



# HARMONICS

1916

South Jersey Radio Association

2015



## **SJRA Centennial Member**

All Centennial Members will be considered affiliated to the SJRA.

### **Privileges:**

- ◆ Participate in all SJRA 100th Anniversary Radio events as an SJRA member.
- ◆ Sign /100 at the end of their call sign (FCC permission pending)
- ◆ Receive Harmonics email version only
- ◆ Bragging Rights to belong to the Oldest Continuously Meeting Radio Club in North America
- ◆ Initiation fees will be waived when converting to a full SJRA member. Conversion must happen prior to June 1st 2017.
- ◆ Includes SJRA 100th Anniversary Coffee Cup
- ◆ Be allowed to purchase SJRA clothing and other logo items
- ◆ Right to use the SJRA Logo on personnel QSL cards
- ◆ Membership Badge not included
- ◆ Membership Certificate (suitable for framing)
- ◆ Pay an extra surcharge to attend to the 100th Anniversary celebration banquet
- ◆ Available to Licensed Amateurs that is not been a SJRA member prior to December 31st 2012

### **Term:**

- ◆ Memberships will be available January 1st 2015.
- ◆ All memberships end December 31st 2016 with the exceptions to those signed after January 1st 2016. These will expire December 31st 2017
- ◆ Non-Renewable Membership

### **Fees:**

- |                            |             |
|----------------------------|-------------|
| ◆ Domestic Membership      | \$20.00 USD |
| ◆ International Membership | \$25.00 USD |
| ◆ Membership Badge         | \$5.00 USD  |

*Funds for membership would go to the 100th Anniversary Budget with the exception of the badge fees.*

## 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 at sjra dot 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 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

### Directors:

Roy Herman, WB2EOD  
 Rich VonLintig, KV2R  
 Rick Lawn, W2JAZ  
 Ira Weinstein, W2IRA  
 Mary VonLintig, KV2M  
 Jim Vecchiola, KR2T  
 Al Witner, N3AVT

### Committees:

**Historian:** Mary VonLintig, KV2M  
**Membership:** Mary VonLintig, KV2M  
**Field Day:** Ken Botterbrodt, K2WB  
**Contests:** Jon Mac Millan, W2MC  
**Repeater:** Joe Fisher, KC2TN  
**Programs:** Rick Lawn, W2JAZ  
**H&W:** Roy Herman, WB2EOD; and Dara Herman, KC2THQ  
**Awards:** Rick Stoneking, W2RDS  
**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:** **Vacant (Please Volunteer)**  
**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 9, 2015. Email: [ted.w2tag at gmail dot 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 Membership Meeting of Dec. 17, 2014

The shortened Christmas meeting was opened at 1910 by President Ken, K2WB, with the standard salute to the American Flag. Ken then asked the attendees who owned a two meter rig and used it other than for nets. Minutes of the November meeting were approved as printed in Harmonics- motion by N2HQL/KR2T.

New members by Mary, KV2M- Bob, KC6AOH.

Treasurer by Ray, N3RG- We have money.

Club Stuff by Joe, KC2TN- 100th anniversary logo available on new orders.

Harmonics by Ted, W2TAG- Still need Alternate Editor.

Historian- Looking for new chairperson.

VE Team- 113 tested so far.

Contests- Straight key night- New Years Eve.

Kits for frequency counter- If you signed up, your kit is here.

Awards were presented: E. Miles Brown, Technical Achievement Award- to Mario, N1AK; Amateur of the Year- Ira, W2IRA, and Ken, K2WB; the Gordon Kressel Award went to Al, N3AVT. Ken also presented "yute" awards.

We adjourned business and began the banquet.

### Minutes of Board Meeting of Jan. 7, 2015

The meeting was held at the Gibson House, in Marlton, NJ opening at 1945. All Officers and Directors were present, (N3RG by Computer). Minutes of the December meeting were approved as printed in Harmonics (motion N2HQL/AC2FO). New members- by Mary, KV2M: Paul White, KC2MZC, accepted on motion by KV2M/N2HQL. Mary also stated that Larry Eichel, the young man mentioned in an article regarding being the 17 year-old co-chair of SJRA field day, had moved back to the area and had shown interest in rejoining SJRA. A motion was made by AC2FO/N3RG to waive the one-year membership requirement for a member to pay senior rates as an incentive for him to rejoin. Motion passed.

