The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

June 2025 Volume 31 Issue 6

The *Jersey Broadcaster* is distributed to members of the New Jersey Antique Radio Club via email as a PDF file. Back issues of many of our newsletters are available on the club's website: www.njarc.org/broadcaster/

Meeting Notice

Our June meeting will be held on Friday, 6/13 at Princeton University in Bowen Hall. Physicist Jonathan Allen will present on "The History of Early Radio & Electronic Manufacturing in New Jersey & New York."

Directions can be found on Google Maps at https://bit.ly/4jZe8XI.We plan to live stream the meeting on YouTube at youtube.com/user/NJARC.

Meeting Review

Our May Meeting featured a talk by Al Klase about the history of Edwin Howard Armstrong. Al included details about Armstrong's early life, his development as a gifted inventor and some of "'Howard's" (as he was known) most famous inventions inventions. This was a reprise of the presentation Al made to the Yonkers Historical Society following the placement of the plaque installed in 2013 on the street where Armstrong lived. (You can read about the event here: https://www.radioworld.com/news-and-business/armstrong-honored-with-plaque.

If you missed the meeting, you can watch a recording of the live webcast, which is available on the club's YouTube channel: https://bit.ly/3yZ5yoR.

Calendar of Events

June 13: NJARC monthly meeting, Princeton

June 14: Fair Lawn hamfest, Fair Lawn NJ

June 20: HARPS monthly meeting, Suffern NY

June 21: Raritan Valley hamfest, Piscataway NJ

July 8: DVHRC monthly meeting, dvhrc.com

July 11: NJARC monthly meeting, Princeton

July 13: Sussex hamfest, Augusta NJ

July 15: HARPS montly meeting, Suffern NY

July 26: NJARC Summer Swapmeet, InfoAge

August 8: NJARC monthly meeting, Princeton

August 23: NJARC Summer Repair Clinic, InfoAge

September 12: NJARC monthly meeting, InfoAge

September 19-20: Kutztown Radio Show

October 7-11: AWA Conference, Henrietta NY

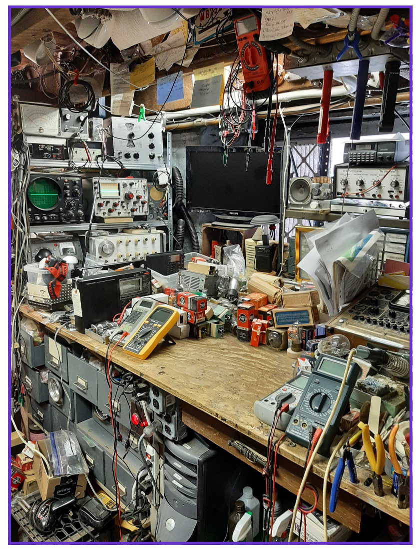
October 10: NJARC monthly meeting, Princeton

October 25: NJARC Spring Repair Clinic, InfoAge

From the President's Workbench

Greetings Fellow Enthusiasts!

Sad news, or perhaps future good news, but for now sad news. My local AM station, WRCR 1700 is no more! As of May 7th 2025, the station owner Alexander Radio Broadcasting, sold (or not sold?!) the station to NYC's Red Apple Media for the sum of $600,000.



The President's Workbench.

WRCR was always known as "Your Hometown Radio," serving the Lower Hudson Valley and Northern New Jersey. On September 1st, 1965, station callsign WRRC entered the daytime airwaves on 1300 kHz. At 500 watts out, it was as local as you could get! If you were located over Clausland Mountain, east of the Nanuet transmitter, you received static. Jumping forward to 2006, the FCC allowed now WRCR to move from 1300 kHz to 1700kHz., reasoning that Rockland County and Northern NJ residents needed 24-hour AM notification of any "mishap" at the Indian Point nuclear facility (Ha!) A new station, transmitter and tower were needed to accommodate the granted class B 10,000 watts of power. So finally on July 13th 2015, with 10,000 watts daytime and 1,000 watts nighttime power, WRCR's non-directional transmitter could reach a larger market audience.

