



The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

September 2018

Volume 24 Issue 9



MEETING/ ACTIVITY NOTES

Reported by
Marv Beeferman

The ON-LINE Broadcaster
The *Jersey Broadcaster* is now on-line. Over 160 of your fellow NJARC members have already subscribed, saving the club a significant amount of money and your editor extra work. Interested? Send your e-mail address to mbeeferman@verizon.net. Be sure to include your full name.

Thanks go out to the club's technical coordinator Al Klase for his presentation "Practical Antenna Systems for the Radio Collector" at the August meeting. Al took the membership on a tour through antenna systems in general with "an eye to modern solutions such as active antennas that better fit the 21st century life style." He also gave us a look at both commercial and homebrew setups.

Al emphasized that careful testing is essential in building a good antenna system. Some suggestions for achieving this include:

- Arranging an A-B switch to compare the new antenna to the old "reference" antenna.
- Working in daylight when atmospheric noise is lower and ground-wave signals are available (minimum fading).
- Choosing a marginal AM station and working for improved reception.
- Using a communications receiver with a S-meter (helpful, but not essential).

Al also emphasized that since background noise is high and receivers are fairly sensitive, a receiving antenna does



MEETING NOTICE

The next NJARC meeting will take place on Friday, September 14th, at 7:30 PM at InfoAge. Directions may be found at the club's website (<http://www.njarc.org>). This month, member John Ruccolo will offer a talk on communication receivers and transmitters. In addition, president Richard Lee promises a "large auction of ham radio parts and equipment."

not need to be highly efficient...signal to noise ratio is far more important than absolute signal level. Therefore, a modest size skywire can give excellent results.

Al continued with a description of loop and outdoor antennas, their construction and their advantages and disadvantages. For the more adventurous, he talked about probe antennas, active antennas, commercial active whips, commercial active loops and homebrew antennas.

If you missed the presentation and want a great resource in pdf format, Al has provided a link (see 1 below) to his presentation. (Editor's Note: A general note about *Broadcaster* links. In most cases, I use a three-column format. If I can fit the entire link on one line in a single column, the link will usually work. However, if length forces me to use more than one line, it won't work unless I can stretch the link across three columns as you will see this month.)

Thanks also go out to Bob Bennett for the "rest of the story" on his restoration of a radio for a Tucker 1044 that originally appeared in the August *Broadcaster*. Bob has provided us with a link (see 2 below) as an addendum to his talk that gives more background on Tucker restorers Bob and Rob Ida and their shop and history. Bob also reports that the Tucker 1044, with its "professionally" restored radio, was awarded second place in class (behind a Tucker 1009) at the Pebble Beach Concours d'Elegance (see attached photo).



If you want to get a look at some beautifully restored 1920's radios, member Bill Zukowski recommends the Steven Johannessen Antique Radio Gallery. He found the source (see 3 below) while doing some research on Atwater Kent. If you're interested in a series of recreations and reenactments of landmarks in TV development starting in 1873, member Dr. Alex Magoun suggests NBC's "Eyewitness" program from 1947 (see 4 below).

Upcoming Events

- September 21-22 - Kutztown Antique Radio Meet
- October 12 - Monthly meeting at Princeton; Mike Molnar talk on Jack Poppele and Radio Broadcasting in NJ
- November 3 - Fall NJARC swapmeet/hamfest at Parsippany PAL
- November 9 - Monthly meeting at InfoAge; Show & Tell and Hints & Kinks
- November 17 - Fall Repair Clinic at InfoAge
- December 15 - Holiday Party at West Lake Golf & Country Club, Jackson NJ

LINKS

1. <http://www.skywaves.ar88.net/ANTENNA/Practical%20Antennas%202-2%20Web.pdf>
2. http://www.vanderbiltcupraces.com/blog/article/fuelcurve.com_ida_automotive_inc_where_excellence_takes_shape
3. http://stevenjohannessen.com/gallery_ak.asp#
4. <https://archive.org/details/EyewitnessStoryOfTelevision02261948#>

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 the second Friday of each month at InfoAge or Princeton University. The Editor or NJARC is not liable for any other use of the contents of this publication other than information.

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HISTORIC SPEAKER DEMONSTRATOR AT THE RTM

By
Al Klase

It's really easy to pile up a bunch of artifacts and say "isn't this wonderful." But it has been my contention, for a long time, that the really magical thing about radios is that they produce sound. The RTM has accumulated quite a collection of early speakers, so I decided that we should set up a display where they could be "auditioned" by visitors.

