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Notes on my history with the Palomar Amateur Radio Club.

Early Activities, < 1975

The first club repeater was built in the early days of ham radio FM operation (about 1970). At that time the only equipment available to hams were tube type surplus units from the commercial business band that we converted to operate in the 2-meter band. The first club repeater was built from this type of equipment with a homebrew COR (carrier operated relay) and timing circuit. The equipment was assembled into a repeater by K6YUH (Jeff McComb) and WA6CUW (Monte Coughran) and was placed in the corner of W6CCE's (Jack Forbes) garage on a hilltop in Vista and remained in operation for several months. This repeater helped to spur interest in getting a "real" repeater for the club.

Shortly after this (early 1970's) a club-sponsored repeater was assembled from a solid state ham transceiver, a Simpson Model A. This radio was selected because the receiver and transmitter used separate circuit boards and it was easy to convert for repeater purposes. Cavities were built from six donated military 155-mm brass artillery shells, which were silver-plated by hand. These cavities were placed in a box with light bulbs and a temperature sensor to maintain temperature stability. The cavities were never stable and required frequent maintenance. This repeater was placed on Palomar Mountain. It was only used a short time before it was stolen, but during that time it displayed the coverage capabilities that were possible from 5600 feet.

Later, the current property was purchased by another ham operator and we built our first 10' X 10' concrete block building (that size building did not require a building permit) at the site. A pipe type fold over tower (still in use by the 6-meter group) was installed and we were on the air with a FM repeater from the Standard radio. The Standard radio was never very good but we continued fitfully with it for several years. We also purchased commercial cavities and a used co-linear antenna (still in service).

This equipment was installed and maintained by K6ROR (Phil Schutze) and Ralph Crossman (K6HAV), both now deceased. In addition a large number of volunteers helped to build the concrete block building and set up the tower and antennas.

Eventually, a "pass the hat" was held and we purchased a Motorola Micor base station repeater. It was purchased new for amateur service and put in place about 1974. A newer remote control receiver was set up to remote control the repeater so we could comply with FCC rules. Other than that we only had the one radio (146.73/.13) at the

site. The repeater call sign was WR6AII. This was the only repeater the club ever purchased that was factory made for amateur radio service.

My History:
I first got involved with some volunteer technical projects around 1975. I was helping with radio maintenance and antenna work at the mountain. In 1978 the existing repeater chairman decided that he wanted to develop his own repeater autopatch system and asked me if I would take over for the club.

I continued as repeater technical chairman until Dec. 1998. I was getting married for the first time at the ripe old age of 48 and decided that I couldn't keep three jobs going at the same time: work, a new marriage and repeater projects.

After 35 years I'm still active in club projects. Offering help when I can on older repeater equipment, field day tech and the "For Sale" table.

It was thanks to numerous PARC experiences that I developed one of the most easily provable theorems of electronics: the smoke theory of electronics. After several frustrating trips to the mountain with problems of reversed polarity (an existing high current power source had the red wire tied to ground and the black wire was +12 volts positive!). I proved that when you let the smoke out of an electronic device it always quit working. Therefore, there must have been some sort of magic smoke that was originally put into the device to make it work. If you "Goggle" my name it comes up under engineering humor, as well as my other UL safety and FCC certifications.

Later we had the donation of an 80' tall antenna tower from a commercial radio station. We took down most of the small miscellaneous antenna towers and consolidated our repeater systems.

This antenna tower is a real beauty. According to Stan we had 18 tons of concrete in the base and it was heavy duty enough to support anything (including a maximum wind and ice load) that we could hoist onto it. Our repeater systems began to rapidly expand after this.

It's always been my philosophy that we never spend more money than absolutely necessary on a job. It is more important that we make something that we can maintain and document, than just getting it together in a hurry. In that light, I can say with pride that many of my repeaters are still running after more than 25 years of continuous operation (knock on wood).

Repeaters currently in use that were originally installed during my time:

1. The 146.70 / .10 packet digital repeater: This started life as strictly a 300 baud RTTY repeater but soon changed into a full duplex packet repeater. It is not a one-frequency digipeater (digital store and forward), but a true repeater with a digital tone detector and tone regenerator.

2. As new repeaters came on line we had to worry about frequency coordination at the mountain site. From one repeater to over 7 each one added another exponent to the possible frequency inter-mixes and cross modulation problems. Art McBride (KC6UQH) came up with some super quality GASFET preamplifiers that really gave our repeaters "ears". On the 147 MHz repeater systems we had one receive antenna feeding two repeaters, with a transmit only antenna on each repeater. It works very well and this is much easier to implement than a multi-RF frequency cavity system.

3. The Metronet repeater: I designed the power supply system, power backup and control logic. The repeater was a specially modified Motorola mobile radio that could handle the 9600-baud data link.

4. Antennas: We modified many commercial antennas to drop them into the ham bands and to improve their performance at our site. In one case we lowered a 460-470 MHz colinear array antenna into the 430 MHz band by adding new extender sections to each section of the array and are still using it as part of a data link. Other antennas include corner reflectors, adding a reflector element to the 2-meter colinear arrays to make them directional; split feed yagis for an emergency antenna, etc.

5. Cavity duplexers, pass cavities, transmission lines: It has been an interesting time learning about these items. You need to check the coaxial cable's velocity factor to cut the lines to a certain wavelengths. Initially we tuned cavities with just signal generators. Later I used RF network analyzers as my available RF measuring tools improved. It is very important to use high quality coaxial cables: double braided, silver-plated, military grade to keep the necessary Rx and Tx isolation.

6. We modified military surplus RF cavities for some of the 450 MHz repeater systems. These RF cavities were high quality, cheap and readily available. We had to cut off the manual tuning parts to make them fixed frequency units.

7 I constructed the 145.05 packet repeater system from a Motorola Micor mobile radio. It used a standard MFJ TNC and 13.8 VDC switch mode power supply. It has been in operation for more than 30 years.

8. ~~Autopatch system. Jerry Houser, Stan (W9FQN) and I developed the technical concept, circuitry, hardware and radio systems from scratch. The uplinks / downlinks and computer controls are still working well although cell phones have finally come down enough in price that mobile phones are not just for the rich. Ordinary Standard business radios were reprogrammed to work into the amateur radio spectrum.~~

9. ~~Before we had a landline telephone at the repeater site, we had a control link transmitter system that was accessible via a dedicated North County telephone number. You would call a special number and enter an access code, then you could control the repeater system. It helped with people that were willing to be control operators, but did not have the required 450 MHz radios.~~

6. The original call sign of the repeater was WR6AII. We had a lot of problems with the FCC when repeaters were first going up and there were all sorts of restrictions on what bands could be linked, control operators on duty at all times, no auto patches, etc. As time went by and more rational thoughts prevailed our equipment became more sophisticated and was interlinked.

7. Mostly, I'm glad to see that the club is still working on improving the site and expanding the equipment. We have a monstrous sized battery back up system in the works. Our antennas continue to operate despite some of them being more than 35 years old. Generally Motorola and GE crystal controlled mobile radios continue to be the mainstay of our equipment. There is more sophisticated frequency synthesized equipment available but nothing that will ever be as reliable.

I hope that in about 25 more years I can attend the centennial celebration of the club.

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