



# HARMONICS

1916

South Jersey Radio Association

2016



*SJRA is:*

**1000**

*Years Old!*

## 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 its 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@sjra.org](mailto:sjra@sjra.org) SJRA's web page: [www.sjra.org](http://www.sjra.org)

SJRA VE Team: [ve@sjra.org](mailto:ve@sjra.org) is the SJRA/ARRL VUCC card checker

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

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 ★ **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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### Officers

**President:** Ken Botterbrodt, K2WB  
**Vice Pres.:** Jon Mac Millan, W2MC  
**Treasurer:** Ray Golley, N3RG  
**Rec. Sec:** Lou Priestley, N2HQL  
**Cor. .Sec:** Dennis Cioffi, AC2FO

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 Rick Lawn, W2JAZ  
 Ira Weinstein, W2IRA  
 Tony Canuso, N2ATB  
 Ted Dean, KD2ARD  
 Al Witner, N3AVT

### Committees:

**Historian:** Vacant (Please Volunteer)  
**Membership:** Alan Handley, K3WWT  
**Field Day:** Ken Botterbrodt, K2WB  
**Contests:** John Doran, W2FDJ  
**Repeater:** Joe Fisher, KC2TN  
**Programs:** Rick Lawn, W2JAZ  
**H&W:** Roy Herman, WB2EOD; and Dara Herman, KC2THQ  
**Awards:** Rick Lawn, W2JAZ  
**Hospitality:** Jean Priestley, KA2YKN  
**Nets:** John Fogleboch, WY2J  
**Publicity:** Vacant (Please Volunteer)  
**Picnic:** Vacant (Please Volunteer)  
**Ways & Means:** Ray Golley, N3RG  
**Property:** Jon Mac Millan, W2MC  
**Web Site:** Ira Weinstein, W2IRA

### 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, July 11, 2016. Email: [ted.w2tag@gmail.com](mailto:ted.w2tag@gmail.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 General Meeting of 25 May 2016**

The meeting was opened at 1936 by Ken, K2WB, at the Gibson house in Marlton, NJ. He welcomed all members and guests, especially the group of students present from the South Jersey Storm Robotics team.

The minutes were approved as printed in Harmonics, with a change that the VE report was made by Lou, N2HQL, instead of AL, N3AVT motion by N2HQL/KC2TN.

Joe, KC2TN, reported the repeaters as working.

Historian report by Mark, KD2JPW- work progressing on easels, timeline being updated.

VE report by Al, N3AVT- 166 tested so far.

100th Anniversary- Taking reservations (money) for the banquet tonight, also boosters for the program book.

Contests- SJRA QSO party, Field day and June VHF were mentioned, chairperson not present.

Recess at 1945, program started at 2005- Demonstration of robot from this year's contest (not fully assembled).

At the end of the meeting, N2HQL/KA2YKN made a motion that the club portion of the 50/50 go to the storm team, motion passed.

### **Minutes of Board Meeting of 1 June 2016**

The last board meeting in the 1st 100 years of SJRA was opened at 1930 by Ken, K2WB, at the Gibson House.

Minutes were approved as printed in Harmonics, N2HQL/AC2FO.

Ray, N3RG, made the treasurer's report, 107 paid up members, so far. Approved motion by W2MC/N2ATB

Membership Committee- Rich (Dick) Gaul, K2GMY; Joe Carruolo, N2CKW, Lawrence Nelson, No Call. Accepted on motion by W2MC/WB2EOD. (We now have 110 paid members.)

There was a discussion regarding the need for maintaining the post office box with pro and con arguments being heard. It was decided to maintain the status quo for now.

Corresponding Secretary- a 5/20 e-mail congratulation the club on its 100th anniversary, and looking for volunteers for a MS150 ride. There was also an e-mail with the offer of some old parts.

There was a discussion regarding the June Harmonics- including the fact that it would be delivered late and that much of the content should be regarding the 100th anniversary.