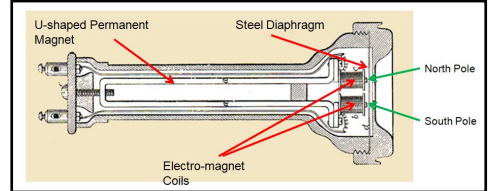


The display highlights loudspeaker development from the early 1920's to the late 1940's. The sound ranges from barely-acceptable to true high-fidelity. A control console allows the visitor to select a speaker and choose from a variety of program material. A volume control is also provided. A light on each speaker indicates which unit is being "auditioned."



Speakers are transducers that convert electrical energy to acoustic energy (pressure waves in the air). Most of the early ones were based on Bell's telephone receiver. The permanent magnet is very important. If it were not present, the diaphragm would move toward the pole pieces on both the positive and negative audio peaks, hopelessly distorting

the sound. The standard telephone proved inconvenient for telephone operators, who needed to use both hands. So, the permanent magnet assembly was folded to make the familiar "watch case" receiver. Thus the telephone became the head telephone or "headphone."



Experimenters discovered that they could attach a "phone" to a phonograph horn and achieve room-filling sound. Commercial products were developed to allow radio enthusiasts to easily apply their phones to a horn when signals were strong.



The steel diaphragm in a headphone element can exert considerable pressure, but only to a small area of air, so the conversion of electrical energy to sound energy in open air is very inefficient. The horn acts as an acoustic transformer, transforming a high sound-pressure level over a small area at its throat to a lower sound-pressure level across a considerable area at its mouth. This transformation is very efficient - a milliwatt of audio will go a long way.

Despite its efficiency, a horn speaker has a couple of shortcomings. A table-size horn will have a sharp frequency roll off below 200Hz where the length of the horn is less than approximately a quarter acoustic wavelength. That's about "A" below

Middle-C, so it cuts out the fundamental frequencies of voices and many instruments. Most early horns were simple cone shapes with a flare at the big end to better disperse the sound. These suffer from poor mid-range frequency response.

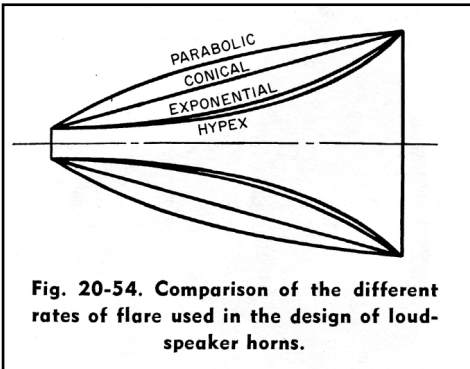


Fig. 20-54. Comparison of the different rates of flare used in the design of loudspeaker horns.

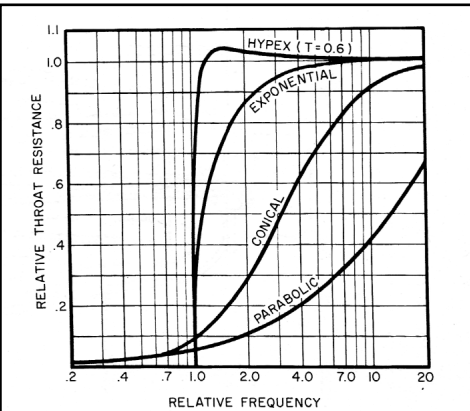
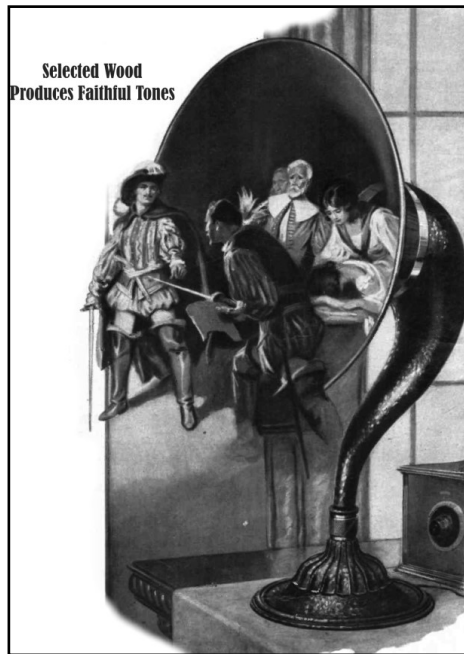


Fig. 20-55. Comparative performance of the horn flare rates that are illustrated in Fig. 20-54.

