

# SCOPE

A newsletter by and for the  
Palomar Amateur Radio Club  
of San Diego, California.

See SCOPE in **color** on our  
website at [www.palomararc.org](http://www.palomararc.org)!

You may notice some differences with the Scope this month. Due to a change in the postal regulations that rule out the use of staples in certain places on periodical publications, we have to change the way we fold and staple our club newsletter. The newsletter is now printed two pages to an 11" by 17" sheet of paper, then folded, then stapled down the center, then fastened closed with circular white stickers.

The explanation for these changes to the regulations is to prevent the staples from catching in the post office machinery.

A second change to the newsletter is the use of a new type of layout software. I decided to switch from Microsoft Word to Adobe InDesign.

There were two reasons for this. First, the number of text boxes required to lay out the Scope the way that I want to caused Word to run very slowly. The trial of InDesign didn't have this performance degradation. Second, InDesign provided many



*Above: One of the PARC annual picnic drawing winners, Bob KC6VDX, claims his prize! Photo by KB5MU.*

more options and degrees of freedom in terms of layout and newsletter design. It's a more powerful program, and I hope to use it to full advantage to improve the Scope.



This is where you come in! Have you ever considered writing an article for the Scope? Had fun with amateur radio lately? Have a question that you need answered? Have you been to a convention, built a kit, or made a clever repair? Do you know someone who has? Let me help you turn it from good intentions to text.

Mail me at:  
[scope@palomararc.org](mailto:scope@palomararc.org)

## Save the Date

Club Meeting  
**2 September 2009**

Amateur Satellite Service  
presented by Art KC6UQH  
7:30pm at the Carlsbad  
Safety Center

Board Meeting  
**9 September 2009**

Palomar Amateur Radio  
Club board meeting at  
7:00pm at W6GNI QTH

Noble Canyon 50k Run  
**26 September 2009**

Volunteers needed to  
provide public service  
communication at this  
very enjoyable event.

# Annual Picnic

by Michelle W5NYV

PARC's annual picnic was held at San Dieguito park on 15 August 2009. The party, a longstanding end-of-summer tradition for the club, started at 10:00am and ended at 5:00pm. PARC operated an HF station on site with a 10m/15m/20m tribander supported by a tower trailer. See page 10 of this issue of the Scope for an update on the progress on the club tower trailer.

Early-arriving members set up the tower trailer, with Conrad KG6JEI bringing the tower trailer to the picnic in the morning and providing towing services at the end to take the tower trailer back home to TOWizard. The radio was an ICOM 735 provided by the club.

Members used the station to make contacts as well as participate in the NAQP single side-band contest. Over 30 contacts were made in the contest, with Germany as a notable DX. We bumped into a few people on the air that were operating the International Lighthouse/Lightship Weekend.

See <http://illw.net>.

Due to the lack of a completed external oscillator, we did not have the planned microwave station at San Dieguito for the 10GHz and up contest.

Michelle W5NYV brought a solar telescope to show picnic attendees and guests the underlying reason that band conditions stink. Zero sunspots were confirmed through the Coronado Personal Solar Telescope.

The first inaugural Transformer Toss was a success with 7 participants. K6SML took an early lead, but KC6VDX came from behind and



Above, Jo KB6MNK and Al W6GNI

won the Distance Division. K6SML placed second and KG6FIX showed well in third. K6KAL hit a branch and was robbed. Paul KB5MU won the height division, with a toss straight up and straight back down. No toes were harmed in the process of tossing transformers. Conrad supplied the power supplies and Andy disassembled the supplies to yield the 5-10+ pound transformers for the toss.

Competitors in order of appearance: Michelle W5NYV, Patrick K6SML, Bob KC6VDX, Marcia KG6FIX, Conrad KG6JEI, Richard K6KAL, and Paul KB5MU.