Contests- June VHF, SJRA QSO, and field day.

History- Mark, KD2JPW- Five easels ready, five more in preparation. Getting ready for the banquet. TV and News coverage in progress.

Trustee- Ken K2WB- bracing for onslaught of activity.

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## HAM TECH

Vol 7 No. 6 by John - WY2J

wy2j at arrl dot net

### AM to SSB - A Technology History

#### Part 2 of 3: Early Ham SSB: 1946 to 1976

**Introduction** - While SSB had been developed by Bell Labs and deployed by ATT in the long distance system since the 1920's it was absent from amateur, commercial and military radio applications until well after the close of WW-2. This was due to a lack of several required technologies for SSB and American industries were focused on resupplying the public with massive quantities of pre-war designed products from cars to washing machines to AM radios. A few companies like RCA were trying to introduce new technologies developed during the war, like B&W TV, on a fast track to the public.

There were pockets of SSB technology outside of the telephone world in places like Collins Radio, GE Electronics Lab in Syracuse, NY and RCA Airborne Communications in Camden, NJ All three were military contractors and the Air Force wanted better (ie SSB) long range HF communication with their new fleets of bombers and had contracts with all three contractors for SSB technology and products. Collins was a supplier to the Ham world but both GE and RCA had many hams among their engineers. Collins and RCA focused on the sideband filter technology which led to the mechanical filter.

GE developed a new approach know as the phasing method which one of the GE engineers, Don Norgaard W2KUJ (SK), published in a GE monthly publication for employee's known as Ham News. A few hams built Don's design but it's popularity grew when a small startup company known as Central Electronics marketed the design as

the model 10A Multiphase Exciter in kit form for \$99.50 in 1952. It was a crystal controlled 10 watt AM, PM, LSB or USB transmitter. Plug in a 3999 KHz crystal, select LSB, setup your AM receiver with BFO on and AGC off and work those Donald Duck sounding stations on the high end of 75 meters. Figure 1 below is a photo of the Central Labs Model 10A SSB exciter which used plug in coils. Two years later they introduced their model 20A with full band switching, a "magic eye" tube carrier null indicator and 20 watts output that would drive a home brew single 811A class B GG linear amplifier to 200 watts. The price was \$250 as a kit meaning you built it.



Figure 1, A 10 Watt SSB XMTR for \$100 in 1952.

**Two Competing SSB Approaches** - With the introduction of the phasing method of SSB generation after the war it was now possible to build an exciter or low power transmitter at low cost and with only one component that was difficult to design, the 90 degree differential audio phase shift network. But the filter method also had one difficult component the sideband filter. This item did

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(Ham Tech from page 4)

have three different implementations, the 20 KHz LC filter, the quartz crystal lattice filter and the Collins mechanical filter. Optimization of all three required design approaches and tools that did not exist in the 1950's and 60's as well as highly specialized fabrication equipment. Both methods of SSB generation still exist up to today but the phasing method is not competitive performance wise except in an all digital implementation. Figure 2 below shows the configuration in block diagram form of both the filter (A) and the phasing method (B). A vacuum tube implementation of the balanced modulator used with all SSB methods is shown in Figure 3. The two modulators required for the phasing method used four tubes with their plates connected to a single tank circuit to add the I & Q signals to form the SSB signal. For those hams who wanted to home brew the phasing exciter the specialized audio phase shift network could be purchased from James Millen Co. Malden, MA or Barker & Williamson Co. in Upper Darby, PA. Millen published the schematic for their network but the precision resistors and capacitors used were difficult to procure.

