunch)

**General** 1:30 PM to 5:00 PM both Saturdays

The FCC tests will be 10:00 AM to noon on 18 May 2019

At the start of the 4 May Technician course, the Palos Verdes Amateur Radio Club will give a 30-minute presentation on how to get further involved with amateur radio.

The class location is at Fred Hesse Community Park,  
29301 Hawthorne Blvd., Rancho Palos Verdes.

**Confirm your attendance to Walt, K1DFO at [waltordway@juno.com](mailto:waltordway@juno.com)**

There is no fee for either course.

Taking the FCC test is \$15.

### Optional Material (sold at cost)

Gordon West books with all the FCC test questions,

\$26 for the Technician and \$26 for the General

Paper copy of Walt's Power Point charts,

\$22 for the Technician and \$22 for the General -

For courses sponsored by the Palos Verdes Amateur Radio Club, students thru grade 12 who pass their examination at a PVARC VE test session will, upon application to the Club, be eligible for reimbursement up to a maximum of \$50 to cover the cost of materials and the examination fee.

Everyone who obtains their first ham radio license through a PVARC VE test session, regardless of age, will receive a free membership in the Palos Verdes Amateur Radio Club for the remainder of the current calendar year.



Palos Verdes Amateur Radio Club
P.O. Box 2316
Palos Verdes Peninsula, CA 90274
www.n6rpv.net/pvarc or k6pv.org

NEW MEMBER & MEMBERSHIP RENEWAL FORM

NEW: \_\_\_\_\_ or RENEWAL: \_\_\_\_\_ MEMBERSHIP DATE: \_\_\_\_\_

Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_ Spouse: \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: Home \_\_\_\_\_ Work \_\_\_\_\_ Cell \_\_\_\_\_

Email address: \_\_\_\_\_

(Unless otherwise noted emails will be sent to the applying member only)

License Call: \_\_\_\_\_ License Class: \_\_\_\_\_ ARRL Member? \_\_\_\_\_ Birth Mo./Day: \_\_\_\_\_

Other amateur radio groups you belong to: \_\_\_\_\_

Additional Household and/or Family Members (if Applicable):

Name \_\_\_\_\_ Call \_\_\_\_\_ Class \_\_\_\_\_ ARRL \_\_\_\_\_ Birth Mo./Day: \_\_\_\_\_

Name \_\_\_\_\_ Call \_\_\_\_\_ Class \_\_\_\_\_ ARRL \_\_\_\_\_ Birth Mo./Day: \_\_\_\_\_

Name \_\_\_\_\_ Call \_\_\_\_\_ Class \_\_\_\_\_ ARRL \_\_\_\_\_ Birth Mo./Day: \_\_\_\_\_

Individual membership (\$20.00) \$ \_\_\_\_\_

Household and/or Family membership (\$25.00) \$ \_\_\_\_\_

Additional donation to support PVARC activities \$ \_\_\_\_\_

Cash: \_\_\_\_\_ or Check #: \_\_\_\_\_ Date \_\_\_\_\_ TOTAL \$ \_\_\_\_\_

Please make checks payable to: Palos Verdes Amateur Radio Club; Dues based on January 1st to December 31st year.

All New and Renewal Member applications must be signed below.

I am applying for a new or renewal membership in the Palos Verdes Amateur Radio Club and understand that by accepting membership I agree to abide by the Club's constitution and by-laws (available on-line at: http://www.n6rpv.net/pvarc/constitution.htm or upon request.)

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Family Member Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Family Member Signature: \_\_\_\_\_ Date: \_\_\_\_\_