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THE JERSEY BROADCASTER is the newsletter of the New Jersey Antique Radio Club (NJARC) which is dedicated to preserving the history and enhancing the knowledge of radio and related disciplines. Dues are $25 per year and meetings are held on the second Friday of each month either at InfoAge or at Princeton University. Neither the editor nor NJARC is liable for any other use of the contents of this publication other than for information.

President's Workbench

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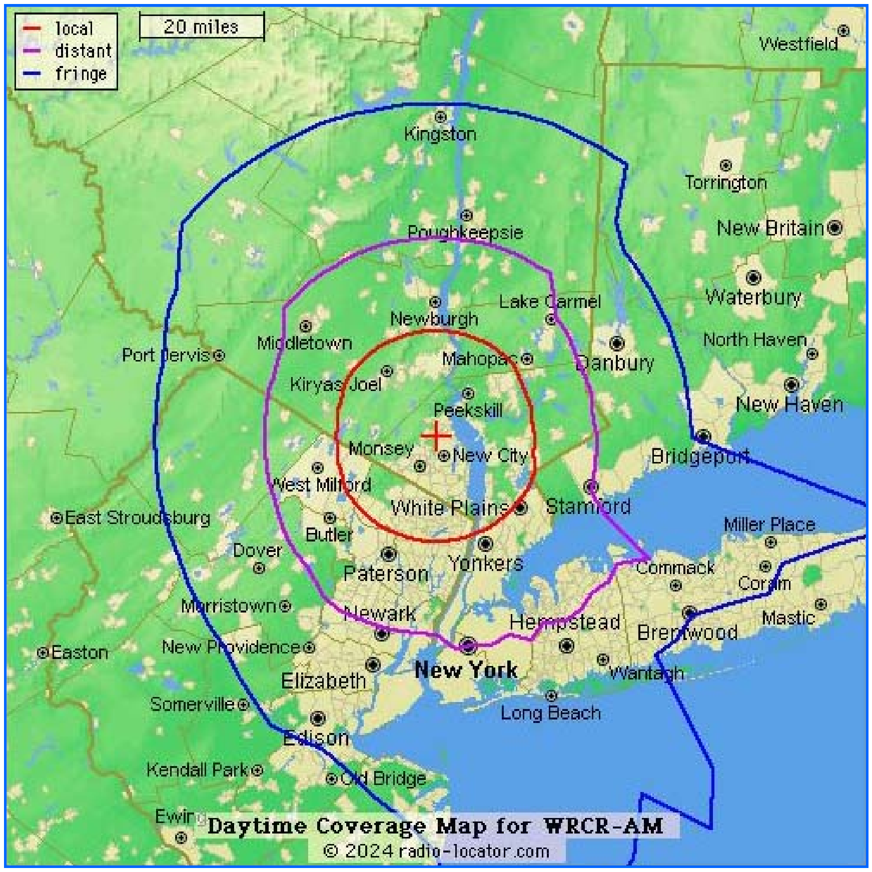

THE TALENT

Your Home Town Radio Shows! Radio Unscripted! Hokkie Dokkie stuff. Call-in-radio. The gardening show. Do you want to be a volunteer? Real estate Q&A. Local politician call-in interviews, the Doo-Wop music show, NY Boulders Baseball. Market update. The Mortgage Matters show. The Gumbo Ya Ya show (don't ask.) Local weather & Traffic. And the weekly morning show with Jeff & Will, which replaced The Steve Parcel Show, who was host of the Morning Show for over 40 years before retiring.

Now the good news?? Red Apple Media is owned by John Catsimatidis who owns and operates WABC Radio 770 kHz in New York City. Since his purchase of WRCR, he's been simulcasting WABC content. But "according to reports" his intentions are to expand WRCR's Home Town Market beyond sections of Bergen, Rockland, Orange, Nassau, and Westchester Counties. Will he continue with the same local talent? Probably not. Stay Tuned!

