January 2016 VOL XCX, ISSUE 7

HARMONICS

1916 *South Jersey Radio Association* 2016

100TH Anniversary Happenings

Ken – K2WB/100

Things are starting to Happen. The use of the /100 after the call sign by members is starting. Several members are have been heard on the repeater.

So far the 100th anniversary committee has had 14 meetings (more to come). Just to keep everyone up to date here is our current status:

Over 75 coffee cups have been sold. There are plenty more to go. Mugs may be acquired to SJRA members by a minimum donation of $10.00. There will be coffee mugs available at the General Membership Meeting on January 27th.

We now have 16 centennial members, The SJRA is now represented on 2 continents, 4 countries (including the USA) and 10 states. Our goal would be to have at least 2 members in each of the States. At least 1 member in each of the ARRL sections and at least 1 member in 100 countries. This will make some of radio sport events planned very exciting. Pass the word around, we need to get more members before 2016 so that our activities will be well represented.

Starting January 1st 2016, SJRA members are encouraged to add /100 to their call signs to commemorate the 100th Anniversary.

Our 100th Anniversary banquet will be held at the Trump Country Club in Pine Hill, NJ on Saturday July 30th, 2016. So mark your calendar.

Work has begun with the SJRA QSO Party, help is needed to administrate and operate. Also, discussions of the SJRA large area special event. The SJRA QSO Party will run for the entire month of June.

We still need a lot of money to achieve our goals and objectives. Our anniversary is only 180 days away.

With that said, Joe, KC2TN, is selling 100th Anniversary clothing and hats, in addition he has patches. Contact Joe should you want to have the *New* SJRA Look.

The Board of Directors approved getting all SJRA members new badges with the new logo.

The Web Team needs help with content for our history time line. Please contact Rich, KV2R, if you would like to help.

There is still a lot to do and we need your help. Please contact me if you are interested in helping with the 100th. If you like to help out in the last minute now is a good time to help!

SOUTH JERSEY RADIO ASSOCIATION

HARMONICS is published monthly and is the official news letter of the South Jersey Radio Association. The SJRA was established on June 16, 1916 and has been meeting continuously since it's inception. The club has been affiliated with the American Radio Relay League since 1920.

The SJRA meets each month on the fourth Wednesday, January through September; and usually the third Wednesday, October, November and December; in one of the Meeting Room of the Gibson House at 525 East Main Street, Marlton, NJ 08053. Visitors are always welcome at our general meetings. **"Our Meetings are Smoke Free"**

SJRA operates the K2AA Repeater (145.290 - PL 91.5) located in Medford, NJ and the K2UK Repeaters (146.865 and 442.350 - PL 131.8) located in Pine Hill, NJ. The repeaters are open for use without restriction to all licensed amateur operators.

There are currently over 100 SJRA members active in most all aspects of amateur radio. Membership is by application and is subject to the approval of the Board of Directors. Club dues are currently $30/yr. for memberships, $22.50/yr. for retired-person membership (62 plus 1 yr membership), and $15/yr. for additional family members and student membership. Membership information is available on the K2AA Repeater or from Mary Von Lintig, KV2M, 856-772-6475

EMAIL: sjra *at* sjra *dot* org SJRA's web page: www.sjra.org

SJRA VE Team: ve@sjra.org is the SJRA/ARRL VUCC card checker

Joe Fisher, KC2TN, is the SJRA/ARRL WAS card checker

Harmonics is now available for SJRA members on the WEB in pdf format at: http://www.sjra.org
South Jersey ARRL Section News is available on the WEB at: http://www.arrl.org/sections/?sect=SNJ

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Harmonics Staff:

Publisher/Editor: Ted Groke, W2TAG
Alternate Editor: Rick Stoneking, W2RDS
Circulation: Mary VonLintig, KV2M; Jim Vecchiola, KR2T

LOCAL WEEKLY NETS

Monday	K2AA, Medford	145.290 @ 8PM
Alternating Thursday	Various Locations	28.405 @ 8PM

Harmonics Deadline

Articles submitted for the next Harmonics will be accepted until Monday, February 8, 2016. Email:
ted.w2tag *at* gmail *dot* com

SWAP SHOP - For Sale/Wanted ads are free of charge and are accepted for Amateur Radio related items only. While ads are not restricted to SJRA members, there is only limited space available and members have priority for listings. No items will be accepted for inclusion in the Swap Shop from commercial vendors or traders. All ads must be submitted at least three weeks prior to the scheduled SJRA general meeting date.