Committees: Harmonics- still looking for asst editor. Repeater(s)- Working OK. Contests: Jan. VHF is the weekend of Jan. 24th and 25th. Club stuff- 100th Anniversary logo is available for new items and can be added to most older items. Coffee mugs are also available.

Health & Welfare- Cards are out, KR2T reports his shoulder is healing. Publicity: a possible new volunteer is pending. A "well done" was given to the awards committee. Programs: By Rick, W2JAZ, Jan.- Estate Auction; Feb.- White Elephant Auction; March- Sheldon, K2MEN Radio Control; April- hands on courses; May- Storm robotics (we hope). August- Bop, K2UT to talk on Arduino use.

VE team- 113 so far: Webmaster- totally off Dotster, upgrading content.

*(Continued on page 10)*

## HAM TECH

Vol 6 No. 1 by John - WY2J

wy2j at arrl dot net

### The Vacuum Tube

#### Part 1 of 3: How it Works

**Introduction** - One of radio's greatest game changing technologies of the 20th century was the invention of the vacuum tube in that centuries first decade. While the tube has been largely replaced with semiconductors there are still a few remaining applications for them in ham equipment such as high power amplifiers. As such this three part article is largely historical technology. It is the first of three historical articles that I am writing as we celebrate the SJRA centennial birthday in the next 18 months. The next will appear near the end of 2015 and will focus on Amplitude Modulation, the technology that put the ham's voice on the air. The last will appear just before the 100th birthday of SJRA in June 2016.

**A Little History** - All vacuum tubes depend on the availability of free electrons from a cathode to conduct electricity in a vacuum when a positively charged plate is present. John Fleming a British scientist first demonstrated his valve or diode in 1904. His source of electrons was a heated tungsten wire, like in an electric light bulb, that was surrounded by a metal plate. When a positive voltage was applied between the plate and cathode current flowed. In 1907 Lee de Forest inserted a wire grid structure between the filament cathode and plate of Fleming's diode and produced the first triode. When a negative voltage was applied between the grid and cathode it would reduce the current flowing from the plate in a continuous manner as the grid voltage was made more negative. This was the first device capable of amplification. While de Forest is credited with

the invention of the triode or Audion as he called it, he never did understand how it worked. It was a lucky experiment that he promoted like a "snake oil salesman" during his life. Lee de Forest's education was in religion not engineering.

The Structure of a Vacuum Tube - Practical vacuum tubes for both commercial and amateur radio began to appear after WW-1. They were all triodes enclosed in the glass envelopes of the then manufactured light bulbs. The screw base was replaced with a 4 pin plug in base. In 1927 the screen grid was

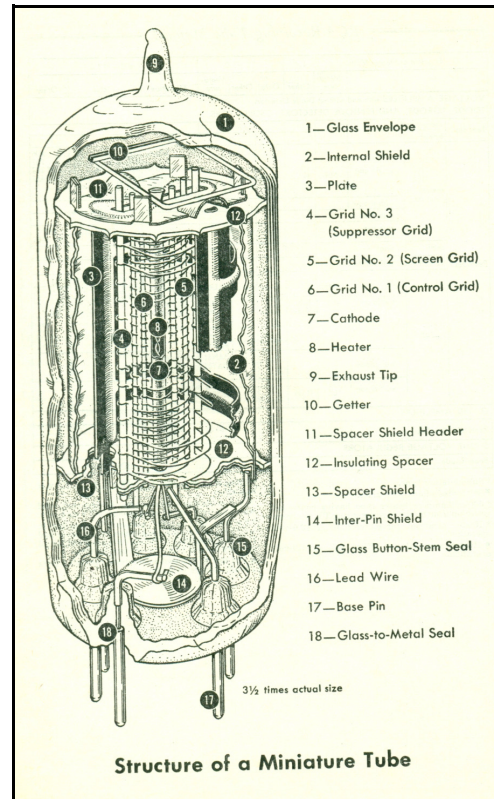


Figure 1: A Pentode Vacuum Tube of the 1946 era

(Continued on page 5)

*(Ham Tech from page 4)*

added to solve the oscillation problems of triode amplifiers. This was quickly followed with the addition of the suppressor grid to solve the secondary emission problems of the screen grid tetrode. This tube is called the pentode. A miniature receiving type pentode of the post WW-2 era is shown in Figure 1.