Michelle W5NYV brought a hidden transmitter (Kenwood D7 with Byonics foxhunting controller) and Paul KB5MU brought four 2m hand-held direction finding three-element yagis made from PVC pipe and steel 1" measuring tape. See [http://home.att.net/~jleggio/projects/rdf/tape\\_bm.htm](http://home.att.net/~jleggio/projects/rdf/tape_bm.htm) for construction details. The first round of trans-

mitter hunting (also called t-hunting or foxhunting) was an easy warmup with the transmitter hidden behind a trash can in the women's restroom. The second and third locations were out in the park. Multiple teams participated, and several hunters brought their own tape-measure yagis. Future transmitter hunts will be held at club meetings and events whenever possible.

The potluck lunch was supplemented by hamburgers and hot dogs provided by the club. There were many notable dishes, including cobbler, Conrad's chocolate brownies, potato salad, watermelon, cookies, and cupcakes. Loren AD6ZJ and Conrad KG6JEI staffed the grill.

The prize drawing closed out the picnic, with Jo KB6MNK winning the grand prize of \$100 HRO gift certificate. Bob Birch, Greg, and



Above, participants eat lunch at the annual PARC picnic. Below, Conrad KG6JEI grills hamburgers and hot dogs.



*continued on page 5*



# October Auction Site and Schedule

by Michelle W5NYV

It's almost October, and that means it's auction time. Come to the General Meeting on October 7th and join the fun! Any radio item new or used, working or not (boat-anchors included) will be tagged with the seller's information. Both buyers and sellers will register prior to the meeting. Please plan on arriving early to get a look at the auction items. Hams interested in bidding on items will be given a numbered card to hold up on items they would like to place a bid on. Any further questions can be directed to: [board@palomararc.org](mailto:board@palomararc.org)

A suggestion heard at the September 2005 meeting: put those address labels you get in the mail to good use by bringing them to the auction. Instead of writing your name over and over, use the stickers instead.

The auction will be held in a different place this year. Instead of our usual location in the Carlsbad Safety Center, the auction will be held across the street in a building that used to be The Farmers Insurance Company. The building was purchased by the city of Carlsbad and is located at the southwest corner of Faraday and El Camino Real. Enter the parking lot on Faraday.

If you have a wagon or other wheeled cart, please consider bringing it in order to transport items more easily into the building. The club will provide one wheeled cart for transporting equipment in and out of the building.

Art KC6UQH will be the auctioneer for the evening. Start planning now for the treasures you'll want to bring and the treasures you'll be sure to find.

Room set-up starts at 5:30pm. As soon as the room is set up, sellers sign in and tag equipment. Bring your stuff early! 6:30 to 7:00pm

buyers are registered (required!) and may view the offered equipment.

If you have questions about an item, this is the time to ask it. Inspect equipment before the auction so you know what you are bidding on (write its auction number down!) Auction begins at 7:00pm.

## PARC Auction Schedule

Room Setup	5:30pm
Sellers Allowed In	6:00pm
Buyers Allowed In	6:30pm
Auction Starts	7:00pm
Auction Ends	9:00pm

PARC receives 10% of the sale price and there is no other fee for buyers and sellers. Donations to PARC are accepted. All monies are paid to PARC. Seller(s) may set a written minimum bid on their items. Seller is responsible for removing any item(s) not sold. PARC does not guarantee the condition of any item sold.

You don't have to be a PARC member to participate in the auction, so invite your friends to join in on the fun. Sellers will not be paid their money until all monies have been collected that evening, so bring a Self Addressed Stamped Envelope if you want the check mailed to you the next day, or pick it up at the next club meeting.



Pictured above is Loren AD6ZJ bidding on a treasure at the 2008 PARC Auction.

In previous years, the auction has been held outdoors (in a surprise move due to a conflict in room reservation), in the smaller EOC meeting room, and in the larger EOC meeting room.

Come on out to the auction this year and see what the new building looks like and what notable items are bought and sold!

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# Help Wanted

## High-Wattage Power Supply Designer

by Edward Kearey KC6VXY  
August 22, 2009

I have recently talked with the Owner of Mesa Power Systems, Ed Bohorquez of Escondido (Full address listed below) regarding his need for some part time help in the design of high power DC power supplies. Ed is the Marketing guy and the deceased brother Bill was the design guy of the company products.