GENERAL ADVERTISING - Limited commercial advertising is accepted on a space available basis. Annual advertising rates range from $25/yr (Min 1/8 page) to $200/yr (Full Page). Information is available from Ken Botterbrodt, K2WB.

Meeting Minutes

Minutes of Board Meeting, Jan 6,2016

The meeting, held at the Gibson House was opened at 1940, by Vice-President Jon, W2MC.

Minutes of the December meeting were approved as printed in Harmonics, motion by KV2R/WB2EOD.

All Board members were present except Ira, W2IRA; Ray, N3RG; Ken, K2WB; and Rick, W2JAZ.

Health & Welfare: Roy, WB2EOD, reported as ***On Schedule***. Roy led a discussion on heavy metal poisoning. Ray, N3RG was reported absence due to the passing of his brother.

New Members: None. Rich, KV2R, read a letter from Mary, KV2M, listing her resignation as Membership Chairperson as of January 31, 2016. Her resignation was accepted with regrets. Corresponding Secretary to send a letter thanking her for her service.

Programs: January, Estate Auction; February, White Elephant/Club Auction; March- Web Team Presentation.

Harmonics Deadline - January 11th.

VE team - December had 3 testies and one administrative action, which included one upgrade to General and a Licensee who has had a Tech License since 1961.

100th Anniversary 1sts: Ron, W5RKN, had first QSL'd card., Mark, KD2JPW, had first recorded contact using /100; Rick, W2JAZ, and Ron, W5RKN, had first satellite contact.

Contests: January VHF/UHF, January 30 thru February 1; ARRL DX, February 20 and 21; North American QSO Party, CW: 1800 UTC January 9 to 0600 UTC January 10, 2016 (second full weekend in January) SSB: 1800 UTC January 16 to 0600 UTC January 17, 2016 (third full weekend in January) RTTY: 1800 UTC February 27 to 0600 UTC February 28, 2016 (starts on last Saturday in February).

Adjourn at 2045.

Lou, N2HQL, Rec. Sec.

December Propagation On The 10M Band

By Bob – KE2D

As a casual radio contester, I like to participate in a variety of contests throughout the year on CW, phone, and RTTY. During the ARRL 10M contest in early December, I was lucky to witness some unusual propagation modes and log a few QSOs. The 10m contest is a mixed mode (SSB and CW) contest that begins at 7 pm EST on the second Friday of December (0000 UTC Saturday) and runs for 48 hours.

Late Friday, I was surprised when I discovered a handful of stations still calling CQ and logging QSOs on 10M CW around 11 pm EST (0400 UTC). 10m is usually dead as a door nail at this time. I was able to work them all with relative ease, although none of

(Continued on page 6)

HAM TECH

Vol 7 No. 1 by John - WY2J

wy2j *at* **arrl** *dot* **net**

Low Bands Receiving Antennas

Part 1 of 2: The Beverage Antenna

Introduction – Hams first licensed in the last 3 to 4 years have never known a solar minimum and what it can do to 10, 15, and even 20 meters. In the next couple of years DX on 10 meters will become a rare event and 15 won't be much better. Even 20 will be dead at night. It's all due to the 11 year sun spot cycle which reached its last peak in 2014 and is headed for a minimum somewhere around 2020. Predicting maximums and minimums is not an exact science. Figure 1 below are plots of the daily (yellow), monthly (blue) and monthly smoothed (red) sunspot numbers for the last 13 years with two predictions for the next year and a half added on.

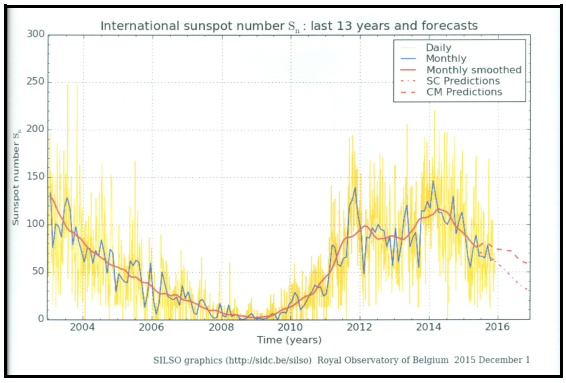

Figure 1, Sunspot Numbers For The Last 13 Years.