**Thermionic Emission** - The free electrons surrounding the cathode are produced by heating the cathode to a temperature where the thermal energy is sufficient to break the bonds of the electrons in the metal's surface atoms. Each metal requires a different value of thermal energy to free electrons and this parameter is known as the work function. Cesium has a rather low value work function and is used in vacuum phototubes where light photons can free the electrons. Carbon has a high work function and resists emission. The plates of high power tubes are often coated with carbon to minimize the emission of secondary electrons resulting from the heavy bombardment of high energy primary electrons from the cathode.

The heater of the cathode is always tungsten due to its very high melting and evaporation temperatures. When used as a cathode itself it usually operates at 25000 K or 40400 F. Its efficiency in terms of milliamps of emission current per watt of heater power is 5 to 10 ma. The use of pure tungsten filament cathodes is limited to power tubes which use very high plate voltages. If a small amount of thorium is added to the tungsten the operating temperature drops to 19500 K or 30500 F and the efficiency climbs to 40 to 100 ma per watt. This cathode is often used in amateur transmitting tubes such as the 811A which can output 200 watts in CW or SSB modes. For low power receiving

tubes the cathode is almost always indirectly heated nickel coated with an oxide of Barium, Calcium and Strontium. The cathode temperature is reduced to 10000 K or 13400 F. The efficiency is still 50 to 150 ma per watt.

**Vacuum Tube Characteristics** - Since the operating parameters of even the simple triode depend on at least two variables, grid and plate voltage, it became standard practice to define tubes by a set of curves on a two dimensional plot. Plate current vs plate voltage was plotted for a number of grid voltages. Maximum values of voltage, current and power dissipation was also specified for the grid(s) and plate. Figure 2 is an example of the plotted characteristics for the 2A3 triode first introduced about 1930 for audio power output stages of radios. It uses a directly heated oxide coated filament type cathode drawing 2.5 amps at 2.5 volts or 6.25 watts of heater power. The plate dissipation is 15 watts maximum and the grid is always negative and draws no current.

This curve had a load line of 2500 ohms drawn which is the recommended load impedance with transformer coupling to an 8

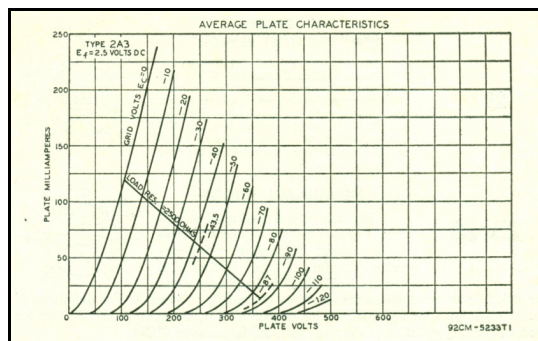


Figure 2: Characteristic Curves for a 2A3 Triode.

*(Continued on page 10)*

## Leaders of the Pack – All Our SJRA Presidents

From A to Z (Al D. Abercrombie - W2GJS) to (Samuel Zollers - W2EWN)

From B to B (C. Waldo Batchelor to Kenneth W. Botterbrodt - K2WB)

### Part 1 - The Beginning, 1916 thru 1946

Since the founding of our great radio club in the year 1916 sixty-four of our members have served her in the greatest and highest honor of all - President. These special sixty-four were (are) truly devoted to SJRA and under their leadership we prospered and became what we are today - The Oldest Continually Operating Amateur Radio Club in North America.

I have spent several months going through our Membership files attempting to find information of their early years with our club, especially when they became members. Unfortunately, our membership files do not include all those who served in the highest office. I was able to locate the original application of several of our leaders and will share that with you, our present members.

C. Waldo Batchelor: 1916 - 1921. Our very first President\*

Harry W. Densham: 1922 -1925. Calls K3EH former 3EH

I found an application without any date on it. The card showed that he was an Honorary Member. His calls were shown as K3EH, W3CUD, and W2EH. His address 148 Washington Avenue, Collingswood, NJ. The card shows 'Deceased 1965.'

