P.O. Box 6421 Auburn, CA 95604 **July 2014** http://w6ek.org info@w6ek.org

At The Key of SFARC:

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Robert Bell, W6RBL
Jim Jupin, WA8MPA

FIELD DAY CHAIRMAN
Bob Naylor, WE6C

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Satellites: Greg, KO6TH
History: Gary, KQ6RT
Misc Radio: Fred, K6DGW
Sunshine: Richard, WA6RWS
rkuepper@surewest.net

REPEATERS
145.430 (-0.6 MHz/PL 141.3)
440.575 (+5.0 MHz/PL 162.2)
223.860 (-1.6 MHz/PL 162.2)

CLUB NET
Thursdays, 7:30PM, W6EK/R
145.430

CLUB MEETINGS
Second Friday of the month,
7:30PM at the Auburn City Hall,
1215 Lincoln Way, Auburn CA

CLUB BREAKFAST
Last Sat of the month at Mel's Diner
1730 Grass Valley Hwy, Auburn 7:30AM

NET CONTROL OPS
Dave Jenkins, WB6RBE
Norm Medland, W6AFR
Bob Brodovsky, K6UDA
Al Martin, NI2U

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WEBMASTER & ARRL PIO:
Carl A Schultz, WF6J

Inside this issue:

Calendar of Events

July 11th:
Club Meeting

July26th:
Club Breakfast

August 9th & 10th:
TEVIS

We encourage members to receive Sierra Signals via email to save the Club the cost of reproduction and mailing

From the Mic

By Tyghe Richardson – KD6MLH, President

Field Day 2014

I would like to start by thanking every club member that participated in any way in Field Day. Without all of your support and help there is no way this event would ever come together. We started out with a good core Field Day Committee and I personally think that was important. We had many ideas come up in the Field Day Committee meetings, and even though not all were used, they were all helpful. I'd like to extend a thank you to all the club members that brought equipment, helped with setup and tear down, brought supplies, helped as ambassadors, and coached for GOTA. There were several club members that went above and beyond and I give a special thank you to them on behalf of the Club: Dave NO6NO, Carl WF6J, Dennis WU6X, Bob K6UDA, Bob N6EMS, Al NI2U, Jeff AK6OK, George KG6LSB, and of course Burton N6UG for all the air we used. I would also like to thank everyone that operated or logged during the event.

As this Field Day becomes a memory and we begin to look forward to the next one, I personally would like to see us continue to grow our logs! This year we made 900+/- QSO's, beating last year by at least 300. We won't know the exact number of QSO's and points until Dennis gets a final calculation, and we won't know our standings until November when the ARRL releases the results, but needless to say we did better than last year, and we all had fun!

Since I served on the Field Day Committee this year I was able to see all the work that goes on behind the scenes to make this event happen. After my experience this year, I've decided to go ahead and ask for a Field Day Chairperson now. Last year's Field Day Vice Chairperson has accepted the position. Mark Graybill W8BIT is the Field Day committee chairperson for 2015. I think a full year of planning is well deserved for an event of this magnitude. There were a few little problems that we had this year, but I think more time to plan and test will remedy with this.

I encourage all members that participated in Field Day to relay your thoughts to either myself, Dick WB6EDR, or Mark W8BIT. Feel free to email me your critique of Field Day or bring it up at the next meeting. We are expecting to have a short video during the tech 10 and should have a few minutes left over to discuss the high points and low points of this Field Day.

I hope everybody that participated had as much fun as I did, and I hope to see more members next year at Field Day.

73's for now, Tyghe KD6MLH

Sunshine Report

Jettie Hill W6RFF, past president and a life member of the club, has been moved to a residential board and care home in Lincoln with hospice care. The address is 1408 Alder Creek Ct., Lincoln. Visiting hours are from 11am to 7pm. Please drop by and see Jettie if you can. I'm sure he would appreciate seeing you.

Richard WA6RWS

I know the Officers and Board of SFARC will join me in passing along a hearty THANK YOU to all who participated in some way with this year's ARRL Field Day-2014

Thank you to:
1. The Field Day chair persons and volunteer members; lot's of meetings and planning
2. The operators and loggers ... without you we would not have made just shy of 1,000 Q's
3. The Cooks, meal shoppers and pot-luck providers; an incredible "portable" dinner was laid out for all
4. The Band Captains; great job ... your efforts really helped us keep radios going this year
5. All those who helped with logistics, setup, brought tables, chairs, easy-ups, and other items
6. All of you who donated radios, tuners, power supply, antennas
7. Bob-K6UDA for toughing-out the GOTA Coach and station this year, and the always-entertaining, tree-topping, tennis ball launching machine.
8. For Carl-WF6J and Bob-K6UDA for the fantastic signage.

