



# Smoke Signals

Newsletter of Fullerton Radio Club

October 2024

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## President's Column

### When all else fails?

The recent disasters in North Carolina and Florida have me thinking about preparedness.

A few weeks ago, my entire area of Fullerton lost power for about two hours. Two hours without electricity is only a minor inconvenience, but during that time I made some interesting observations. My first instinct was to visit the SCE website to report the outage and check the extent of the outage. I had no internet since my router is powered from the AC line (future project). I also had (almost) no phone service, since due to very limited cell signal on my street, I normally depend on so-called WiFi calling, which routes my AT&T cellular service over my home WiFi. I was able to walk to the end of the street and get a cell signal. If the outage had exceeded 8 hours or so, cell service would likely have ceased entirely.

In some "grid-down" situation (solar flare, earthquake, infrastructure attack) (1) How long could you be self-sustaining? (2) If communications for your neighborhood, city, or region were disrupted for an extended period of time, would your ham radio equipment be of any value to you and your neighbors? If yes, how would you let your neighbors know? What kind of messages would you handle. Who would you talk to?

## The History of the Hughes/ Raytheon Repeaters

By Joe Moell K0OV

### Part 1, The Early Years

FRC holds a weekly net on the K6QEH repeaters at the Raytheon facility in west Fullerton. This repeater has a long history, having gotten its start over a half century ago as the first southern California repeater to be put on the air by an aerospace industry radio club.

Two-meter FM activity blossomed in the early 1970s as Regency and other manufacturers began to offer mobile transceivers. However, there were very few southern California repeaters open to the general ham population. The repeater that I monitored most was W6FNO on Johnstone Peak. In those days before cell phones, hams often were first to report traffic accidents and other emergencies using this repeater. For that reason, W6FNO had a 30-second timeout timer to discourage long QSOs. The callsign was sent in CW at about 40 WPM at the beginning of every transmission, so our parakeet quickly learned to imitate it.

Hams wanted repeaters where they could ragchew on their commutes, so local clubs began to put them up. Frequency selection tended to be haphazard. Inputs and outputs were selected based on whatever clear channels could be found and were spaced to minimize receiver desensitization. It soon became clear that coordination and standardization was needed.

In September 1972, a conference was arranged by John Griggs W6KW, the ARRL Southwestern Division director. All southern California clubs and individuals operating a two-meter repeater or wanting to build one were invited. At the end of that conference, there was a band plan for 26 repeater pairs with 600 kHz spacing between 146 and 148 MHz. Thirty-six present and future repeaters were coordinated to these pairs. Among

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Save the date.

**HAPPY**

**HOLIDAYS**

Fullerton Radio Club annual Holiday Dinner.  
Wednesday December 18 5:30 pm at Fullerton  
Sizzler

**Fullerton Radio Club**  
P.O. Box 545, Fullerton, CA 92836

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## FRC October Board Meeting Minutes

The monthly FRC Board Meeting was called to order by President Bob Houghton AD6QF at 5:32 PM on Wednesday, October 2, 2024. Additional Board members present included Robert Gimbel KG6WTQ and Larry McDavid W6FUB.

Board members absent: Gene Thorpe KB6CMO, Walter Clark, Bart Pulverman WB6WUW

The September Board Meeting minutes were reviewed and approved without amendment.

**Treasurer's Report**

- Bank balance: \$6257.51 as of October 2
- New deposits: \$.02 interest
- New expenditures: None
- New members: None
- Bob's records show 35 memberships 2024 paid and 1 life member as of 10/2/24.

**Old Business**

None

**New Business**

Saturday 9/14. 2nd Saturday Radio in the Park at Hillcrest  
Should FRC have an EMCOMM liaison? (Robert? Gene?)  
FRC Election planning / nominations

Submitted by President Bob Houghton

the open repeaters coordinated that day were W6FNO (146.22/82) on Johnstone Peak, K6SYU (146.19/79) for Anaheim Amateur Radio Association, WA6TWF for the Catalina Amateur Radio Association on the island, and K6QEH for the Hughes Fullerton Employees Association Amateur Radio Club. Attendees at that conference also formed the Southern California Repeater Association (SCRA) to continue coordination of repeaters and simplex frequencies.