William R. Ebensperger: 1926. Call K2AA former 3JW, W3AQM, W2AQM\*

Norman Weible: 1926. Call 3BWJ\*

Evan L. Rhoads: 1927 Also President in 1929\*

John Soffe: 1928\*

William Heckler: 1928\*

Evan L. Rhoads: 1929 (see 1927)

Charles H. Jenkins Jr.: 1930 - 1931. Call W2VX. This is somewhat puzzling. The only card in the membership records goes back to 15 May 1946. If this is the same person the application in the files is after he was president. License class - 'A'. Address - 129 Oak Avenue, Westville, NJ. Occupation - Draftsman.

Edward Braddock: 1932. Call W2BAY, Two cards in membership file. Card No. 1: This card was filled out when he was 73 years old. License class - Extra. Call W2BAY/W1XV. Address 120 Clements Street, P.O. Box 305 Haddonfield, NJ. Occupation - Mfrg. Rep/Sales/electronic components. This card also shows Ed Braddock as an Honorary and a Life Member. Card No. 2: License class - Extra. Call - W1XV. Address - P.O. Box 1425, Orleans, MA.

Larry L. Hardin: 1933. Call W3AQC\*

Gedney M. Rigor: 1934. Call W3QL. Also President in 1938\*

C. Dale Kentner: 1935. Call W2ZX. Card in membership file (not original application) Date of application - 24 November 1955. License class - 'A'. Call - W2ZX. Address - RFD 1 Kresson Road, Marlton, NJ. Age - 50. Occupation, RCA. Sponsor, R.R. Welsh, W2PTM

Clarence E. Owens: 1936. Call W2BGP. Card in membership file. No dates available. License class - 'A'. Address - 216 Morse Street, Camden, NJ and 702 Park Avenue, Collingswood, NJ. Deceased November 1950

*(Continued on page 8)*

**\*No membership records available**

## 100<sup>th</sup> Anniversary Happenings

So far the 100th anniversary committee has had 4 meetings (many more to come). Just to keep everyone up to date here is where we are.

The committee has created and approved a budget for the 100th Anniversary project.

Over 30 coffee cups were sold at the SJRA Christmas Party. Our first fundraiser has been started. We have 100th Anniversary coffee mugs. Mugs may be acquired to SJRA members by a minimum donation of \$10.00. I will be bringing some coffee mugs to the General Membership Meeting on January 21st, 2015.

The first of the fund raising raffles is still in the planning stages.

The Board of directors has approved modification of the SJRA Centennial Membership. To allow us to pursue members now instead of waiting until June 1st, 2015. Details will be presented at the January SJRA meeting.

There is still a lot to do so and we need your help. Please contact me if you are interested in helping with the 100th.

Pass the word to your friends outside of the SJRA. Our goal would be to have at least two members in each of the States. At least one 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.

There is still a lot Let me know if you are interest in joining the committee.



## President's Message

Ken – K2WB

2015 is finally here, I'd like to wish everyone a very Happy and Healthy New Year.

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 10 things to do in 2015. 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
- ◆ 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

Ray, N3RG. our Treasurer 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.

*(Continued on page 10)*

*SJRA Presidents from page 6)*

Walter W. Filson: 1937. Call W2BEI\*

Gedney M. Rigor: 1938. Call W3QL (see 1934)

Christopher J. Davis: 1939. Call W3FH\*

Armand M. Fischer: 1940 Call W2DJ. Card in membership file showing 'Doc' Armand M. Fischer. Date of acceptance - 17 November 1932. Call - W2DAJ. Address 1104 Merrick Avenue, Collingswood, NJ. Occupation - Accountant

John A. Terrell: 1941. Call W3FDF. Also President in 1944\*

Paul A. Matlack: 1942. Call W3FBZ and W2QXG. Card in membership file. Date of application - 17 April 1936. License class 'B'. Calls. Address 136 5<sup>th</sup> Avenue, Mt. Ephraim, NJ. Age 26. Occupation Service man. Sponsor R.R. Creighton - W3BMC.