And special thanks to:
- Dave-NO6NO for use of the bar-b-que
- Al-NI2U and Bob-K6UDA for the bob-tailed curtain; lot's of effort, but many Q's, never failing
- Bob-WE6C for loan of the tower and tri-bander
- Jeff-AK6OK for loan of 6 laptops and a flat-screen monitor for logging
- the Army for the generator (we will craft a thank-you letter)

Not by intent, I know I've missed a few other "special" people who made the event possible and we thank you as well...

For those that couldn't make, we missed you too and hope you can be there next year.

The memories? Well, I'm already thinking back to the weekend and a few really special events that made it so worthwhile. Like the 7-year old making his first radio contact at GOTA with Mom looking over his shoulder, so proud (WOW!), or Tyghe yanking QSO after QSO into late-night and early-morning 80m SSB, or Steli pulling 2-point CW Q's from 15m, or me going knees and hands down, almost flat on my face tripping over some kinda wire in the pile of other wires spread over the site. For those that parked below the site, I hope you can see that with the growth of the event, parking like we used to has become a bit dangerous.

73 to all. Look for a full report next meeting,
Dennis-WU6X
SFARC Secretary

BOARD OF DIRECTORS MEETING MINUTES
June 13, 2014

The SFARC Board meeting for June commenced at 1800 hours at Round Table Pizza in Elm Avenue shopping center in Auburn.

Roll Call: All officers and Directors were present with the exception of Board member Robert-W6RBL. Guests present were Al-NI2U, Amaryllis-KK6TFT, Toni-KK6JPJ and Birton-N6UG.

REPORTS and DISCUSSIONS

President's Report: Tyghe-KD6MLH, nothing to report.

Secretary's Report: Dennis-WU6X reported he had cancelled breakfast reservations this month at Mel's Diner.

VP/VE Report: Dave-NO6NO reported he had purchased Baofeng dual-band radios for VE sessions. He reported VE testing results of: (13) candidates took (20) exams with (5) Techs, (5) General and (1) Extra class level passing.

Treasurer's Report: Richard-WA6RWS reported finances in the black with no issues, and net cash on hand, expenses, income and balance of approximately $1,000 un-allocated funds at the beginning of June.

Repeater: Richard – WA6RWS reported the 220 transmitter has been temporarily disabled due to a noise problem. However, the receiver is still linked to the 2m and 440 boxes.

Directors: Mark-W8BIT reported remaining Field Day-2014 needs, including Band Captains, "meat" (Richard volunteered to purchase), and the need to pick-up WE6C's antenna and tower. These issues will be brought to the membership at the General meeting.

Jim-WA8MPA reported a net gain of $15.51 on refreshment sales over the past 5 months, and requested the Secretary draft a "thank you" letter to McDonalds for donating ice each month.

Meeting adjourned at 1818 hours.

Submitted by *Dennis Gregory - WU6X, SFARC Secretary*

GENERAL MEETING MINUTES
June 13, 2014

The SFARC General meeting for June commenced at 1930 hours at the Auburn City Hall Rose Room, President Tyghe-KD6MLH presiding. All Officers and Directors were present except for Robert-W6RBL. Tyghe led approximately 43 members and guests in a Pledge of Allegiance to the flag followed by an introduction of Officers, members and guests.

REPORTS:

President's Report: Tyghe called for approval of the minutes from last meeting as posted in the newsletter. A motion to approve passed unanimously with no corrections. Tyghe reported that the monthly Club breakfast was still ON, but will be "less formal"; no reservations. The Club was also reminded that Western States would be using the 2m repeater over the weekend and to try and keep it clear from un-essential chatter. He announced that the presentation for the General meeting would be on Field Day.

VP's Report: Dave-NO7NO reported he has dual-band Baofeng radios for sale to new hams for $40. See Dave if interested. He also called attention to the "informational display" setup at the meeting, and will be using it at

Field Day as well.

Secretary's Report: Dennis-WU6X reminded the Membership of the Yahoo! Groups calendar, and information for new members and guests, and to sign the attendance sheet.