With an assigned frequency pair, the Hughes ham club set to work building a repeater using surplus Motorola tube-type mobile transmitter and receiver units plus a beefy AC power supply. Supervising the project were Bob Bruemmer WB6CGG and Bruce Snyder W6EOV. The photo (right) from



Clare Carlson flips switch putting HFEA Radio Club's new repeater into action. With him are Bill Dean, rear, and John Schoeneman. Members built repeater in their spare time.

HughesNews shows the repeater being placed into service by the Fullerton site executive, Clare Carlson WA6FMD.

This first repeater had separate receive and transmit antennas mounted on the side of the towers supporting the big Collins HF log periodic antenna that was being used for MARS phone patches to Marines in Viet Nam. These vertical dipole antennas were mounted one above the other and separated as far as practical on the towers to minimize receiver desense, since there was no duplexer.

There was no "automatic control" of repeaters in that era. FCC rules required a control operator to be monitoring whenever the repeater was on the air and the repeater had to be capable of being turned off immediately if improper operation was observed. Not wanting to get their employer in federal trouble, the Hughes hams took this much more seriously than some other repeater owners. A dedicated landline was connected to the repeater control circuits. When called, it answered and listened for single audio tones of different frequencies that accomplished various control functions. An aluminum box that generated the tones was passed around among the club members who had control operator duty. A clock timer turned the repeater off every evening at 2300 hours and back on at 0600 hours, so control ops didn't have to monitor all night.

At first, the repeater used the club's callsign, K6QEH. Then FCC began a short-lived experiment of demanding separate licenses and distinctive callsigns for all repeater stations. In 1974, the club applied for a repeater license and was issued WR6ACQ, which was used until FCC gave up the mandatory licensing experiment and the repeater became K6QEH/R. Some repeaters in southern California are still using their WR6 callsigns from that era.

There were over a hundred hams in the club back then, so there was plenty of repeater activity during

commute times. But its range left much to be desired. The old tube receiver wasn't very sensitive and the tower-mounted dipoles had no gain. The downslope on Bastanchury Road east of State College was called "the big attenuator" because when users drove down to Associated Road, even high-power mobiles would drop out. As hand-held transceivers such as the Tempo S1 and IC-2AT with "rubber duckie" antennas became popular, the shortcomings of the repeater became even more evident.



In 1977, the club decided that it was time for something more worthy of a first-rate aerospace company, so construction of a custom solid-state repeater began. The transmitter and receiver were modified kits by VHF Engineering Company. Everything else was built from scratch, including nine audio and control circuit cards with TTL logic. Many functions could be remotely commanded with DTMF "Touchtones." For maximum receive sensitivity, a RADAR Receiver Department engineer designed and built a GaAsFET preamplifier. Silver-plated duplexer cavities were fabricated in the Hughes machine shop and a high-gain antenna was put up on a tall mast. A backup battery was included to keep the repeater going if power failed. After many noontime and evening hours of effort, it was ready to go on the air.

Coverage of the new repeater was so much better that new problems were exposed. Two other repeaters, one in the San Fernando Valley and one in Riverside, had been coordinated and were on the air as a result of that first SCRA meeting in 1972. Both were "armchair copy" in some parts of the K6QEH expanded coverage area. WR6ACQ users often brought up these machines inadvertently because subaudible tone access had not come into widespread use. Discussion began about finding another frequency pair for the repeater, but that would not be easy. Even though 15 KHz channel splitting had more than doubled the number of two-



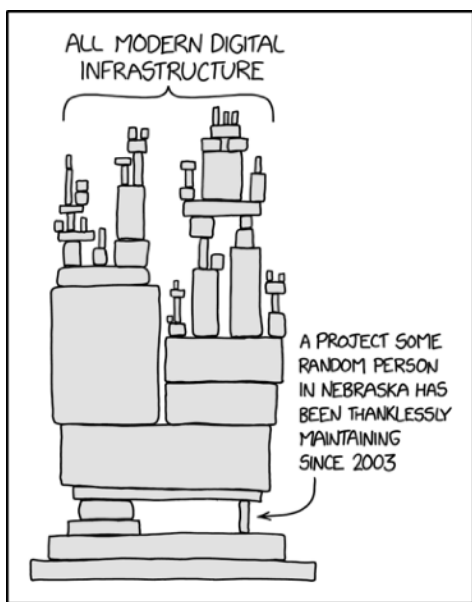
meter repeater pairs, and new pairs had been added below 145.5 MHz, the number of southern California repeaters on the air had also multiplied.