– Richard Lee Pres. NJARC

A Deep Dive into the Zenith 600 Series Trans-Oceanic

By Jim Whartenby

The Zenith 600 series began with the L600 and ended with the B600! Evidently the Zenith staff used up all of the alphabet and had to start over. The progression of the 600 model series is as follows:

Model	Year	Chassis#	Sams	Photofact Changes
L600	1954	6L40	254-13	Was rear ¼" headphone jack
R600	1955	6R40	254-13	Headphone jack moved to front
T600	1956	6T40	254-13	Add Radio/Phono switch
Y600	1957	6T40Z	254-13	Change to power supply?
A600	1958	6A40	381-16	Band Change from 4 - 8 to 4 - 9 Mc
B600	1958-62	6A40	381-16	No change. Last tube chassis

What is of interest with all in the 600 series of Trans-Oceanic short wave receivers is the use of a selenium rectifier that supplied both B+ and heater voltage and the use of a 50A1 ballast or current regulator tube. It is said that the TO performs best with batteries, but the only difference that I see in the schematic is that when using batteries, the B- bus is connected to the chassis via S3. For me, AC power works quite well with no noticeable hum.

The first Deep Dive article in the April 2025 Broadcaster compared power supply rectifiers. To recap (no pun intended!) selenium's claim to fame was that no heater power was required for rectification. It has a lower forward voltage drop compared to vacuum tube rectifiers and they were much smaller, more reliable and generated considerably less heat.

The drawback for selenium rectifiers is the relatively high reverse bias current which increased over time as the rectifier fails. The forward voltage drop also increases over the life of the rectifier which reduced the B+ voltage supplied to the radio. Both of these conditions make the selenium rectifier eventually run hotter then intended. Prolonged heat increased the reverse leakage current and forward voltage drop which itself causes more heat. This is the failure cycle of selenium rectifiers.

Comparing selenium to silicon rectifiers using the criterion of reverse to forward resistance ratios shows the superiority of silicon. The selenium rectifier found in this particular Zenith 6A40 chassis still seemed good according to the specifications found in Selenium Rectifier Handbooks. I originally saved this Zenith 6A40 chassis as an organ donor. It was missing the line cord take up reel and the audio output power transformer. Fortunately, I was able to locate and install the correct audio transformer from the transformer stash. Evidently, I save everything!

Comparing the forward voltage drop at 65 mA to the reverse bias current of -250 volts gave 7.7 volts forward volts and -3 mA reverse current. Forward and reverse resistances were then calculated. Comparing the reverse resistance to the forward resistance gives 83k divided by 118.5 ohms = 703:1. The silicon reverse to forward resistance ratio per the 1N4007 datasheet (I don't have the equipment needed to accurately measure micro-amps!) is 200,000,000 ohms divided by 10.7 ohms or 18,500,000:1. This is the reason why silicon diodes operate so much cooler then selenium.

The ballast tube maximizes the positive temperature coefficient of a heating element. As the temperature rises, so does it's resistance thus limiting the current through the element. The type of material, it's length, cross sectional area and the gas sealed inside the tube determine the particular ballast tube characteristics. They are all relative constant current sources. Current still increases with the applied voltage but at a much reduced rate compared to a typical resistor. The ballast is, in effect, a nonlinear resistor. The vacuum tube heater also has a constant current effect but not as pronounced. An interesting note is that during the testing phase, this particular TO chassis played on the BCB until the heater voltage went below 5.5 volts or 0.92 volts per tube heater. I was surprised!