(From: The Audio Cyclopedia, H. Tremaine, p 1099)

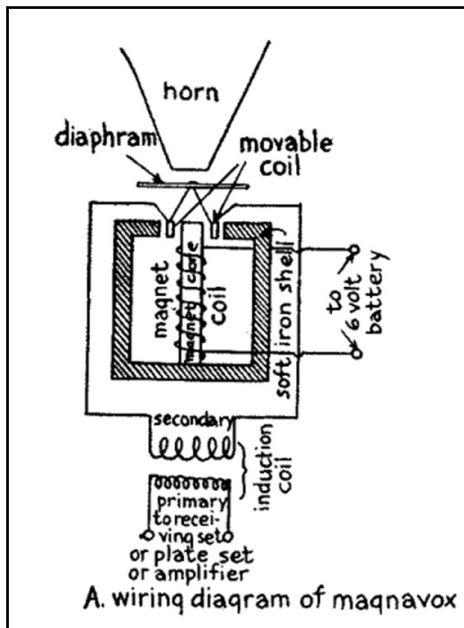
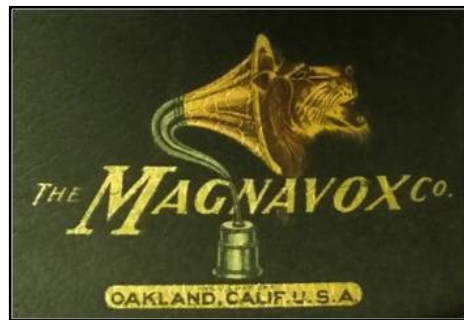
Our #1 and #2 speakers, the Amplitone and the Western Electric 10A, have conical shapes. The improvement in tone quality, to even the most casual listener, is obvious when compared to #3, the MusicMaster, with its exponential flare and wooden bell.

Speaker #4, a Magnavox R3, was actually an earlier design by Peter Jensen, who was working on public-address systems. Classic telephone style transducers cannot produce really high sound pressure levels because the travel of the diaphragm is very limited. More ambitious designs run into the limitations of the available permanent magnets - they weren't very strong. Jensen's solution was a strong DC electro-magnet powered by the radio's "A" battery. A voice coil, similar to the ones in modern speakers, moved in the field of the electro-magnet and was connected to a metal diaphragm. Greater diaphragm



The MusicMaster

movement equals more sound, hence the brand name Magnavox.



The Phone Company gets back in the act in 1924 with the introduction of the Western Electric 540-AW Hornless

Loudspeaker. A very efficient moving-armature driver actuates a large paper cone via a pushrod. It's passably loud, and has much improved bass response compared to the small horns.

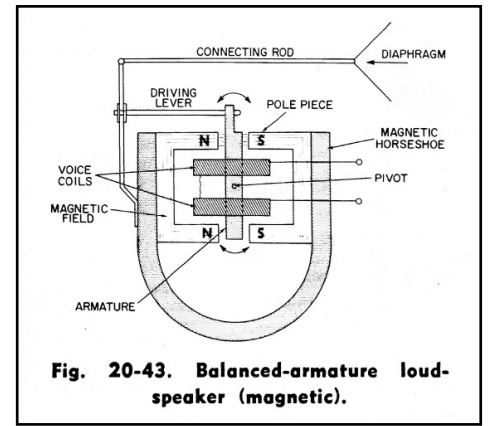
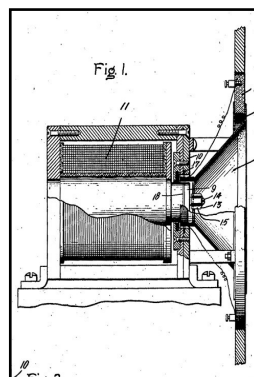


Fig. 20-43. Balanced-armature loudspeaker (magnetic).