About that time, a 146.37/97 MHz repeater began operating on Santiago Peak. Its coverage was so great that there were interference complaints from hams in Mexico. In response, the Two Meter Area Spectrum Management Association (TASMA, which is the successor to SCRA) mandated that this repeater had to shut down. In the future, there would be no mountaintop repeaters permitted on that pair to avoid causing QRM south of the border. The Hughes ham club took advantage of this decree and shifted WR6ACQ to 146.37/97 in the fall of 1979.

In addition to Tijuana, the WR6ACQ repeater initially shared 146.37/97 with repeaters in Vista, Santa Clarita and Oxnard. Repeaters on this pair in Trona and Barstow have come on the air since. Nevertheless, interference has been minimal compared to the original channel because of their greater distance and intervening hills.

Also helpful in reducing co-channel interference was the TASMA mandate that all repeaters on shared frequencies shall use subaudible tone access. When this feature was added to WR6ACQ, many of the users' transceivers didn't have provisions for it. Communications Specialists in Orange sold a lot of "tone boards" for retrofit into these radios. A club project was modifying IC-2AT handi-talkies to add miniature tone boards and dipswitches for subaudible frequency selection, as shown in the photo.

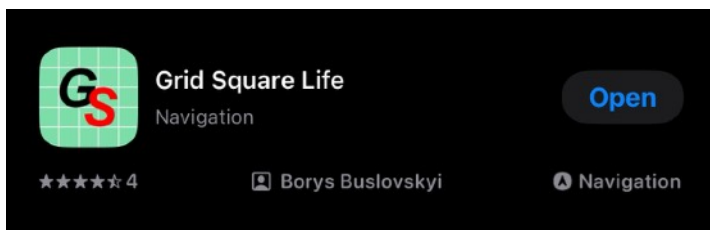
Next time: The autopatch and a hilltop receiver



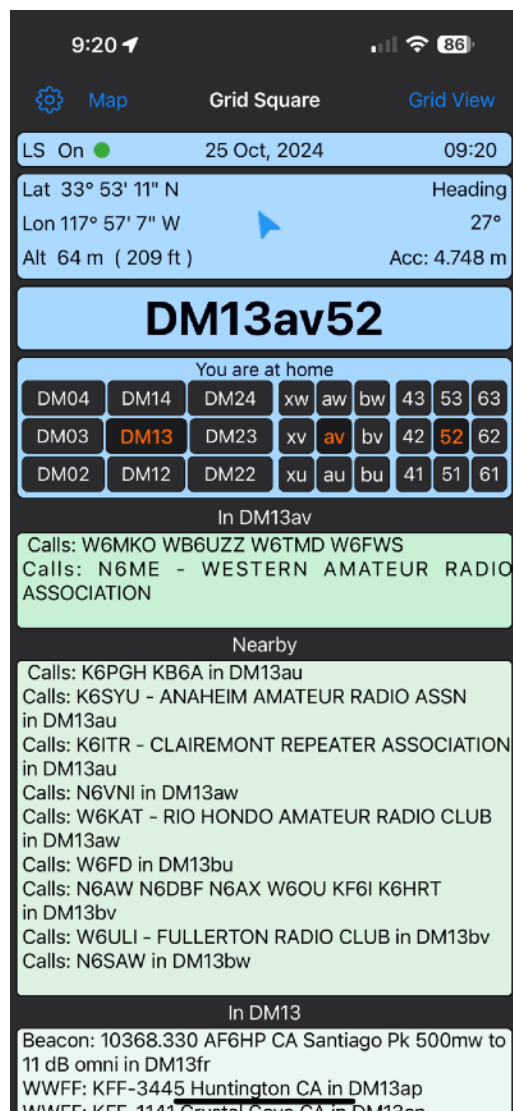
Smoke Signals

## Apps for hams

Our TAG topic for this month was "cell phone applications." I realized that there are quite a few ham radio-related apps that I use regularly. One that I find handy is called Grid Square Life.



There are lots of ham radio exchanges that involve reporting your grid square (Maidenhead grid). Here is an app that uses your phone's GPS to show you your current grid square location, as well as some other useful information. It is called Grid Square Life and you can buy it for \$3.99 in the iOS App Store. If any of you use a similar app on Android, please let me know.