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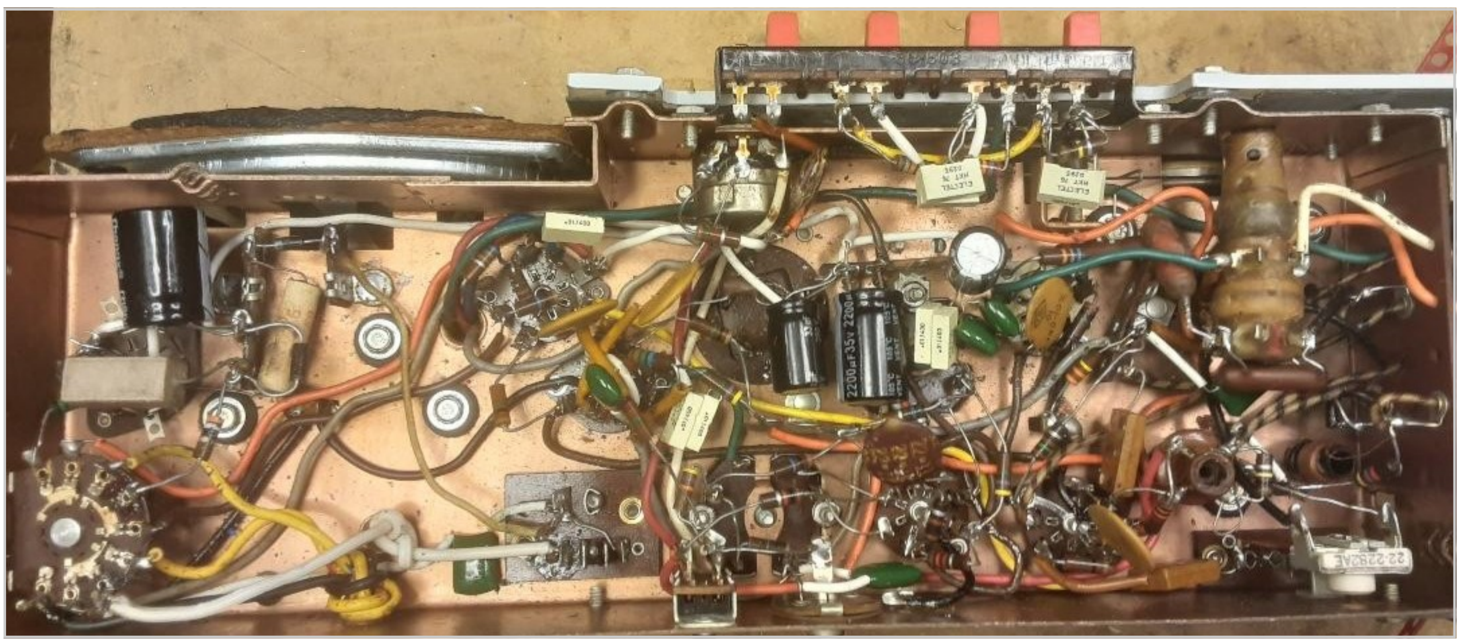
A Deep Dive into the Zenith 600 Series Trans-Oceanic
(Continued)

Recapping the cramped chassis was a challenge, especially near the four section electrolytic filter capacitor. Removing one component lead at a time and making a note where the replacement had to go allowed me to dig down into the chassis and expose the filter capacitor terminals. My habit is to remove wires from terminals and leave them clean. This makes for a neater chassis. It is a Zen thing.

Since modern capacitors are so much smaller then the original 1958 components, it was much easier for me to just add a few terminal strips then to extend the component leads. The added terminal strips were mounted to the chassis using my trusty 100 watt American Beauty soldering iron. This is perhaps the same type of iron that the women who initially assembled the radio used some 65 years ago.

It was easy to find new tie point locations so that the new by-pass and filter capacitors did not need to use the original tie points to the B- bus. This allowed me to put the replacement capacitors where they were needed. This eliminated several long wire leads that were part of the original circuit. Of course, there were a few coupling caps that had to be stretched to the lead limit to make the required connections. This was a minor problem with the radial lead capacitors used as replacements.