The smoothed sunspot number is correlated with F-2 layer HF propagation and the maximum usable frequency increases with average sunspot number. This is due to increased ionization of the earth's upper atmosphere when it is bombarded with greater amounts of ultraviolet light and soft X-Rays from a greater number of sunspots.

Low Sunspots Equal Low Frequencies – With the solar minimum approaching try 40, 80 and even 160 meters at night. This is where these bands shine for DX, particularly in the winter. But the antennas are big, huge, and what if my shack is in a condo? You already agreed to sleep days and stay up nights to work DX so sell the condo and buy a farm, a really big one as far away from people and power lines as possible. But what about atmospheric noise, isn't it high? Yes but Harold Beverage, W2BML, (SK) came up with a good solution 95 years ago while working as an antenna engineer at RCA. He published it in the November 1922 issue of QST and many hams use his receiving antenna today on the three lowest frequency bands.

The Beverage Receiving Antenna - Note, I mean receiving only. If you transmit on it most of the power goes into heating the termination resistor and ground due to its high losses. But it does have a low SWR so you could load it up and melt a little snow.

Figure 2 shows the antenna in its simplest form, a single terminated wire run in a straight line toward the desired direction of reception. It should be typically 8 to 12 feet high, level above flat ground and at least one wavelength long at the lowest frequency used.

A good compromise for 40, 80 and 160 meters is to make it two wavelengths at 3.5 MHz on 80 which will be a little over one wavelength at 1.8 MHz and four wavelengths at 7.0 MHz. This is a wire 562 feet long. For maximum performance on 160

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***(Ham Tech** from page 4)*

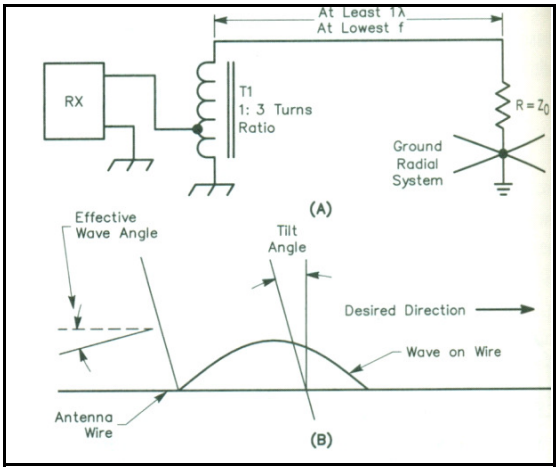

Figure 2, A Simple Beverage Antenna.

make it 1100 feet long and it will still work on 80 but be too long for 40 meters. At 8 to 12 feet above ground the termination impedance will be between 400 and 500 ohms. This is also the feed impedance so it is matched to 50 ohms with a 50 to 450 ohm wideband RF transformer. The antenna terminating resistor is connected to a ground system that can be just a 10 foot length of pipe in the ground.

A vertically polarized signal arrives from the direction of the wire and it is intercepted by the wire. The voltage builds up as the wave passes over the wire with a maximum at the receiver port. A signal from the reverse direction adds up to a maximum at the termination resistor. Signals that arrive perpendicular to the wire result in all phase angles at the end of the wire so they cancel. The gain listed as 8.52 dBi is directive gain and does not include the relatively high losses. The best Beverage designs rarely exceed a real gain of -3 dBi.

On these frequency bands QRN is far higher than receiver noise so you are looking for the antenna to maximize S/N not absolute gain. Consider the case where the antenna is aimed NE to favor Europe. You have the lightning prone Gulf of Mexico to the rear where the Beverage provides 18 dB or more of QRN suppression. A vertical or dipole would provide no suppression of reward QRN causing a loss of about 3 S units of S/N, very significant.