Treasurer's Report: Richard-WA6RWS reported finances "in the black" with no issues; name badges were ready for pickup at the sign-in table along with extra copies of previous Newsletters and other items (CalStar sign-up forms, ARRL, membership, etc.)

Repeater: Richard-WA6RWS reported a noise issue in the 220 box has the transmitter shut off. The receiver will still take connects and repeat to 2m and 440; however, the 220 box will not function as a standalone "repeater" temporarily. Also, Richard commented on a few repeater "etiquette" issues, mainly "kerchunking" … keying the repeater with identification.

Satellite Report: Greg-KO6TH reported that there will be no hams on ISS for the next 6 months; ISE3 is being re-commissioned; Oscar 50 will likely be too busy for FD-2014, and Oscar 7 is having issues. Several CubeSats carrying Amateur Radio payloads are set to launch during June. These include two FUNcube projects, **FUNcube-3**, a transponder-only payload on the QB50 precursor CubeSat, QB50P1, is scheduled for launch on June 19 from Russia, at a tentative launch time of 1911 UTC. Initial beacon signals from the main transceiver are expected to be AX.25 1200 bps BPSK packets on 145.815 MHz. FUNcube-3 will carry an inverting 400 mW SSB/CW transponder, with an uplink passband of 435.035-435.065 MHz (LSB) and a downlink passband of 145.935-145.965 MHz (USB).

And, **FUNcube-2**, with its telemetry downlink for educational outreach, is expected to be tested later. The goal of the FUNcube project is to support science, technology, engineering, and mathematics (STEM) initiatives now underway in the US, the UK, and elsewhere. The target audience is primary and secondary school students. FUNcube-2 will provide a 400 mW inverting SSB/CW transponder, with an uplink passband of 435.080 to 435.060MHz (LSB) and a downlink passband of 145.930-145.950MHz (USB); beacon on 145.915MHz.

VE Report: Dave-NO6NO, reported VE testing results of: (13) candidates took (20) exams with (5) Techs, (5) General and (1) Extra passing … also, that a new Technician question pool would be implemented next exam, scheduled for July 5th.

Sunshine Report: Robert-W6RBL's Father had passed and Richard asked for thoughts and prayers for the family.

Refreshments/Drawing: George-KG6LSB reviewed the many fine items for the drawing, while Jim-WA8MPA reported on the planned refreshments for the break.

Membership: No report

White Elephant Auction: Tyghe reported there should be some nice items available at the upcoming auction scheduled in place of the October meeting, and reminded members to put it on their calendar.

OLD BUSINESS: None to report

NEW BUSINESS: George-KG6LSB displayed a new "hi-viz" vest for use during events. Lots of pockets and safety markings.

General Announcements: Tyghe reminded the member of the White Elephant Auction in October. The Club Net meets every Thursday's at 7:30; Board and General meetings occur on the 2nd Friday; Board is held at Round Table Pizza at 6pm, and General meetings at 7:30. Club breakfast (last Saturday), the Elmer Net is held every other Wednesday night at 7:30pm. See W6EK.org for more information or date changes.

Tech-10 & Presentation: No Tech-10 in lieu of the presentation; The Presentation was by the Field Day-2014 committee. A movie from last year's event as well as stats, and goals for this year, was presented by various members.

The meeting adjourned at 2125. Submitted by Dennis–WU6X, Club Secretary

MISCELLANEOUS RADIO

C-R Multiband Antennas

Amateurs world-wide are blessed with a number of "bands" from the MF range well into the millimeter ranges. While HF [i.e. "200 meters and down"] used to be all ours, we're a long time from those days. But, small slices of that range are allocated to us, and in the MF/HF region [1.5 – 30 MHz], we have nine bands … 160, 80/75, 60, 40, 30, 20, 17, 15, 12, and 10 meters. OK, 60 meters isn't a "band" but those five channels are seeing increased use. So, while having pioneered operation at below 200 meters and demonstrating it's incredible usefulness, and then losing it, we do still have a broad spectrum of frequencies to play with.

Being blessed with such a wide range of frequencies on which we can operate is a really good deal for us. It poses a very big problem however. While current HF radios will play on every band, radios do not work well plugged into dummy loads. We need antennas that will radiate our signals well, and will [or can be made to] make our radios happy to supply RF to the coax.

Here's one solution:

This is the "Steel/Aluminum Farm" at W7RN. Those really big Yagi's are "3 over 3 on 80 "– 2 - 3 element 80 meter Yagi's stacked. I think the monopole tower [which rotates as a tower] is around 150+ feet high.