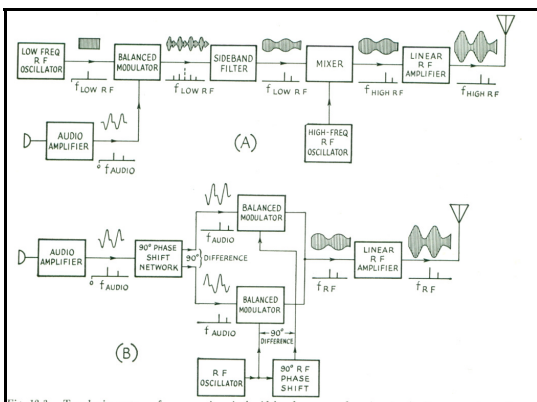


Figure 2, Filter and Phasing Methods for SSB

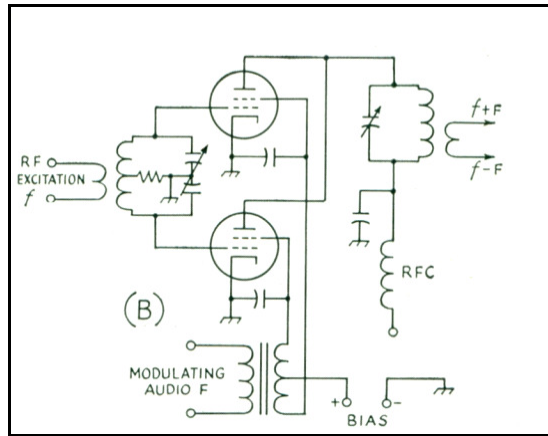


Figure 3, High Level Balanced Modulator

**Other Missing Technology -** If you were an early SSB pioneer in the 1950's with a phasing exciter and perhaps a 100 to 200 watt linear amplifier there were many missing technologies to make it even close to today's SSB rigs. Most were in the receiver with a 6 KHz bandwidth IF rather than the optimized 2.4 KHz, lack of a functioning AGC system made riding the MGC control necessary with signal level variations and frequency stability was 20 to 100 times poorer than required, making for constant retuning even with a crystal controlled transmitter. This gave SSB a bad reputation for poor audio. There were no conveniences like VOX or fast T/R switching and the transceiver hadn't been thought of. The performance of the analog phasing exciters in terms of carrier and sideband suppression was poor compared to today's SSB transceivers. Both required exact amplitude and phase matching of circuits to a small fraction of a dB and one electrical degree. As a result a well adjusted phasing exciter rarely exceeded 35 dB carrier and 30 dB sideband suppression. Compare this to the specs on your SSB rig(s) today.

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## President's Message

Ken – K2WB

We made it! As of June 12th, 2016 it has been 100 years since the SJRA's first meeting in Collingswood, NJ. Unfortunately, all of the charter members are gone but fortunately, they are remembered in our awards and in our historical files. Some of us have even had the privilege to knowing a charter member. I take pause in wondering what those early members of the fledgling South Jersey Wireless Association would think about the SJRA today.

In 1916, the charter members built almost all of their own equipment. Communications by amateur radio between New Jersey and California would be rare. The radio spectrum looked like a blank tapestry that probably ended around 3 or 4 MHz (back then it would have been megacycles or Mc). Today our members communicate by bouncing radio waves off the surface of the moon.

So here we are surviving two world wars; several smaller wars and conflicts; men landing on the moon; people living in space; and the South Jersey Radio Association is still here. Over the years our membership swelled to almost 300 hams; however, for the last 20-30 years SJRA membership has averaged to just over 100 members.

Besides the founding fathers, many SJRA members became corner stones of the club. Some of our members have been part of SJRA for more than 30 years. Just as amateur radio has many interesting facets, at least one member of SJRA has knowledge about implementing and performing in an area that may be of particular interest to you. If you need help in a certain facet of amateur radio, all you need to do is ask and an SJRA member will come to your aid.

Our Field Day operation is world class. We have fun and still manage to hold a strong position in the top four in our category. We usually place first or second while we continue to learn from each other and improve.

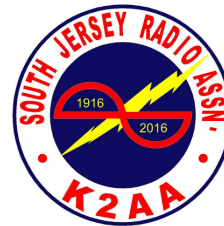
By the time this anniversary issue of the SJRA Harmonics newsletter is published, the SJRA will have passed the 100 years old mark; the SJRA 100 Year QSO Party will be history; and the SJRA will be looking to the future. I am happy and proud to say we are the future. The future is here and the SJRA is as strong as ever.