Owner Ed and his brother have owned the Mesa Power Systems company in Escondido for over 20 years. At one point in time they employed as many as 80 people. With the downturn in the economy and the death of the technical brains (Ed's brother) the company has run on to hard times. They are now running on a skeleton crew.

The immediate need for the designer is to correct some RF noise riding on the output of a DC power supply (800 watt) sold to a large corporation of San Diego. The San Diego company has returned 8 of the power supplies with the noise. Since the deceased brother did the power supply design, Ed needs someone to design the noise fix. The job could be by that job only or based on part time work to include other design work.

I am a member of both the Escondido and Palomar Amateur Radio Clubs so I know we have the needed talent in our clubs to design the needed filter. Hopefully you will provide this information to those you think may be interested in tackling this task. Listed below is the company information.

Mesa Power Systems – Ed Bohorquez, President  
2250 Micro Place,  
Escondido, CA 92029  
Tel: 760-489-8162  
Fax: 760-489-5718  
Email edb@mesapower.com  
Web site: <http://www.mesapower.com>

Thanks for any help you can provide.  
Ed Kearey San Marcos, KC6VXY  
760-744-8327

# Club Reports

## Membership Report

New Members Joining PARC: KJ6ACO.  
And one member paid a 5 year renewal!  
And 5 members reinstated their membership,  
thank you!

Here is the list of members receiving the SCOPE on the web, that "expired" in the last month or so. Please check this list, and get your renewal checks in the mail!

Pretty Please! N6WXD, K7MOA, K7WCC, KI6QDP, W6CDU, K6BZZ, KI6SAT, KD6FKN.

**7 out of 8 of these are listed for the second time.**

The club does need your support!

Al  
W6GNI

## Fold and Staple

W6GNI Al & Kathy & Julie  
WA5ACE Sonny  
KB6YHZ Art

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**Model BA-8** (for RG-8, RG-213, 9913 and similar cables up to 1/2" dia. \$16.50+tax+\$8 S&H/order.

See catalog at [www.Palomar-Engineers.com](http://www.Palomar-Engineers.com)  
Please check our complete ads in **QST**, **CQ**, and **World Radio** magazines.



*continued from page 2*

Rosemary also won gift certificates to HRO. Congratulations to all the winners!

There were 277 participation points entered into the drawing. The more participation points a member has, the more tickets the member gets to enter into the drawing at the picnic, up to a maximum of 20 tickets. Attending meetings, volunteering, and attending events earns participation points.



Clockwise from above, tickets are randomized by Conrad, a prize winner comes forward, winners are drawn, another prize winner comes forward, and tickets are checked after a winning numbers is announced.





Hi Michelle,

I just wanted to let you know that the Vista 146.970 repeater is back on the air under new ownership, new coordination and new equipment. All new. It is an open repeater in the City of Vista, negative offset, PL of 107.2 and carries the callsign KA3AJM. It is sponsored by the Desert Communications Network (DCN) and MetronET, and site location is provided by Amateur Radio Community Services (ARCS). We welcome all amateurs in the area to use the new repeater. We will soon be adding 10 meter, 6 meter, 2 meter, 220 and 440MHz remote bases to it so folks can enjoy those bands all from the comfort of their 2 meter HT or portable. No dues are required or requested.

I am the owner of the repeater, and just want to let folks know its there if they'd like to use it. It would sure be great if you could put a small blurb in the SCOPE about it.

Best Regards,

Chris Baldwin, KF6AJM

Did you know that RF Parts has an excellent amateur radio museum in the front room?

Merit W6NQ has an outstanding collection of radios, ephemera, and tubes, and he can remember when the Palomar Amateur Radio Club was small enough to meet in members' living rooms.

If you're near San Marcos Fry's, drop by and shop at RF Parts.