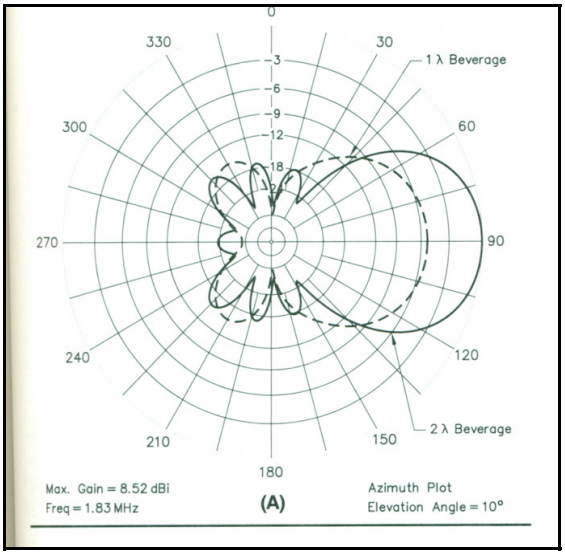

Figure 3, Azimuth patterns for two antenna designs.

Of course to cover 360 degrees of azimuth you must build multiple antennas as mechanical rotation is totally impractical. Two antennas at 90 degrees to each other with 180 degree electrical pattern switching will do the job. A design for each element of this antenna is shown in Figure 4. The two wires in this antenna are typically spaced 12 to 18 inches and at the same height above ground. Reversing the receiver connection and termination between ports J1 and J2 reverses the pattern by 180 degrees. The vari-

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***(December Propagation On 10M** from page 3)*

them were strong. Most of them had a fluttery, almost watery, quality to their signal. They were all between about 40 and 375 miles from my QTH so none of these were "in the neighborhood".

After working all the stations I could hear and getting only a few takers when I called CQ, I decided to listen to some of the other stations. When I worked those stations a short while earlier, I noticed several times that their signals would occasionally and quite suddenly get dramatically stronger with no ramp-up whatsoever, and then almost as quickly die down again. The effect was so dramatic it was almost as if I hadn't had any antenna at all and suddenly one was connected and then disconnected again, all in only a second or two. I even briefly considered that I did in fact have a loose connection somewhere. While I "read the mail" and listened in, I heard this occur several more times. I was so curious that I decided to record some of these in my computer using my audio interface and Audacity (free audio recording and editing software). In the span of 15 minutes or so, I was able to record several of these from a couple of different stations. I considered the possibility that what I was hearing was meteor scatter. At first, I discounted this because hearing them at a rate of one every 1 to 2 minutes seemed too high to be likely. After doing a quick search on the internet, I realized that we were in the midst of the Geminids meteor shower and that it would peak in just another day or two. I was right! It was meteor scatter. Normally, few (if any) stations would have been on 10m at that time of night and certainly not transmitting so frequently and continuously, but with the contest under way and the tropospheric propagation giving them reason to forge ahead, their signals were acting like beacons and randomly hitting meteor bursts.

When a meteoroid leaves space and enters the uppermost atmosphere, it begins to burn up between roughly 80 to 120 km above the earth's surface (48 to 72 miles, but sometimes lower or higher). Once it begins to burn, or more accurately vaporize, it becomes classified as a meteor. A meteoroid may only be the size of a grain of sand or even smaller. While infrequently they can be larger, most meteoroids are probably smaller than a pea. As the meteor vaporizes, it creates a trail of ionized particles behind it. This ionized vapor trail is able to reflect radio waves for a short period of time. Smaller meteors will create trails that only reflect signals for a very small fraction of a second. Larger ones create longer, more dense trails that can reflect signals for a few seconds or in some very rare cases, a minute or more. While meteoroids are constantly entering the earth's atmosphere, their numbers increase greatly during meteor showers. There are more than half a dozen meteor showers throughout the year, including the Leonids, Perseids, and the December Geminids.

The duration during which a meteor's vapor trail will reflect a radio wave is dependent to a large extent on the wavelength of that radio signal. Signals with shorter wavelengths (UHF, e.g. 70cm) will be reflected far less often and for much shorter durations. Longer wavelength signals (VHF, e.g. 10m and 6m) will be reflected more readily and for longer. A meteor trail reflection that lasts only a quarter of a second on 2m, may reflect a 6m signal for a second, and a 10m signal for 2 seconds or more. One advantage of this is that it increases the