The SJRA also has members beyond New Jersey as we are twinned with the Limerick Radio Club in Ireland and have recently become official friends with the Superstition Radio Club in Arizona. In addition, the SJRA has a member in Japan and a member in Ireland.

We are also proud that to date, the SJRA has 24 Centennial Members. One Centennial Member is in the Philippines but most are out of the South Jersey. These Centennial Members give us friends in thirteen states, four countries, and three continents.

It is my privilege to be serving as President of the SJRA at the end of its first 100 years and now at the beginning of its next 100 years. I hope all our members feel the same as I.

Congratulations to all members of the South Jersey Radio Association on this our 100th anniversary.



## **Design Advances Make Portable Operation Easier, More Fun**

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

I've just returned from the Dayton Hamvention. Dayton was a blast as usual, and if there's one thing I took away from this year's event it's that portable operation is not only becoming more popular but more sophisticated as well. In fact, it's a virtuous circle. More sophisticated portable equipment is making portable operation more popular, which is spurring manufacturers to make more sophisticated equipment, which is making portable operation even more popular, and around we go.

This is perhaps most easily seen in the evolution of the Elecraft products. One of their first rigs was the K1, a small rig that was frequently toted out into the field, even though it wasn't really designed for that purpose. It had a small form factor, but had a conventional front panel layout.

The next evolution was the KX1. This CW-only radio was designed specifically for field work. It originally only covered 40m and 80m, and had a very limited front panel, but its built-in battery pack and KXPD1 paddle made it a great choice for portable operators when it was introduced in 2004.

A big leap forward was made when they introduced the KX3 in 2012. This radio combined a bunch of features never before found in a portable rig. The KX3 features an SDR architecture and covers all modes, including (SSB, CW, Data, FM, AM); used the same full-sized LCD display as the K3; has advanced DSP features; and can be connected to a computer via USB for firmware upgrades and for use with other ham radio

software. The KX3 is so full-featured that many operators use it as their main rig with a suitable linear amplifier.

At Dayton 2016, Elecraft took this concept even further and introduced the KX2. It's about half the size of the KX3, but yet has almost all of the features of the KX3. There was a tremendous amount of buzz over this radio at Dayton among portable operation aficionados. The base price of the KX2 is \$750, and with options, will cost you about \$1,000.

Of course, Elecraft isn't the only company competing in this market. LNR Precision sells a radio called the LD-5, and at Dayton, they introduced the LD-11, which like the KX3 and KX2 features an SDR architecture and covers 160m - 6m. This radio goes for about \$800, and has also proven to be popular among portable operators.

Dayton also had a number of exhibitors that supplied products other than radios to aid portable operation. There were several portable antenna manufacturers, including Buddipole ([buddipole.com](http://buddipole.com)) and PackTenna ([packtenna.com](http://packtenna.com)), and BiEnno Power ([biennopower.com](http://biennopower.com)) was also there, showing off their new lithium-iron batteries,

While radios like the KX2 and LD-11, at relatively low prices, allow operators to easily get out into the field, portable operation would not be as popular as it is without organized activities. Programs like the Summits on the Air (SOTA, [www.sota.org.uk](http://www.sota.org.uk), [na.sota.org](http://na.sota.org)) and the National Parks on the Air (NPOTA, [npota.arrl.org](http://npota.arrl.org)) make portable operation even more fun. These programs do this by providing a structure in which operators can find one another and gain awards for operating. SOTA did not have a

*(Continued on page 8)*

*(Portable Operation Easier from page 7)*  
 booth at Dayton, but NPOTA was a big part of the ARRL section there.

If you aren't already a portable operator, you should give it a try! You don't have to invest a bunch of money in a rig to just try it. KX1s have been had for less than \$400, and simpler QRP rigs cost a lot less. Getting outside and operating in the fresh air is a lot of fun and could give you a whole new perspective on amateur radio.