W7RN is the Comstock Memorial Station, located about 5 miles west of Virginia City NV at the summit of Geiger Grade at somewhere around 6,500 feet elevation, and built by Tom, K5RC [w7rn.com].

Tom and I worked on Apollo together, although we didn't know each other then. We've become friends through the No Cal Contest Club. He's invited me to operate there a few times, and all I can say is, "It's really different when real antennas are connected to really good radios."

Alas, not many of us have 10 acres on a ridge top in rural Nevada on which to erect an antenna farm that rivals the Voice of America. And, Tom was not without a huge legal battle with his neighbors and the County over this [1], and believe me, he is really rural – wild horses graze on his property, it's open range, and the road in isn't paved.

So … "How can I take advantage of 9 MF/HF bands on a suburban lot?" I will never hear and work stations on all bands from my own station such as I have at W7RN, and I actually live on 5 flat semi-rural acres, but I'd sure like to have access to "all" the bands." One solution to this problem is the subject of this issue.

There are a great number of techniques to design and construct multi-band antennas. One is semi-bogus, but "semi" only because it's never been a secret and it works for most of the users. B&W has been marketing a wide-band folded dipole for at least as long ago as my high school prom. It has been a mainstay for the military and for National Guard armories for many years, and it does indeed exhibit a low SWR across a very wide range of frequencies, important to those in uniform … they also don't work DX. It does this with a big resistor which sort of swamps whatever the antenna is doing and it looks like a more-or-less 50 ohm load everywhere. And, for the Guard and the military, it does its job. It also turns a significant fraction of the RF to heat.

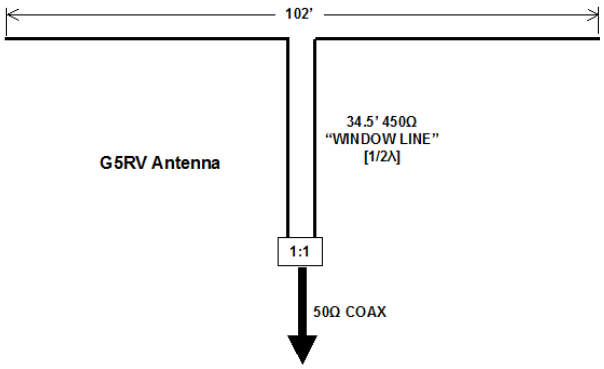
That's not the job we want to do however. We're all looking for the antenna that works on all bands, presents a matched load to the transmission line on all bands, and squirts our RF at the DX station we're struggling to work with 100% efficiency. If you successfully design one of these, contact a patent attorney immediately. All the evidence we have is that they are exceedingly rare, and may be non-existent.☺

It is possible to get multiple bands from a single antenna assembly without resorting to a move to Northern Nevada however. All of them are compromises in one way or another, nothing beats monoband optimized antennas for each band, but despite being compromises, multi-band antennas will give you access to multiple bands … and they do work better than a dummy load. Most require an antenna matching unit at the radio which can add more losses, but that's what

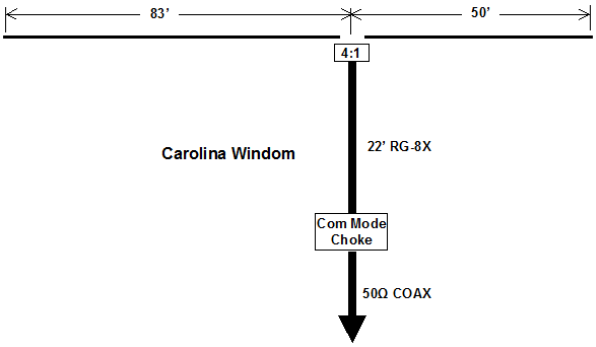
1 QST - June 2014. Tom fought a huge and protracted battle with his neighbors [maybe a mile away] and Storey County over his station.

compromises are all about.

The ubiquitous and very popular G5RV is one example. It was originally designed as a 20 meter antenna [obvious from the specified length of the window-line section], however many claim that you can feed it directly on multiple bands with 50Ω coax as shown in the diagram. This requires a matching unit at the transmitter, and one should definitely include a common-mode choke just below the 1:1 balun. SWR [and losses] in the coax will be high on all bands except 20 meters, so "short" is good. Many hams use 300Ω TV twin-lead for the matching section.