William H. Ford: 1943. Call W2RZC. Card in membership file. I think that this may be his original application to SJRA but some difference in the call. Date of Application - 16 May 1940. License class 'B'. Call listed as W3IIC. Address 8 Cripp's Drive, Mt. Holly, NJ. Age 35. Occupation - Electrician. Sponsor - Geo. W. Knowles W3AEJ

John A Terrell: 1944. Call W2RFU (see 1941)\*

C. Henry Cook: 1945. Call W2QHM. Card in membership file. I think that this may be his original application to SJRA but some difference in the call. Date of application - 15 January 1942. License class - 'B'. Call - W3GZS. Address - R.F.D. No. 1, Salem Avenue, Clarksboro. Occupation - Mail carrier. Sponsor - Lewis B. Spencer - W3IAS

Louis B. Spencer: 1946. Call W2RBF. Card in membership file. Date of application - 21 September 1939. License class - 'B'. Two calls shown - W3IAS and W2RBF. Ad-

dress - 145 Lansdowne, Haddonfield, NJ. Age - 38. Occupation - Assembler. Sponsor - Charles W. Lowe

These early leaders were the sunrise of our club. They started the South Jersey Radio Association on her path to greatness. Imagine what joy they would feel if they could be present at her 100<sup>th</sup> Anniversary. I am sure that they will be with us in spirit when Number 100 come around in June 2016.

**To be continued.**

73 to all and I am History, Mary, KV2M

### **\*Special Interest Notification\***

The Gloucester County Amateur Radio Club's February 4th meeting will feature two guests that should be of interest to area hams and those interested in amateur radio.

"Skip" Arey, NJ2EI, is scheduled to appear and give attendees an outline of some exciting growth and activities he has planned, as our new Section Manager. This will be an excellent opportunity to learn what's in store and how you can participate.

In addition, Steve Molo, KI4KWR - Chat Support Lead Expert for GigaParts - will be conducting a demonstration of Yaesu's new FT-991 transceiver. This highly anticipated radio features HF, VHF and UHF capabilities, plus supports System Fusion Digital operation.

GCARC meetings are held on the first Wednesday of each month in the Pfeiffer Community Center at 536 Blue Bell Road in Williamstown, NJ - beginning at 7:00 PM. Refreshments will be available. More information is available at [www.W2MMD.org](http://www.W2MMD.org).

Cory Sickles, WA3UVV  
SNJ Public Information Coordinator

## **SJRA Membership Renewal Begins January 1st, 2015.**

Please consider paying your dues early this year.

We've done our best to make it easy...

Use the SJRA website and PayPal to renew at:

[http://www.sjra.org/sites/default/files/2014\\_Renewal.pdf](http://www.sjra.org/sites/default/files/2014_Renewal.pdf) or:

Bring a check payable to "SJRA" to the next meeting or:

Simply mail a check payable to "SJRA" to:

Ray Golley, Treasurer  
552 Newport Rd.  
Millville, NJ 08332

Thanks for your consideration.

## **SJRA Members Birthdays**

### **February**

4th, Ted Groke, W2TAG  
8th, Len Warren, KD2FMV  
12th, Noah Weinstein, KC2YAT  
13th, Jack Imhof, N2VW  
15th, Al Witner, N3AVT  
15th, Martin Conrad, WB2EHY  
16th, Riley Stoneking, N2RAS  
22nd, Shawn MacDonald, K2SMD

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

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

Email Ted, W2TAG, with your listing,  
[ted.w2tag@gmail.com](mailto:ted.w2tag@gmail.com)

## **Monthly Puzzle**

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

### **Last month we posed the following:**

A digital clock operating on 115 Volts has a resistance of 12 kohms. If the cost of electricity is 12 cents per kilowatt hours how much does it cost to operate it for one month?

Answer: From Ohms law  $E/R = I$  and  $W = E \times I$  therefore  $W = (115)^2/12000 = 1.1$  Watts. There are 30 times 24 = 720 hours in a month. 1.1 times 720 = 793.5 hours or 0.794 kwh. At 12 cents a kwh we find that it costs 10 cents a month to operate that clock.

Don and Pat are walkers and Don walks 1 km/h faster than Pat. From a common point Dons walks North and Pat walks East. After one hour they are six kilometers apart. Find the rate each person walks.