*Dan, KB6NU, is the author of the "No Nonsense" amateur radio license study guides, and blogs about amateur radio at KB6NU.Com, and you can contact him by e-mailing cwgeek at kb6nu dot com. Listen for him operating his KX1 from the park or beach this summer.*



Last ones on the 2015 Field Day site. Left to Right: John, W2FDJ; Jon, W2MC; Burton, NJ2IT; Bobby, KD2AWE; Bob, KE2D; Rich, KV2R; Mary, KV2M; Ken, K2WB.

**2016 ARRL Field Day is June 25-26**

## Test Session Report for: June 8, 2016

The SJRA would like to congratulate the following on their recent achievements:

Christopher D. Berget  
 10204 Broadsword Dr.  
 Bristow, VA 20136  
 Earned his General

Mark Walters, KD2JPW  
 P.O. Box 8175  
 Turnersville, NJ 08012  
 Earned his General

Blake Vandergrift, KD2FQQ  
 29 Buttonwood St.  
 Mount Holly, NJ 08060  
 Earned his Extra

Bruce D. Canino, KD2LBU  
 107 Clayton Rd.  
 Williamstown, NJ 08090  
 Earned his General

Paul Nasis  
 501 Princeton Blvd  
 Wenonah, NJ 08090  
 Earned his Tech

Robert Harper, KC3EER  
 266 Romney Blvd  
 Newark, DE 19702  
 Earned his Extra

Charles Yurek, KD2HNS  
 3494 New Jersey Ave.  
 Pennsauken, NJ 08109  
 Earned his Extra

	Tech	General	Extra	Total
To Date	102	46	25	173

## **SJRA 100th Anniversary Party**

As our plans for the 100th banquet comes to completion we need to give the caterer an estimated head count. Guests are welcome. Please let me know your intentions ASAP.

I am collecting money (\$45 per-person) for tickets at the June SJRA meeting on June 22th. We are accepting Cash and/or Check

**Date:** Saturday July 30th, 2016 starting at 11:00 to 15:00 EDST

**Where:** Trump National Golf Course in Pine Hill, NJ (the old Ski Mountain).

**Includes:**

Meal

Cake

Chance to win the door prize a Yeasu FT-100 Radio, DJ, and more...

There will be cash bar available.

Menu will be available soon. (We are having a Brunch).

Dress Code Office Casual and/or Sunday Best

This is a once in a life time opportunity to celebrate with the Oldest Continuously Meeting Radio Club in North America.

If you need transportation to the banquet let me know. Something can be arranged.

**PLEASE, RSVP ASAP**

Please do not hesitate to contact me if you should have any questions.

Thank you.

Ken, K2WB:

Ken at k2wb dot com

## **Monthly Puzzle**

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

**For May we posed these problems:**

My daughter has a square garden plot each side of which is 20 feet long. To re-dress the garden she wants to add 1 inch of mulch over the entire area. The mulch bags at a local home improvement store contain 2 cubic feet. How many bags should she buy?

**Answer:** First we calculate the area of the garden. 20 times 20 equals 400 square feet. Next we obtain the cubic feet required to cover the area with one inch of mulch.  $400 \times 1/12 = 33.33$  cubic feet. Since each bag contains 2 cubic feet we get 33.33 divided by 2 equals 16.67 bags. Therefore she should buy 17 bags of mulch.

Six 10k resistors are connected in series to form a circle. If you place a constant voltage source of 100 Volts across one of the resistors what amount of current will flow? If you place the same constant voltage source across two adjacent resistors, what amount of current will flow?

**Answer:** In the first case we have a 10k resistor in parallel with five 10k resistors in series. The total resistance across any one of the resistors is  $1/R_1 = 1/10000 + 1/50000 = 1/8333$  and  $R_1 = 8.33k$  Ohms. Similarly, the value in the second case is  $R = 13.33k$  Ohms. Dividing the given voltage of 100 by these values we get 12mA and 7.3mA respectively.