All of the white rectangular radial lead capacitors in the above photo are 0.01 µF, 400 volt units. Some are doubled up to replace the few 0.02 µF caps found in the circuit. Five black electrolytic filter capacitors were installed where they would have the shortest leads. The one seen on the top-left has another one mounted just below, it is hard to see in this photo. The green capacitors are 0.047 µF at 400 volts.

Once the new components were installed and their connections triple checked, AC line power was applied through a General Radio VARIAC® and a VIZ WP-26A Isotap transformer. The TO worked well in the BCB position. An alignment was done to the IF transformers and BCB tuner. The IF was spot on. The main issue with the BCB and other SW tuners had more to do with frequency tracking on the slide rule dial then in peaking performance. Not bad for a 65 year old radio.

Using the taps on the VIZ, I able to get pretty good agreement between the marking on the VARIAC® dial and the actual line voltage applied to the radio. This made the measurements process much easier. Voltage measurements were made with the AC line starting at 100 VAC and going up to 130 VAC. This range was chosen since the 50A1 ballast sees just under it's rating spread of 30 to 65 volts. Voltage measurements were

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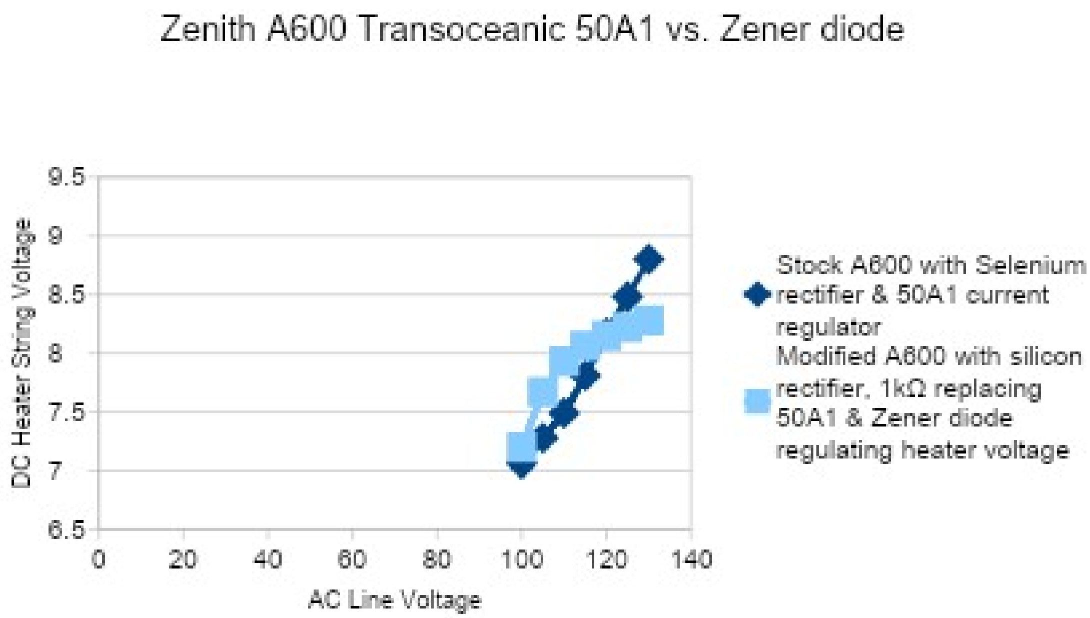
A Deep Dive into the Zenith 600 Series Trans-Oceanic
(Continued)

made across the heater string using my everyday DVM. Care was taken not to overly exceed 1.5 volts per tube or about 9 volts total for the series string of six heaters.

1.5 volts seems to be the magic number for the battery tube heater voltage. Yet there seems to be some disagreement between the battery manufactures and the tube manuals. Most of the tubes used in the TO specify a nominal 1.4 volts for the tube heaters while the 3V4 listing in the Tung-Sol tube manual specifies 1.25 volts ± 20% per heater. This gives a range of 1 to 1.5 volts. The A battery used in the TO has a 9 volt rating when the battery is fresh but I suspect that it could be a bit higher.