<digression>The longer the coax run, the "better" the match that results. This is deceiving … as the length of the coax increases, so do the losses at high SWR, and the impedance seen by the transmitter is increasingly made up of those 50Ω losses.</digression>



The Carolina Windom is another compromise multi-band antenna that enjoys some popularity. Note that it is fed off-center [that's where the "Windom" comes from[2]]. Feeding it unbalanced deliberately induces common mode current in the 22' coax section which becomes part of the radiator, consequently the radiation has both horizontal and vertical components. This often makes the Carolina Windom prone to higher noise levels on receive. The vertical section sort of "smooths out" the radiation pattern of the horizontal section, filling in the nulls if it were center-fed.

The common mode choke [a string of ferrite toroids on the coax] electrically ends the common mode section. As with the G5RV, this antenna will definitely require an antenna matching unit at the transmitter, and most folks add another common mode choke at the entrance to the shack to prevent RF-in-the-shack problems.

Fan dipoles [multiple wire dipoles, each 1/2λ long for its particular band, all fed together from the center] can be made to work well. They are touchy to tune however and 3 bands is about the practical maximum. We used them in SE Asia, however the depot maintenance guys pre-tuned them and marked the wire lengths so all we had to do was erect them. One interesting construction technique is to make the elements out of window-line [or even 300Ω TV twin-lead]. The longest element is on top and supports the assembly. The shorter elements are formed progressively downward by cutting the conductor and removing the excess insulation. Fan dipoles are very difficult to model using the NEC-engine which struggles with closely spaced connected wires.

Trap dipoles are very popular, and can be purchased as well as homebrewed. The traps are parallel-resonant circuits [capacitor in parallel with an inductor] that are resonant on each of the bands to be covered. Such a circuit presents a very high impedance at its resonant frequency, effectively isolating the part of the element beyond it. For example, the 10 meter traps, closest to the center, "disconnects" the outer portion of the element on 10 meters. On lower frequencies, they introduce some inductive reactance [just like a loading coil], which has the effect of shortening the overall length of the antenna. Traps are the stuff of most tri-band beams. One has to be careful in building the traps … you want as high a Q as you can get, and voltages can get very high. Their disadvantage is that they will introduce some loss.

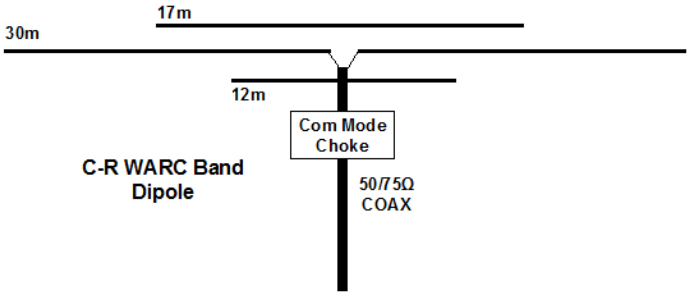
There is another, much lesser known multi-band design that has the advantage of very low losses and ability to be used on three or even four or five bands. It is named the Coupled-Resonator Dipole, and it resembles the fan dipole except that only the lowest frequency dipole elements are actually fed power. Whereas the fan dipole can be a bear to get adjusted correctly, the coupled-resonator dipole is quite easy.

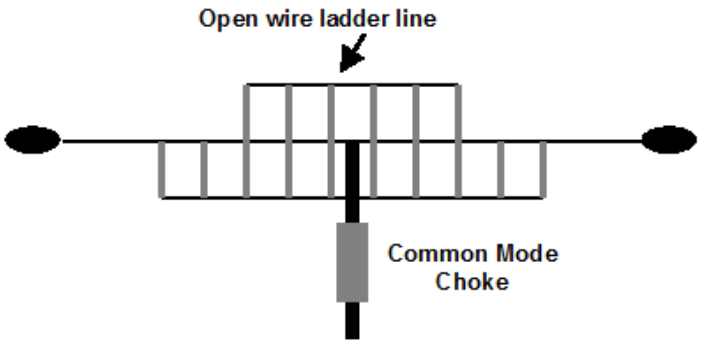
It consists of a half-wave dipole for the lowest band, surrounded by additional half-wave elements for each higher band, closely spaced [1 – 2 in] to the main dipole and each other. An early method to build them was to use crossed spacers with the longest [and support] wire through the centers, and the other elements through holes in the ends, forming a square cage, much like the multi-conductor high voltage transmission lines nowadays. These crossed insulators were originally

2 Named for Loren Windom, W8GZ, who designed an off-center dipole fed with a single wire against ground in 1929. These were hugely popular with all of my Novice friends in the 50's, all teenagers [and broke], who couldn't afford to buy feedline.

available for single frequency cage antennas to “fatten” the conductor and increase the bandwidth.