Answer: If you draw the problem it becomes evident that you have a right triangle with the hypothemus 6 and one side equal to A and the other side equal to A + 1. From the Pythagorean theorem, the sum of the square of the sides equals the square of the hypothemus. Therefore  $P^2 + (P + 1)^2 = 36$  which resolves to  $2P^2 + 2P - 35 = 0$ . This is a quadratic equation in the normal form where a = 2, b=2, and c =-35. It works out that Pat has walked 3.7 and Don 4.7 kilometers.

### **For this month we present the following:**

A tank circuit tunes from 3508 to 4004 kilohertz. The circuit consists of a variable capacitor with a minimum of 2 and a maximum of 50 picofarads, a fixed capacitor of 156 pf and a coil, all components are con-

*(Continued on page 10)*

*(Presidents Message from page 7)*

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-request@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 Callsign with your name.

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

*(Meeting Minutes from page 3)*

100th Anniversary- Still moving along- cups available, 30 sold so far; Ken has seen some serious interest in the "Centennial memberships" program. Motion by N2HQL/KV2R to allow the memberships to start 1/1/15 was passed.

Corresponding Secretary: Had correspondence with son of Wally Brown regarding some old documents to be turned over to the historian.

Old business- Work being done on an internal directory to allow board members to contact each other when necessary for private discussions to add capabilities to the BOD e-mail system.

New Business- discussions on increasing interest and participation in club business.

Adjourn 2130.

By Lou, N2HQL  
Recording Secretary

*(Monthly Puzzle from page 9)*

ected in parallel. What is the inductance of the coil?

The first term of a geometric series is 3 and the 10<sup>th</sup> term is 1536. What is the seventh term?

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

*(Ham Tech from page 5)*

ohm speaker. With 250 vdc on the plate the tube draws about 60 ma and the plate will under no signal conditions dissipate  $250 \times 60/1000 = 15$  watts. This is the operating point with -43.5 vdc bias on the grid. A 67 v p-p audio signal riding on this bias will swing the grid from 0 to -67v and the plate will swing from 110 to 360 volts a value of 88.4 v rms. The output power is  $88.4^2/2500 = 3.1$  watts. The voltage gain of this simple audio amplifier is  $(360-110)/67 = 3.73$  or  $20\log 3.73 = 11.4$  dB rather marginal. Because the input impedance of the tube is very high the input power is very low giving a significantly higher power gain. With a 100,000 ohm grid load resistor the input power is  $(67 / 2.83)^2/100,000 = 5.6 \times 10^{-3}$  watts. The power gain is thus  $3.1 / 0.0056 = 553.1$  or  $10 \log 553.1 = 27.4$  dB, very respectable. As seen from this simple calculation the vacuum tube is a potent force in advancing the radio art with large values of signal amplification, something that could not be done before its invention.

Next Month - We look at the tetrode and pentode and how they solved the instability and oscillation problems of the triode in receiver applications. We will also explore the various operating modes of vacuum tubes including class A, AB1 , AB2 , B and C.

## 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

<p>The SJRA congratulates the following on their recent achievements:</p> <p>Robert Harper                  266 Romney Blvd                  Newark, DE 19702                  Earned his Tech</p> <p>Ryan Schuyler                  27 Onondago Trail                  Medford Lakes, NJ 08055                  Earned his Tech</p>	<p>Helen Anderson                  1 Circle Drive                  Moorestown, NJ 08057                  Earned her Tech</p> <p>Brian Finch                  133 Pheasant Field Lane                  Moorestown, NJ 08057                  Earned his Tech</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 15%;">Tech</th> <th style="width: 15%;">General</th> <th style="width: 15%;">Extra</th> <th style="width: 15%;">Total</th> </tr> </thead> <tbody> <tr> <td>To Date</td> <td style="text-align: center;">74</td> <td style="text-align: center;">29</td> <td style="text-align: center;">14</td> <td style="text-align: center;">117</td> </tr> </tbody> </table>		Tech	General	Extra	Total	To Date	74	29	14	117
	Tech	General	Extra	Total							
To Date	74	29	14	117							

**January Meeting:  
Fourth Wednesday, January 28, 2015**

The meeting commences 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:  
Annual Estate Auction**

**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**

South Jersey Radio Association  
PO Box 1026  
Haddonfield, NJ 08033