## TAG Activity Report for October 2024



This is the first group photo where it's nighttime. Notice the autumn-like clothes. Left to right: Dave Rugh, Bill Webb, Harish Kumar, John Mock, Ray Rounds, Larry McDavid, Dick Bremmer and the host Walter Clark.

The theme for the evening is cellphone apps, not anything sophisticated such as what the "cell" in cellphone means, the distance between towers, polarization, power or frequencies.

**Ray Rounds** had the best history for the evening with examples. He even brought a pager and flip phone. There was much discussion on projects that use pagers for ham radio experiments. The picture here is the first cellphone with an ASCII keyboard.



Motorola MOTO (W755) Flip Phone  
- Released 2008  
- 1.3MP Camera  
- 1.9" display  
- numeric keyboard

LG enV2  
- Released March 2008  
- Price: \$129  
- 2.4" display  
- Keyboard for messaging

Motorola Droid X  
- Released May 2010  
- 8MP Camera  
- 4.3" display  
- On screen keyboard



**Harish Kumar** brought an example of HamSphere, which is an SDR simulation. HamSphere is a highly realistic SDR simulation. It allows new hams (or non-hams) to practice QSOs with each other over the internet. The exchanges do not go over the ham bands so do not require a license.

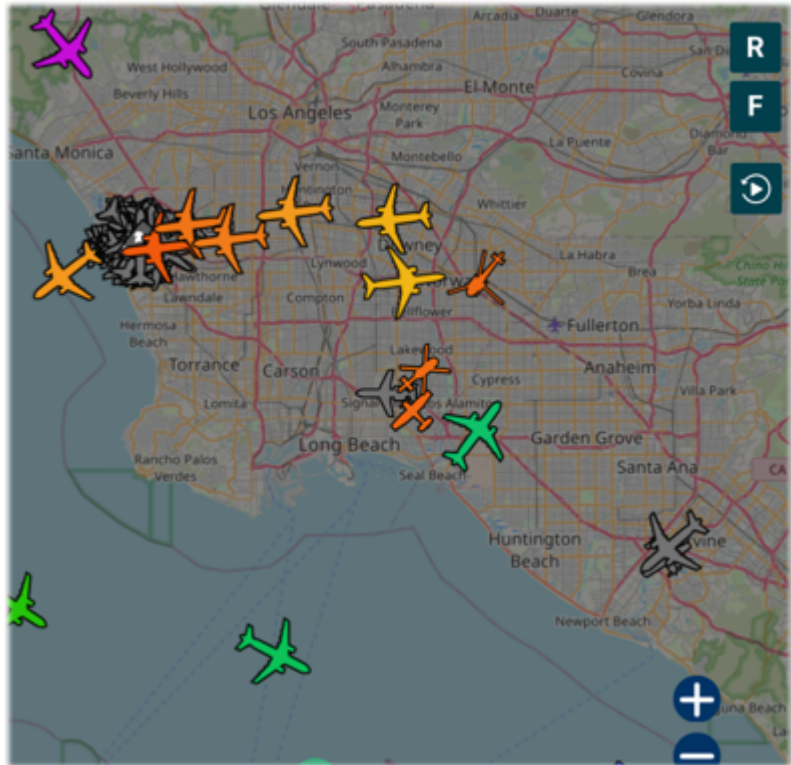


**Bob Houghton** described a protocol called POCSAG which allows hams to repurpose commercial pagers to work on ham frequencies; probably the 70 cm band. It's not clear what the advantage there is. I guess you can brag about it. Maybe put a kilowatt linear on it maybe (humor)



**Dave Rugh** talked about ADS-B which is normally used by airplanes, even the smallest planes. It allows the pilot to see other airplanes on top of the very familiar aeronautical chart. The geometry is processed to show the map and the other planes from the point of view of the pilot. But Dave showed us how we can see all the planes from our cellphone:

To Walter's question on how can you make sense of that cluster of planes over LAX, Bob said you can use your fingers to un-squeeze the image like you can zoom in on a cellphone camera image.



**Bill Webb** demonstrated a fascinating application that took advantage of the compass in a cellphone. It enables you to measure the rpm of anything you can strap the cellphone to. Remember ye ol' phonograph turntable. Bill's got one. He is quite a collector of L-peeze. Remember those? Well guess what; Walmart claims to sell more 33-1/3 LPs than CDs. In case that's a surprise to you, Spotify and Amazon Audio, even YouTube makes listening to music far handier and far cheaper than ye ol' CD. CDs like LPs are for collecting. Even public libraries have given away or destroyed their entire collections of CDs. When someone goes to the Reference Desk to complain about the missing shelves, the Reference Librarian says. "Here, I'll show you, hand me your phone."