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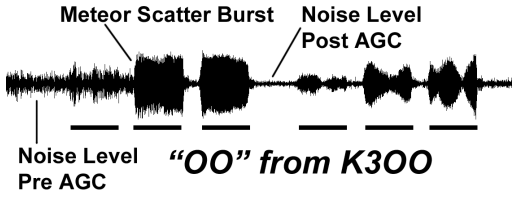
(December Propagation On 10M** from page 6)

chances of hearing meteor scatter on 10m. When I say "hear", I mean literally, with your ears. CW is not a continuous transmission mode. It is by nature an on/off signal system, with most of the duty cycle being in the off state; between transmissions, between characters, between elements (dits and dahs). Luckily, 10m has the advantage that a meteor's ion trail will reflect it much longer than shorter wavelength (higher frequency) signals. Therefore, even the smaller meteors stand a better chance of reflecting a signal from a station on 10m.

Many stations that routinely pursue meteor scatter contacts these days use a semi-synchronous timing protocol and special chat software connected to the internet for coordination. These operating techniques combined with the advent of fast computers using audio DSP and the invaluable contributions of Joe Taylor, K1JT, and his WSJT weak signal digital modes, have made meteor scatter QSOs more common place. Ray Golley, N3RG is a master at this. Ask him about it sometime and I guarantee you'll be fascinated. However, audible meteor scatter heard by ear is much less common so I was excited to actually witness it. None of them lasted long enough to actually make a QSO but I was still thrilled to hear it. I surfed up and down 10m SSB a couple of times but never heard any stations despite a small number of stations being spotted there. I'm not sure if the enhancements from meteor scatter would have been as obvious on voice, which has an inherent up-and-down quality to begin with.

After I recorded the signals, I played them back the next day and watched the audio waveform in Audacity. It was clear where the meteor bursts had occurred and playing them back repeatedly made it obvious what I was hearing. Two of the stations were Jay, K2TTT, in Rockaway, NJ and Rick, K3OO, in Wind Gap, PA. They are both 40-45 miles away. I sent them emails explaining what I had observed and included screen grabs from Audacity showing the waveforms along with a couple of audio files. Both wrote me back and were very interested to hear the recordings. Jay said he was pointing his antenna NW hoping to work some meteor scatter. Rick confirmed they were meteor scatter bursts. It turns out that Rick also works analog (not digital) meteor scatter on 6m and recognized them right away. He even pointed out that on at least one of them, you can also hear the apparent Doppler shift that often accompanies meteor scatter signals. Rick pointed out that the ARRL 10m contest usually overlaps with some part of the Geminids meteor shower most years; something I had never realized before. Rick also said that he had a few broken QSOs from other stations that called during a meteor burst but he wasn't able to complete them. This means that some of the meteor bursts must have lasted at least a few seconds.



In this short section of a recording of a CW signal, you can see the waveform during a meteor scatter burst. The sudden signal level jump right in the middle of the letter O is a dramatic change. Notice how the receiver AGC kicks in to effectively lower the signal strength. I estimate that the AGC attenuated the signal by at least 9 dB and possibly more.

What Would Wayne (Green) Do?

Dan, KB6NU, cwgeek *at* kb6nu *dot* com

Wayne Green was a crackpot…but he was a great one.

For those of you who aren't as old as I am, Wayne Green, W2NSD, was not only the publisher of 73 Magazine, but also the founder of Byte and other PC magazines in the early days of personal computing. In 73, he would write these long, rambling editorials. Often, he would take the ARRL to task, criticizing what he thought to be some lunk-headed policy or another.

Just as often, he'd be encouraging hams to take up some new technology. He was, for example, one of the guys driving hams to set up repeater systems.

He would often exhort hams to get started in their own technology-related business. I remember one column where he urged hams to get involved in the home-security business. And, of course, when personal computers became popular, he wrote that hams should think about getting into that business. His reasoning was that our knowledge of electronics would stand us in good stead in those businesses.

Today, I think that he would be telling us to get more involved in with technologies like the Internet of Things, WiFi, or whatever other wireless technology is coming down the pike. "Wireless" is the key word here. These networking technologies are based on good, old radio, and who better to push these technologies forward than guys like us who understand radio.

This point was brought home to me last week as I was interviewing an executive of a wireless company for an article that I'm writing. He said to me that many of the companies he works with are taking a software-centric view to their wireless products. They simply use the reference designs provided by the wireless chip makers and expect those designs to work flawlessly in their products.