The dark blue line with the diamond markers in the above graph shows the Zenith 6A40 chassis in the "as built" condition. The heater string voltage varies as the AC line voltage is adjusted over the 100 to 130 volt range. Note that the dark line has a slight bend at about 110 VAC input where the 50A1 initially takes control of the current passing through it. From 110 to 125 VAC, the line is quite linear and is centered at about 120 VAC.

The light blue line with the triangle markers in the above graph is the voltage to the tube heater string that is limited in value by a Zener diode. Note that it's voltage does not rise above about 8.25 volts. The Zener diode is put in parallel with the tube heater string and the ballast current regulator is replaced with a 1KΩ 20 watt power resistor. Notice that the light blue line also has a slight bend below about 110 VAC. Above 110 VAC, the Zener starts conducting and regulating the heater voltage. The remaining section of this line is straight with a slight upward tilt.

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A Deep Dive into the Zenith 600 Series Trans-Oceanic
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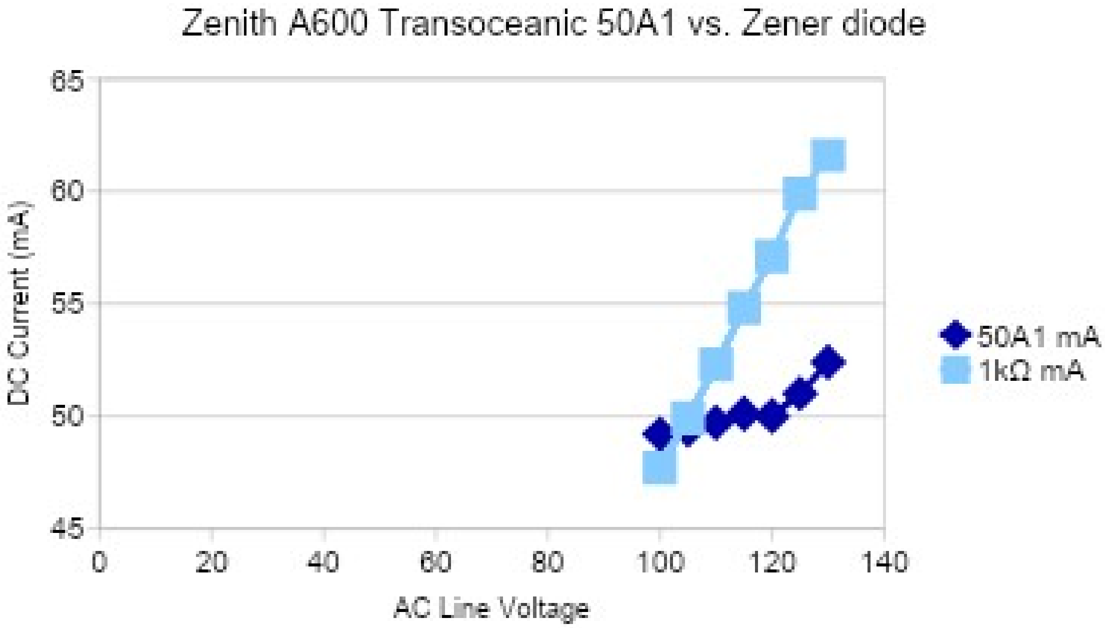

When the same heater string is powered by a Zener diode voltage regulated supply, the current has a mean value of 55mA at 115 VAC. See light blue curve with diamond markers. 50 mA is still flowing through the tube heaters but any current above this value is diverted through the Zener diode. This corresponds to the first graph where the heater voltage shown in the light blue line is now regulated to about 8 volts when the line voltage exceeds about 110 VAC.