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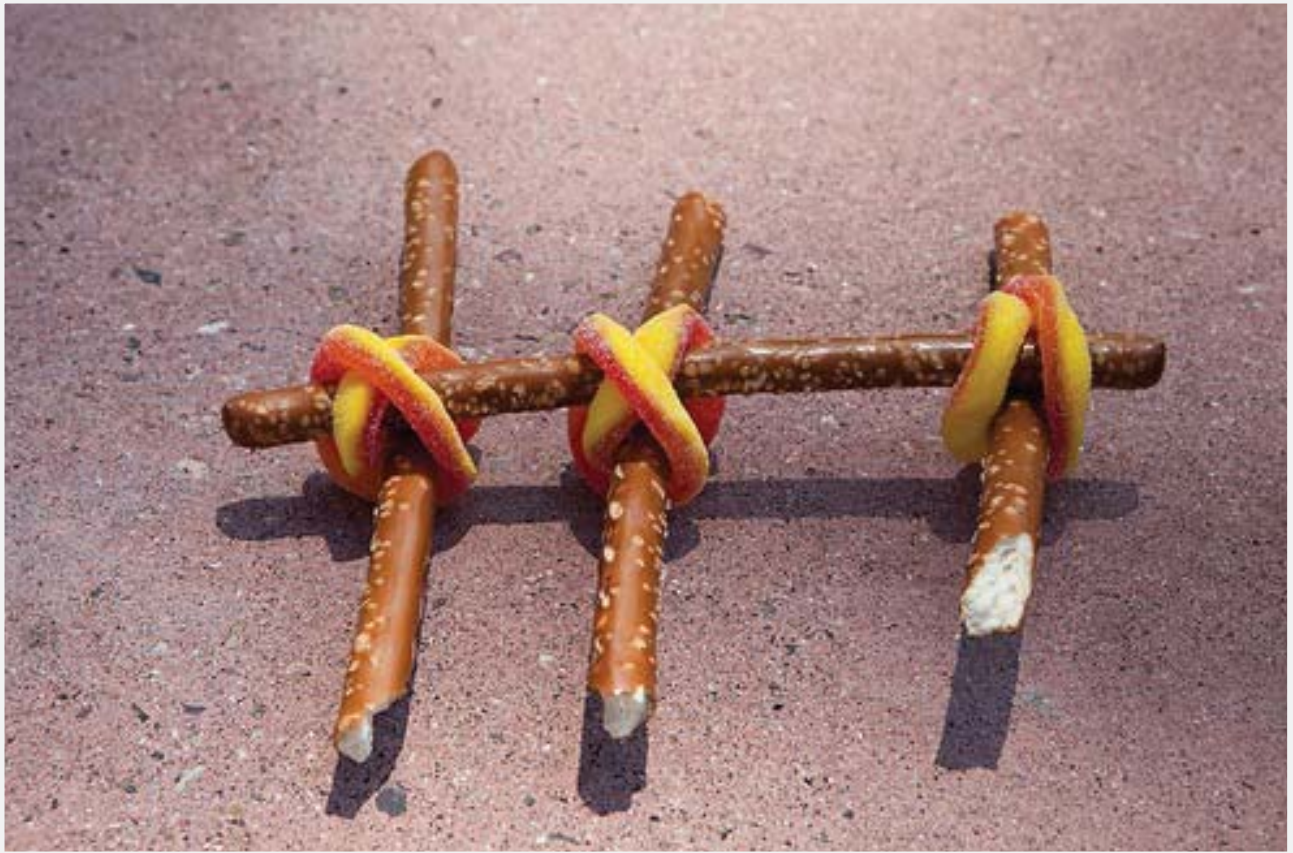
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## A Gain (Weight) Antenna Design

by Michelle W5NYV

The Pretzel Yagi is an easy-to-build, easier-to-use confection constructed from pretzel sticks and Gummi Omnis.

Two Gummi Omnis are utilized per element. Resonant frequency is obtained by trimming the elements to taste.