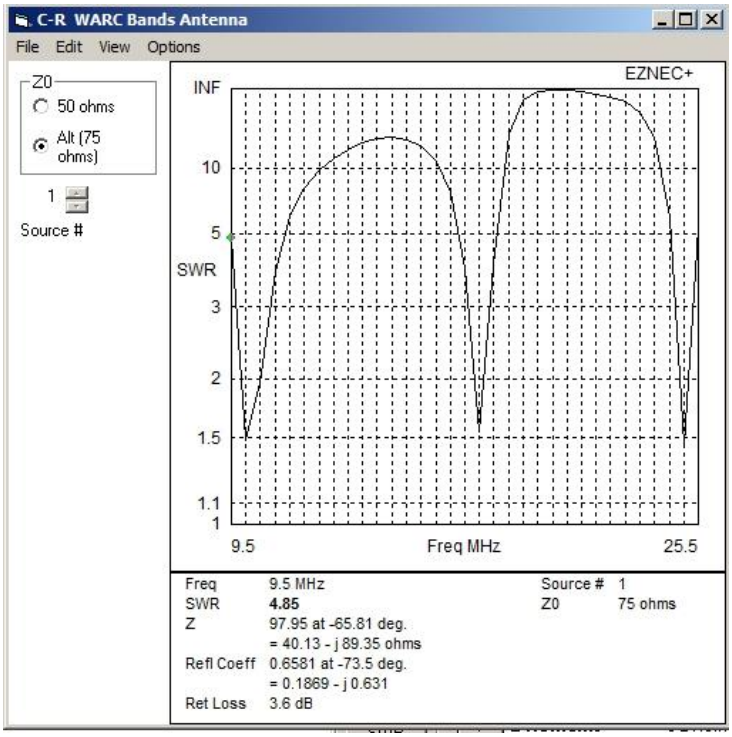
The figure at the right depicts a C-R Dipole for the 3 so-called WARC bands. Dimensions are given below. You have probably noted the recurring common-mode chokes in all of these diagrams. They are nothing but #34 ferrite toroids slipped over the coax and taped in place. 7 or 8 toroids will work very well. The common-mode current is current that flows on the outside of the coax shield. It is not balanced by an opposite direction current as occurs between the inside of the shield and the center conductor, so it radiates and distorts the antenna pattern.[3] On receive, it forms a vertical antenna and will pick up a lot of noise.





A fairly neat way to build a 3-band C-R dipole is to use two lengths of open wire ladder line as shown to the left. One side of each piece is paralled and forms the lowest frequency element and support wire. The other side of each piece is trimmed for the other two bands. It's a good idea to bond the two parallel wires along their length by wrapping them with bare wire every couple of feet. You can use 450Ω window line instead of the open wire ladder line, however it will introduce some losses, and probably more important, it will change the antenna characteristics when it rains.

The SWR plot shows what the antenna looks like to your radio [ignore the numbers at the bottom, they are for a single frequency (9.5 MHz) where I began the scan]. There are three very distinct resonance points in the CW portions of 30, 18, and 12 meters.



The wire lengths are 47.0 ft, 26.6 ft, and 19.4 ft. I spaced the wires at 1.2 in. which is about the spacing of 400 ohm ladder line, and I would feed this antenna with RG-9 75Ω coax. Slightly less spacing would have a better match to RG-8 coax.

1.5:1 is close enough for most transmitters so no antenna coupler is required. All the other multi-band antennas discussed [except the fan dipole] get very complex radiation patterns as you go up in frequency, squirting your RF in all directions. The C-R dipole, like the fan dipole, is a half-wave dipole on each band with the predictable radiation pattern and no trap losses.

Antennas are about the last bastion of home-brew for hams today, but there's plenty to experiment with.

The photo of W7RN was taken by Tom, K5RC and used with his permission.

Fred, K6DGW

3 It also gets conducted into your shack and annoys all the solid state devices we use now.

Noche de las Estrellas; 2014, now with Moonbounce:

By Pat Barthelow, AA6EG

Things are firming up for Noche de las Estrellas; "Noche" 2014, November 29th. Watch these videos below to get an idea of the nature of the World's largest astronomy Star Party Celebration. This year, amateur radio moonbounce will be an exciting addition to the huge event.