Bill suggested that the most amazing thing a cellphone can do is communicate with a satellite. iPhones 14,15 and 16 have a Qualcomm modem chip that can send messages to satellite cellular. It is very low bandwidth of course to reach a satellite but enough to allow emergency communications in the form of SOS like messages. Presumably it sends your GPS location as well. With the latest software version, you can send a short text using iMessage. It's no longer only for emergencies. Here's Bill's cellphone in the demo mode of the latest upgrade.



**Larry McDavid** showed us how he can monitor the performance of his solar array over his house. Not seen here are dips in the light curve as clouds conditions change.

Although not related to cellphones, Larry showed us just the heat sink for the new computer he is building. I'm sure we will hear more about this upgrade next month. The liquid filled tubes Larry's one finger is pointing at, heat pipes, go between the fins and the CPU mounting plate. The large black rectangle is the array of cooling fins.



Larry's left hand fingers are around the rectangular plate that attaches to the CPU. The CPU of course is part of the mother board and the small end of that heat sink is made to have an intimate thermal contact with the CPU.





**Bob Houghton** demonstrated how a cellphone can display a slow scan image from the ISS. Last week, the ISS was transmitting Slow Scan TV images. Earlier in the day, he had recorded one pass (an audio file that lasts a couple of minutes). In the picture below, he is playing back the audio file into his Apple iPad Tablet, which is running a SSTV (slow scan TV) app that converts the audio file into still picture.



The cellphone in this case is a tablet and for those of you who are not tablet centric, it's a cross between a laptop and a cellphone. The thing below the tablet is his radio. The microphone of the iPad is receiving the audio from the radio's speaker (remember acoustically coupled modems?). His IC-705 transceiver has the ability to record the audio for playback later. In this case the audio-image from the ISS. Yes slow scan image transmission uses audio frequency and is as old as ham radio itself.



**Tom Fiske** brought something cellphone-like in size only. It's a digital timer. It has nothing to do with cellphones, but he wanted to tell his sad story about occasionally speaking too long on a repeater with a time-out timer. This was new to me about repeaters. If you are on too long (like 90 seconds) it punishes everyone by shutting down for 3 minutes. So Tom uses this timer to remind him.



He also brought this rather sophisticated audio filter, made by a company called Timewave.

### **Discontinued Product**

## **DSP-59+ Noise Filter**

**Simultaneously reduces noise, kills heterodynes and filters QRM!**



#### **Reduce noise and interference**

- Adaptive noise filter for Voice and CW

#### **Eliminate heterodynes**

- Automatic multiple tone noise filter

#### **Sharp Speech, CW and Data filters**

- 555 Linear phase FIR filters
- 25 Hz. - 600 Hz. adjustable bandwidth for CW & Data
- 200Hz. - 3.4 kHz. adjustable Lowpass & Highpass
- RTTY, AMTOR, PACTOR, HF-Packet and G-TOR

#### **Built-in Self-Test & Audio Generator**

**Dick Bremer** brought a security camera. The camera can pivot and twist and is equipped with its own infrared light source surrounding the lens.



Being able to see in the dark remotely on your cellphone is getting to be quite common. Also quite common is the use of the cellphone to display what a drone sees.



**Walter Clark**, the host of TAG demonstrated one of his drones that has a camera and transmitter that broadcasts on 2.4GHz. The most expensive thing about an FPV is the display. (FPV, or First-Person View) is the name

of the hobby in which the flying vehicle is guided by using the camera in the vehicle.) The use of the cellphone drops the price down to the toy level. In Amazon the number of drones offered with the key words “drones with camera for adults” is 420 different brands of drones. And they seem to look of the same.

Like mine:



but they are different in detail. All Chinese-made of course. What is in common is the radio link with 3-axis gyro and altimeter. Truly mind boggling the sophistication, low cost and fantastic number. There is a pleasant consequence for flying regular R/C planes. In olden days neighbors at the flying site would complain. Moms walking their dogs were afraid of being hit. Well with 500,000 FPV drones sold per month, almost every kid in the soccer field has one and is not a bit afraid of our planes flying over their heads.