While feed lines have been proposed of licorice, the current consumption was found to be too high in a series of experiments at the 2009 PARC picnic.

Additionally, the salt pattern was licked into a toroidal carbohydrate module, which was then used in an ARDF (Appetite Relish Dinner Finding) application. Seconds were then served as soon as the indulgence match was made.

Other areas of research include an eggbeater antenna that should lead to better cake response.



# Hacking With GNU Radio - A Report From DEFCON 17

by Michelle W5NYV and Paul KB5MU

One of the first presentations at the DEFCON<sup>1</sup> computer security convention held 30 July - 2 August 2009 in Las Vegas, NV was "Hacking With GNU Radio" by David Bryan.

GNU Radio is a free software toolkit for developing and using software-defined radios (SDRs). It's popular in amateur radio community as well as in areas of wireless research. In order to use GNU Radio, you first obtain appropriate hardware, such as the USRP (The Universal Software Radio Peripheral). The USRP is a high-speed USB-based board primarily intended for SDRs. Then, load an appropriate operating system, such as Ubuntu, and install the components required for GNU Radio.

There are two version of the USRP in circulation. Version 1.0 employs USB 1.0, and version 2.0 of the USRP employs gigabit Ethernet. Version 2.0 allows for more bandwidth.

Equipment designed and sold for operation in any specific

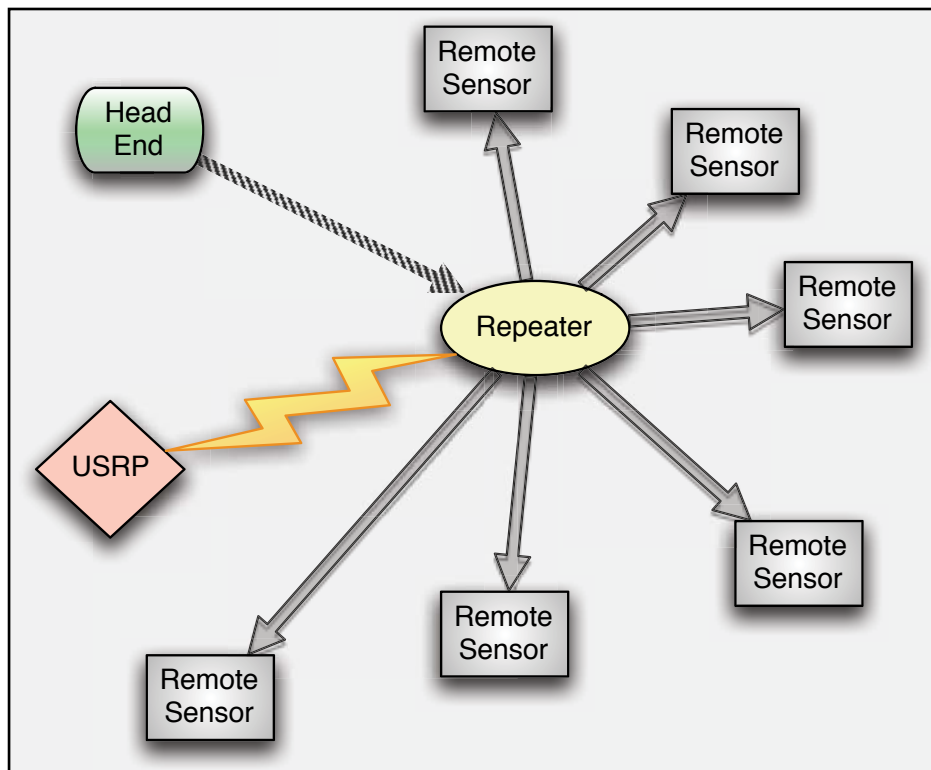
1 [www.defcon.org](http://www.defcon.org)



CORRECTION: It was erroneously reported in the caption of the above photo in the August 2009 issue of the SCOPE that "Steve Venner W6TAN receives certificate of appreciation from Dennis Baca KD6TUI." The correct caption should read "Steve Venner W6TAN and Dennis Baca KD6TUI celebrate the completion of the redesign of PARC QSL card with an exchange of original art work." Scope editorial staff apologize for the incorrect caption previously printed.