Prime location, one of potentially many throughout the world will be at Zocalo Square in Mexico City, one of the largest city squares on the planet. In 2012, during the day and evening Saturday of Noche, an estimated 100,000 visitors visited the exhibition at Zocalo..., and many other large Latin American cities participated. The 5 years now of Noche have brought science and astronomy before a good estimate of 900,000 people, according to Dr. Jose "Pepe" Franco, head of Mexico's Academy of Sciences and the founder, leader of Noche de las Estrellas.

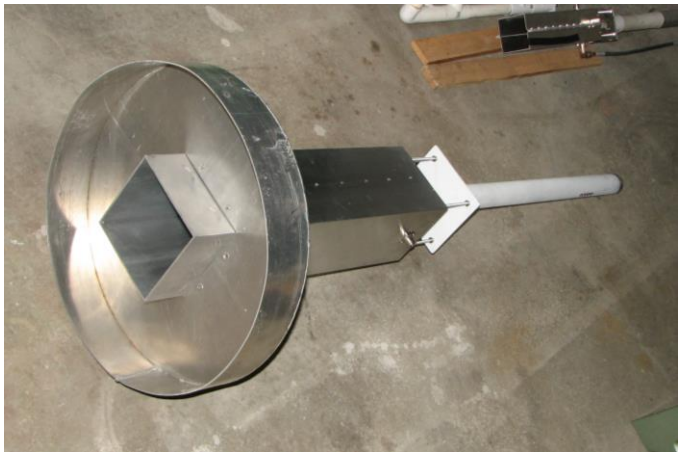
See: http://www.interacademies.net/Academies/ByRegion/LatinAmericaCarribbean/Mexico/21248.aspx

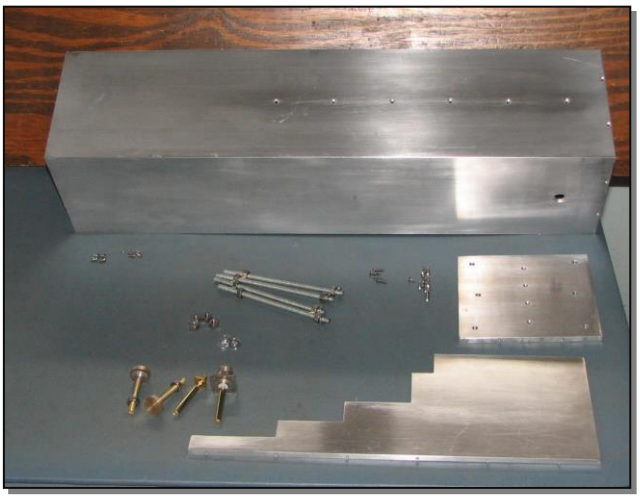
Photo of Zocalo Square, Mexico City, one of many venues for Noche:
http://4.bp.blogspot.com/-YZJSEhhKpkE/T3xTFT6IixI/AAAAAAAAQdo/qYE5WQugMvY/s1600/18.jpg

A website will be put up soon with ongoing details and developments. We will plan JT-65 EME which is the easiest EME mode to enter, low cost, and not too demanding of huge power or antennas. It may turn out to be the most interesting mode, because it basically appears to be digital texting via the moon. Probably more interesting to the modern day newcomer to ham radio, than listening to morse code. At the moment, big enough antennas are not available to do Voice EME, but that may happen in future Noche celebrations.

We are looking into very cheap, hand pointable rectangular horns to use at Zocalo for antennas, about 20 dB gain. The rectangular horns are fabricated from Home Depot, 1"structural foam, coming from 4' x 8' sheets, and cost about $20 in materials for the horn, proper. To the horn you add a rectangular waveguide for 1.2 ghz, which can be from simple to complex to construct. See attached photos. Here are some details of the EME horns, with approximately 20 dbi gain: http://ok2kkw.com/next/horn_23cm.pdf

The linear polarized waveguide feeds to the horn, are relatively simple to make, but if you want to go with Circular polarization, which is in some ways better, it gets more complicated and costly. Here is a very good design and build article on a circular waveguide feed, using extruded aluminum box tubing:
http://kl6m.com/23cm/23CM-SEPTUM-FEED.pdf