While they often do, he gave me an example where simply using the reference design was a colossal failure. In one case, he said, the company mounted the board inside a metal enclosure. Since the antenna was part of the printed-circuit board, the enclosure acted like a shield, and of course, the device had little or no range.

He went on to say that he thought that there was a real shortage of experienced RF guys in the wireless industry. Does that sound like an opportunity to you? It does to me. So, I'm going to make like Wayne Green here and exhort all you guys to get out there and take advantage of it.

This is not only a business opportunity, but a way for amateur radio operators to fulfill a couple of the ***purposes*** of amateur radio, as set forth in Part 97.1 of the amateur radio regulations. Part 97.1(b) says that one of the purposes of the Amateur Radio Service is "Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art." According to Part 97.1(d), another purpose of the Amateur Radio Service is "Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts."

Let's do it!

• •

When he's not ruminating on the latest wireless technologies, KB6NU likes to make

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President's Message

Ken—K2WB

2016 is finally here, I like to wish everyone a very Happy and Healthy New Year. It is finally here and the 100th anniversary celebration has begun. Already I have recorded a number of SJRA /100 firsts!!

- Ron, K5RKN, has the First confirmed QSL Card with /100 (Ron is a centennial member in Texas)
- Mark, KD2JPW, has the first document /100 contact of any kind and it was also done on a repeater
- Rich, W2JAZ, is the first SJRA member to make a /100 contact via a satellite
- Ron, K5RKN is the first SJRA Centennial member to make a /100 contact via satellite

If you have an SJRA /100 first please let me know.

Congratulations to all of the award winners of the SJRA awards this year.

With the help of the Board of Directors and others I have compiled a list of Top 11 things to do in 2016. These are in no particular order.

- Check into the SJRA Nets (we have two)
- Help an older Member come to a meeting
- Participate in a Club sponsored contest like November Sweeps or VHF Contests
- Help a new ham get on the air

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Monthly Puzzle

Don—WA2DUE, wa2due *at* arrl *dot* net

Last months problems were:

In a recent contest a local radio amateur had a total of 195 contacts with the following countries: France, Germany, Spain, and Italy. He worked twice as many French stations than Italian ones; 23 more German than French ones; and one third as many Spanish than German ones. How many contacts were made with each individual country?

Solution: Using the first letter of each country name we set up an equation thus; F + G + I + S = 195. Then F = G – 23; G = G; I = (G – 23)/2; and S = G/3, which by substitution, G – 23 + G + G/3 + (G-23)/2 = 195. Multiplying by 6 to eliminate the denominators we get 6G – 138 +6G +2G – 69 =1170. Combining liked terms, we have 17G - 207 = 1170. Adding 207 to each side we end up with 17G = 1377. Dividing each side by 17 we get G = 81. We easily find F= 58, I = 29. and S = 27.

What is the number when doubled is greater than its half by 66?

Solution: We write 2N – N/2 = 66. Multiplying both sides by 2 to eliminate the denominator we get 4N - N = 132 and therefore 3N = 132, and N = 44.

Art, N2CPR and Roy, KB2EOD submitted solutions to these puzzles. Congratulations and thank you to both.

For the new year we present the following:

In a mechanical system there are two meshed gears, the first consist of 32 teeth and the second of 50 teeth. If the first gear

(Continued on page 10)

***(Monthly Puzzle** from page 9)*

is turning 1250 rpm, how fast is the second gear turning?

Company A is valued at 22 times the assets of Company B. The difference between the value of the two companies is 126 million dollars. If these two companies were to merge, assuming their asset values remains the same, what would be the merged company's total value?

Please submit solutions and/or comments to **wa2due** *at* **arrl** *dot* **net**.

***(What Would Wayne (Green) Do?** from page 8)*

use of some vintage wireless technologies by working CW on the HF bands. He's also a prolific blogger (www.kb6nu.com) and the author of the "No Nonsense" amateur radio license study guides (www.kb6nu.com/study-guides). If you have a comment or a question, email him at: cwgeek at kb6nu dot com.

SJRA Membership Renewal Begins January 1st, 2016.