radio service has to meet certain requirements in order to obtain an "Equipment Authorization" (EA) from the FCC. For transmitting equipment, there's always a maximum power output limit, of course, but that's not all. Devices for most radio services

This doesn't stop everybody. David cited several examples of successful hacking of wireless networks with GNU Radio that included RFID payment cards, GSM phones, frequency-hopping bluetooth, and multiple access systems.



must be designed specifically to cooperate with the normal procedures of that service, and must not allow the user to modify the device's behavior in any non-standard way. This is supposed to make it difficult to use an off-the-shelf device for any unintended purpose, whether you call it "wireless security research" or "hacking".

These requirements don't apply to lab test equipment, which is why the USRP is sold as test equipment. It can be programmed to do anything you like, within its performance capabilities. It is, of course, a violation of FCC rules to use a USRP in any radio service that requires Equipment Authorization. The amateur radio service doesn't require EA, but almost every other service does.

David described an experiment in which the GNU Radio was used to interrupt the normal operations of a particular type of multiple access system called a Supervisory Control and Data Acquisition (SCADA) system. The system in question was a multiple-access 900MHz star broadcast supervisory control and data acquisition wireless network used for water pump monitoring and management.

The "head end" of the network transmits commands, which are amplified by a repeater, to remote sensors. The remote sensors then report water level. The head end is the commanding node of the network. David showed a slide of the

*continued on page 10*





Above, participants at the PARC picnic gather at a table. Kites, brought by Loren AD6ZJ (at right), can be seen on the table in the foreground. Terry, in the white shirt and dark hat, brought samples of the chocolate that the company he works with makes. Below, Terry takes one last trip down the food table. At right, W6YOO. Below right, the HF station makes a contact in the contest.



# HAM RADIO OUTLET

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right-hand lane. Turn right at stoplight. As you are turning right you can see  
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U-turn back to shopping area and HRO sign. Be sure to see our equipment in  
action on **real** antennas!



*continued from page 8*

network, roughly reproduced in the graphic on page 8, and asked the audience where would one attack the network. The answers given were 1) be the repeater 2) intercept the communications and 3) become the head end.

For option 1, David explained that this requires a nontrivial amount of power. In order to become the repeater, one has to have enough RF power to reach the remote sensors or compete with the existing repeater. This may not be feasible with a portable research tool. For option 2, David's comment was that while this was feasible, it wasn't the simplest attack on the network. He proceeded to discuss option 3, which many hams would recognize as the best way to interfere with a star broadcast system. Since most ham repeaters are have essentially the same network topography, David's hack is similar to a jammer on a repeater.

David built up a gain antenna for the GNU radio, parked near the repeater, and keyed up the transmitter in a mode that duplicated the head end. Simply keying up the transmitter brought the entire system to a halt. Because the management and control of the remote sensors was all "in band", the remote pumps could not be managed as long as the GNU radio was transmitting on the expected head end frequency. This particular network was wide-open, with no authentication, no PL tone, no CTCSS, and had a single-in multiple-out repeater-based design. The effect was a shut down of the water pumps that served that particular water district. This type of attack is called "denial of service" (DOS). If carried out long enough, a DOS attack would result in a widespread water outage. Since many systems, groups, institutions, and activities depend on the availability and integrity of the water supply, such a disruption would have considerable negative consequences.

The SCADA transmitter was located about a block away from the repeater. Repeater locations could be determined, according to David, by using the universal licensing system at [www.fcc.gov](http://www.fcc.gov). This is true of some classes of licenses, but not all classes of licenses. For example, a ULS geographical search of W6NWG does not return the coordinates of our repeater. However, a ULS geographical search of San Diego County returns several different types of transmitters with sets of tower coordinates in latitude and longitude.