Lastly, the Zener diode used in this experiment is a 10 volt 5 watt 1N5347B. This was used so that there could be a finer control of the heater string voltage. A ¼ watt resistor was added between the 10 volt Zener and the tube heater voltage string. The resistor value was chosen so that it would drop about 1.5 volts at 50 mA. The resistor value chosen with the Zener used was 39 ohms, as seen in the above photo near the AC line - battery switch. The standard values below and above this is 36 and 43 ohms respectively. Using this method, it will allow one to tailor the voltage drop to be closer then the ± 10% tolerance of the typical Zener diode.

So at this point, the heater voltage is well controlled, actually much better the what was available to the Zenith engineers when the 600 series of Transoceanics were designed. Nothing was done about the 7 or do volt higher B+. Since NOS battery packs have not been available to power the TO since the late 1960's. I don't believe anyone is sure about what the actual voltage tolerance of the original battery pack would be. Safe to assume ± 10% so the B+ battery can be as low as 81 volts or an high as 99 volts.

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A Deep Dive into the Zenith 600 Series Trans-Oceanic
(Continued)

Test Data #1, Stock A600 with selenium rectifier and 50A1 current regulator ballast.
Test Data #2, Modified with silicon rectifier, 1k replacing 50A1 and 10 volt Zener diode .
Test Data #3, Same as above.
Note: 560 ohm resistor actually measures 604 ohms & 700 ohm resistor actually measures 727 ohms.

Test Data #1

Line volts	Heater volts	50A1 volts	50A1 mA	50A1 Ω	Current thru 1kΩ mA
100	7.06	38.7	49.2	787	47.7
105	7.28	43.6	49.4	883	49.9
110	7.49	47.8	49.7	962	52.3
115	7.81	51.8	50.1	1034	54.8
120	8.17	55.8	50.0	1116	57.1
125	8.48	59.2	51.0	1161	59.9
130	8.80	63.7	52.4	1216	61.6
Δ 30 volts	Δ 1.74 v	Δ 25 v	Δ. 3.2 mA	Δ 215Ω	
± 13%	± 11.1%	± 24.1%	± 3.2%	± 20.8%	

Test Data #2

Line volts	Heater volts	Volts across 1k resistor	Current thru 1kΩ mA	Actual 1k value Ω
100	7.20	46.8	47.7	981
105	7.67	49.1	49.9	983
110	7.93	51.3	52.3	981
115	8.06	53.8	54.8	982
120	8.15	56.0	57.1	981
125	8.22	58.2	59.9	972
130	8.28	61.0	61.6	990
Δ 30 volts	Δ 1.08 v	Δ 11.3 v	Δ 13.9 mA	Δ 9Ω
± 13%	± 6.7%	± 11.1%	± 12.7%	± 1%

Test Data #3

Measured line volts	Volts across 560 Ω	B+ current thru 560 Ω	Volts across 700 Ω	Heater current thru 700 Ω
100	7.4	12.2	34.7	47.7
105	7.9	13.1	36.3	49.9
110	8.5	14.1	38.0	52.3
115	9.3	15.4	39.8	54.8
120	10.1	16.6	41.5	57.1
125	10.7	17.8	43.0	59.9
130	11.6	19.1	44.8	61.6
Delta 30 v	Delta 4.2 v	Δ 6.9 mA	Delta 10.1 v	Δ 13.9 mA
± 13.0%	± 22.6%	±22.4%	± 12.7%	±12.7%

RADIO

New Jersey Antique Radio Club's

Summer Tailgate Swap Meet and Ham Fest

**InfoAge Science and History
Leasrning Center and Museum
2201 Marconi Road
Wall Township, NJ 07718**

Saturday July 26, 2025

Refreshments Available

**40 Spaces available
$25 for members
$30 for non-members
Bring your own tables**

Open to the Public

**8 AM to Noon
Vendor setup at 7:15 AM**

**$5 ENTRANCE FEE
CLUB DONATION**

For Directions

**Visit our website: www.njarc.org
or set your GPS to:
2201 Marconi Road
Wall, NJ 07719**

Vendors Make Your Reservations Now!

**Contact:
NJARC President
Richard Lee
(914) 589-3751
radioricardo61@gmail.com**