This is just a brief reminder that DoozRdo on January 1, 2016. We've tried our best to make it convenient for you by going to the club's website and following the instructions on the renewal form.

http://www.sjra.org/sites/default/files/2015%20Renewal.pdf

More than 25 members have renewed so far... so beat the rush and renew your membership today.

Thanks, Happy New Year and 73,
Ray Golley - N3RG
Treasurer, SJRA
552 Newport Rd
Millville, NJ 08332-7821

***(President's Message** from page 9)*

- Help with Field Day
- Volunteer for a committee
- Show children or someone amateur radio
- Encourage someone to join the SJRA
- Make a suggestion to the Board of Directors
- Write an Article for Harmonics or the web site
- Use /100 at the end of you call sign

Our treasurer Ray, N3RG, has indicated that renewals have been coming in. If you have not renewed your membership please do so soon. Don't forget to update your information such as email address and mailing address so that you can continue to receive Harmonics.

Please indicate if you want to receive Harmonics by regular mail with your renewal.

The club has an email list that is a great way to reach out to all of the members of the club if you have a question or an item for sale. This service is only available to members of the SJRA and will be the only to receive harmonics by email. If we have your email address you will be receiving an email from sjra-members-resquest@mailman.qth.net inviting you to join the list or you can join directly by going to http://mailman.qth.net/mailman/listinfo/sjra-members. Remember to include your Call sign with your name.

To send an email to the list, just send it to **sjra-members** *at* **mailman.qth** *dot* **net** and it will go to all of the members in the list automatically.

SJRA Jackets, Shirts, Hats

Order NOW – Next order going in soon!

*(**Ham Tech** from page 5)*

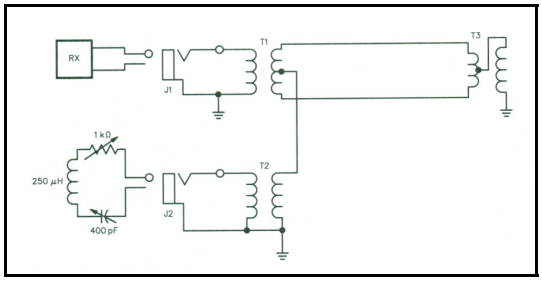

Figure 4, Pattern Reversible Beverage Antenna.

able resistance and capacitance in the terminator allows the reward pattern nulls to be steered over 60 degrees in azimuth thus increasing the rejection of reward spot noise sources.

Transformers T1 and T2 are conventional 9 to 1 wideband impedance matching designs covering 1.8 to 10 MHz. Transformer T3 is a reflection transformer with special requirements. The reader is referred to ON4UN's Low Band DXing book for details on winding this unit for two wire Beverage antennas.

Next Month - We consider a less effective receiving antenna than the Beverage for 80 and 160 meters but far less demanding on real estate, the small loop.

Test Session Report for: December 16, 2015

The SJRA would like to congratulate the following on her recent achievement:

Karla Wills, 433 Washington Ave, Waterford Works, NJ 08089 Earned her

	Tech	General	Extra	Total
To Date	94	39	22	155

January Meeting:

Is the Fourth Wednesday, January 27, 2016

The meeting commenced promptly at **7:00PM** in the first floor Meeting Room of the Gibson House on Main Street, Marlton, NJ 08053. Guests are always welcome.

Program For January:

Estate Auction Featuring Items from the Estate of Ben Heady, W2IJP

SJRA Member February Birthdays

Martin Conrad, WB2EHY; Ted Groke, W2TAG; Jack Imhof, N2VW; Harry Kingsmill, K1NGY; Shawn MacDonald, K2SMD; Michael McDowell, KC2UUG; Riley Stoneking, N2RAS; Leonard Warren, KD2FMV; Noah Weinstein, KC2YAT; and Al Witner III, N3AVT.

Health and Welfare Co-chairpersons: Roy, WB2EOD, and Dara, KC2THQ

Amateur Radio FCC License Testing

The SJRA sponsors *FREE* Amateur Radio FCC License testing on the second Wednesday of each month. The location is: 443 Commerce Lane, Suite 5, West Berlin, NJ 08091. Registration is at 7:00 PM and testing begins at 7:30PM. Walk-ins are accepted.

VE team members can be reached at VE ***at*** SJRA ***dot*** org. A calendar and more information can be found on the SJRA web site.

First Class Mail

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