See the following URL for one of the examples generated in the above search:  
<http://wireless2.fcc.gov/ULsApp/ULsSearch/license.jsp?licKey=1910364>

Research into wireless weaknesses, especially

## Tower Trailer Update

by Dennis KD6TUJ

The tower trailer continues to evolve. A base and tie downs for the elements was added before the picnic. As the storage side is built up, the fold-over tie downs will rise to the top of the storage and have a cover connected to the top. Also added were stop/marker lighting and the mounting of the license plate.



when they concern vital infrastructure such as the water system, is necessary. Demonstrating weaknesses needs to lead to improved wireless systems. The remote sensor system in question could be improved by using encryption, using mesh network topology instead of relying on every transmission going through a central node, and using out-of-band management and control.

Each of these defenses has advantages and disadvantages, but any of them would improve the ability of the wireless network to resist attack.

The conference was overwhelmingly white and male, tilted heavily towards the younger black-T-shirt-wearing end of the spectrum. While this wasn't surprising, the total lack of overlap between conferences such as TAPR, AMSAT, and other amateur radio gatherings was noticed. No familiar names were in the speaking schedule, and while there was an announced ham simplex channel for the event and hams attending (several from Southern California introduced themselves to me during the weekend), there was very little visible evidence of an amateur radio presence at an event that drew an estimated 10,000 homebrewers and hackers.



# Another Trailer Story

by Dennis KD6TUJ

The PARC trailer has many stories to tell. The latest occurred in this year for Field Day and in support of the Cubs in Space Day Camp. Of the many things that can occur, who would think that a tow truck operator would have problems towing a small trailer across a couple of miles?

For field day, Conrad KG6JEI, brought the trailer to Guajome Park. At the end of field day Conrad brought the trailer to Loren's AD6ZJ house for additional clean up. Loren cleaned up the trailer further and uninstalled the tower as it was no longer usable as designed. The 4th section insulator is no longer staying in place creating a jam situation.



On Sunday before Cub Scout week started I took the trailer to the Antique Tractor and Steam Museum. The adventure begins the trailer is connected to the truck so we can bring over. As we leave and turn onto Bobier the trailer stand rubs the road as we go across the drainage and decides to disconnect. We discover this as we are turning right and the trailer continues straight for about 3 feet. Great. I shook the trailer up and down when I connected it, no problem. Oh well. Blocking traffic in the slow lane I reconnect the trailer and chain it up. Continuing on, we proceed to the signal at the bottom of the hill at North Santa Fe. Stopping for the signal the trailer decides to continue until the chain tightens up. Blocking traffic again, set the mount back on the ball, get around the corner, slide up to the curb, and CHAIN DOWN the hitch. Now, let's try to get there.

Starting again, here we go. Now to travel on the

driveway to behind the barn. Not bad, going slow, and lots of potholes. Alright, got through those. Let's make a left to go around to the back



...and not again! Reconnect again. Finish the last 100 feet.

Setting up the trailer for the Scouts was short and simple. As I lean against the trailer the "box" shifted. What was that? I leaned against the trailer again. It shifted again. Not a good sign.

This trailer has served PARC for over 30 years and is over 50 years old. I am sure it has been many places. Across the years it has seen numerous rains, parked for long periods without attention, and became home to many less fortunate critters that may not have had a home. There are obvious signs of water damage in the roof area that must have progressed to the framing. This is damage that is yet unseen. The hitch was looked at after the tow out and it was concluded that the lock was not activating properly. A lot of WD-40 later it seemed to work better.

At the Board meeting we decided that the service life has come to an end for this trailer. We will be looking for another trailer about the same size, with a solid frame, in our price range.

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N6WPA

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Questions? Ideas? Comments? [W6NWG@amsat.org](mailto:W6NWG@amsat.org)

## Featured Program:

Art KC6UQH will be the featured speaker at our September membership meeting. His talk will be about the Amateur Radio Satellite Service. Meet at the Carlsbad Safety Center at 7:00pm for a half hour of socializing before the meeting. Program starts at 7:30pm.