**Here is this month's selection of puzzles:**

What letter is next in this series: O,T,S,N,T,F,E,.....?

(Continued on page 10)

*(Ham Tech from page 5)*

On the transmitter side, all CW and AM rigs used class C stages that you tuned up by monitoring grid and plate DC current and they were as non-linear as we could make them. Now SSB amplifiers had to be linear with specifications like IMD that were completely foreign to hams except a few buried in the labs at a BTL, GE, RCA and Collins. The industry that supplied ham equipment had been split between receiver and transmitter designers since 1930 and now we want a linear transceiver. The talent in each camp didn't talk to each other and except for Collins never did design a good transceiver, but even Collins couldn't solve the affordability issue. They eventually all just went out of business and the next generation set up shop for the new technology that was required.

The average ham had to be re-educated in the new SSB technology that was still being invented in the 50's, 60's and 70's. He needed time to learn, to get comfortable with the technology, part with his old AM gear and invest in a whole new station. It took time, a generation.

**Next Month** - We finish up with the final issue of this three part historical column on The Transition from AM to SSB. We will look at the development of the missing technologies of 60 years ago, the year your author entered his junior year in Electrical Engineering at Penn State and the IRE (today's IEEE) devoted a full monthly Proceedings Issue of Technical Papers to SSB.



*(Meeting Minutes from page 3)*

Programs- Field Day Preparation (June) and Field Day Wrap up (July).

VE Team- Five candidates last month, everyone passed something.

100th Anniversary- Three new applications: Harry, W3DNQ, Logan, NJ; Tom Abernathy, K3TOM, Atlantic Division Director; Dan Romanchik, KB6NU. All were accepted on a motion by W2MC/N3RG. A complimentary letter was received from Governor Christie about the value of Amateur radio operators. The menu selections for the Banquet were chosen.

A communication from Tom Gorman, KE2ES, in regard to bringing people to field day.

The Field Day organization is getting underway and we also need to push the SJRA QSO party.

The meeting was adjourned at 2110.

Lou Priestley, N2HQL Rec. Sec.

*(Monthly Puzzle from page 9)*

The daily cost for producing a certain electronic device can be represented by the equation  $C = 800 - 10x + 0.25x^2$  where C is in Dollars and x is in units produced. How many devices must be produced daily to obtain the daily minimum costs?

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

## List Your "For Sale" Ham Stuff in the SJRA Harmonics

Email Ted, W2TAG, with your listing, **ted.w2tag at gmail dot com**

## SJRA Jackets, Shirts, Hats

Order NOW - Next order going in soon!



Spring Jacket is \$44 (S,M,L,XL), Fall Jacket is \$55 (S,M,L,XL),  
Shirts are \$27 (S,M,L,XL), Hats are \$20 (*New Lower Price*, one size fits all)  
Name and Call Sign embroidery included....Larger sizes slightly more!  
Email Joe, KC2TN, with orders or additional info: *kc2tn at comcast dot net*

### 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.

### June Meeting:

**Is the Fourth Wednesday, June 22, 2016**

The meeting commences promptly at 7:30PM in the first floor Meeting Room of the Gibson House on Main Street, Marlton, NJ 08053. Guests are always welcome.

### Program For June:

Field Day Preparations

### SJRA Member July Birthdays

Don Beaulieu, WA2DUE; Anthony Dianora, KC2HHX; John Doran, W2FDJ; Craig Henning, NC2H; and Carol N. Hutkin, K2BL.

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

### Ride Needed

We have two members who need rides to our meetings. If you come from or go through Mount Holly/Lumberton or Medford (near the Library) please contact me ASAP!!!

Ken, K2WB

Ken *at* k2wb *dot* com

**First Class Mail**

South Jersey Radio Association  
PO Box 1026  
Haddonfield, NJ 08033