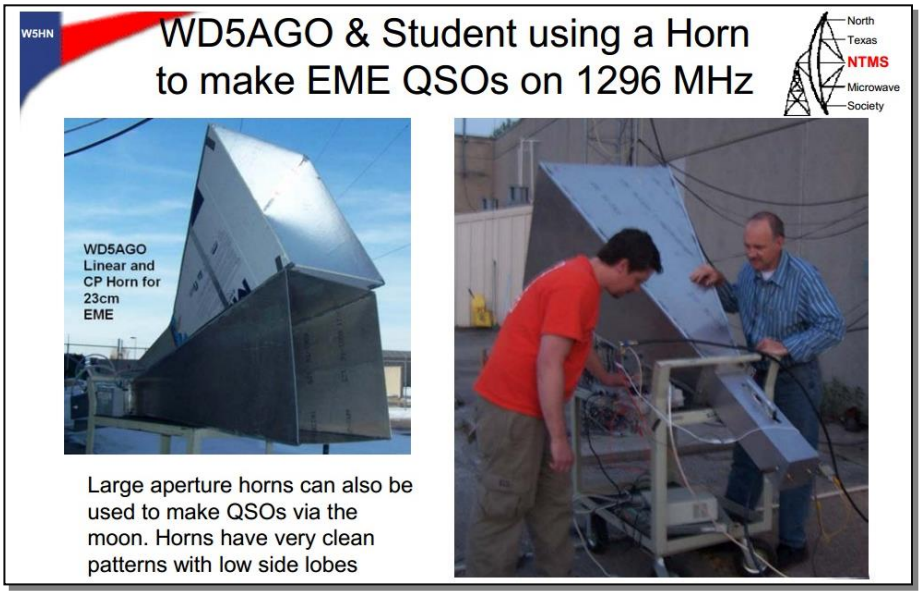


I encourage anyone to develop their EME capable JT65 Station and join the world's largest star party on November 29. Hopefully, we will get participation by some big EME stations to make reception easier.

Noche de las Estreallas Videos:
http://www.youtube.com/watch?v=Wdcjj43HV4Y
http://www.youtube.com/watch?v=rjbN6S-PxGs
http://www.youtube.com/watch?v=egVoqbgfsXQ
http://www.youtube.com/watch?v=-vAOzsFR9I0
http://www.youtube.com/watch?v=EXtSWvJhUfc
http://www.youtube.com/watch?v=sh8XMhRic_A
http://www.youtube.com/watch?v=kGgZYGk7o_w
http://www.youtube.com/watch?v=woedM0thY2E
http://www.youtube.com/watch?v=mppjHAYO9Bw
http://www.youtube.com/watch?v=3ssXxPYxAso
http://www.youtube.com/watch?v=VdMAbb2HYRA

Best, Pat Barthelow
AA6EG

apolloeme@gmail.com
Google Lunar X prize Team,
SYNERGY MOON
www.synergymoon.com



SIERRA FOOTHILLS AMATEUR RADIO CLUB
P.O. Box 6421, Auburn, CA 95604

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SIERRA FOOTHILLS AMATEUR RADIO CLUB **2014 MEMBERSHIP APPLICATION**
P.O. Box 6421, Auburn, CA 95604

Name: _____ Call: _____ Class: ___ e-mail: _____

Address: _____ City: _____ State: _____ Zip: _____

Associate Name: _____ Call: _____ Class: ____ email: _____

Phone: _____ Cellphone: _____ Application is: (Circle) New Renewal

Dues / Donations:

Membership: yearly*	$ 22.00	Name Badge:	$ 7.00	Yes	(special name)_____
Associate: yearly*	$ 7.00	Repeater Donation:	$_____		
Auto Patch Donation:	$_____	Newsletter Booster:	$_____		
Misc. Donation:	$_____	Christmas Donation:	$_____	ARRL member? (circle)	Yes No
		TOTAL:	**$**_____	**Please add $1 if paying via PayPal**	

*Prorated dues for NEW Members/Associates Only

July	$ 20 /6	October	$ 14/3 + following year
August	$ 18/5	November	$ 12/2+ following year
September	$ 16/4	December	$ 10/1 + following year

OFFICE USE ONLY: DO NOT WRITE BELOW THIS LINE

Date: _____ Treasurer: _____ Secretary: _____ Roster: _____

Payment: _____ Check Number: _____ Cash: _____ PayPal:_____

Rev. Nov 2013