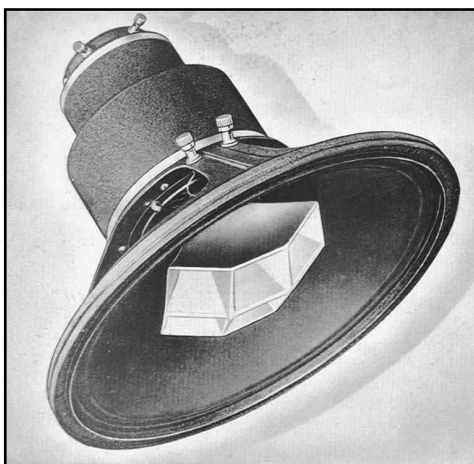
The Radiola 104, introduced in 1926, used the Rice-Kellogg (you can't make this stuff up) music-optimized loudspeaker, the first electro-dynamic cone speaker. It was developed by General Electric engineers Chester W. Rice and Edward W. Kellogg. The 104 was a combined speaker, audio amplifier, and A-B power supply designed to be used with the Radiola 28 superhet. The electro-dynamic speaker would become a standard feature of radios throughout the '30s and '40s.



Meanwhile, back at The Phone Company, a lot of work was being done on sound motion pictures. A major challenge was to fill a large theater with sound that was a faithful representation of the original performance. High

Fidelity was born, but it generally involved really large horn speakers.

Western Electric spun off the Altec Services Company to take care of theater sound systems. Altec Services acquired the nearly bankrupt Lansing Manufacturing Company in 1941, becoming the Altec Lansing Corp., and began building loudspeakers. In 1945 they introduced the Altec 604, a two-way speaker. A multicellular horn for high-frequencies was mounted coaxially with a 15" woofer. Both were fed from an external cross-over network, separating the audio spectrum into two bands. Both speakers utilized newly-introduced Alnico-V permanent magnets, eliminating the power supply that would have been needed for electrodynamic designs.



The 604 found a home as a recording studio monitor and remained the standard in this application for many years. In the early '70s, I asked a recording engineer why he was using these old speakers to do mixdowns. His answer: "Because everybody knows what they sound like."

Come and hear ours at the museum!

MEMBERS CHILL AT SUMMER REPAIR CLINIC

By
Marv Beeferman

If you never attended one of the club's repair clinics, either as an "expert" who guides clients in dealing with their ailing radios or a client himself, then you really should consider it. Scheduled clinic days, held at InfoAge, show up in the "Upcoming Events" section of the *Broadcaster* and the next clinic will be held on November 17th. Experts show up at 9:00

and clients are welcomed at 10:00.

In today's environment, where the politics can get as heated as the temperature, sometimes it's nice just to get together with a few friends who share a common interest and leave the stresses of your life somewhere else. You'll be treated to my world famous "radio bagels" and president Richard Lee's perfect cup of morning coffee. Then be ready for a welcoming atmosphere where the good advice as well as the kibitzing will flow as smoothly as hot solder. A pizza lunch is provided at a minimal cost.

As usual, you can view this summer's antics on YouTube, courtesy of Bob Bennett's "Radiowild" (see link below). We're looking forward to seeing you in November!



Kevin Mcdermott worked on a 1958 Model 630, 45 RPM record player owned by Tommie Shider. It suffered from a bad amplifier and cartridge. Kevin determined that new amplifier tubes and capacitors were in order. He was able to rebuild the amplifier and cartridge but opted to finish the job at home. Mr. Shider noted that he "enjoyed watching an expert at work! Kevin knew exactly what needed to be done to restore the record player."



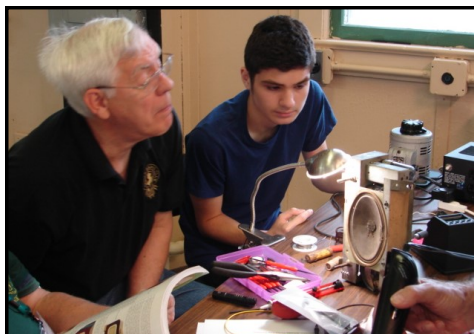
Max Theis was joined by Al Klase to work on Max's 1937 Sears Silvertone 4565. The 4565 was part of the "Sears Golden Jubilee" series of radios with different-sized gold dials and styles and

had the most impressive gold dial of the series. It covers the AM broadcast band and short-wave up to 18 MHz. The radio was restored by its previous owner and the "shutter" function on the magic eye tube was not working. A potentially bad 1 megohm resistor in the IF transformer and the AVC circuit was being investigated as the day ended.

Max also worked with John Ruccolo on an RCA 45EY15 "Roy Rodgers" record player that had no sound and required recapping and a plunger rebuild.



John Ruccolo assisted Richard Lee in dealing with the low modulation output of Richard's B&K D200E RF signal generator. All that was required was a "tweaking" of the calibration potentiometer. There are some things that even a radio club president can't figure out - or perhaps he was just testing John's skills?



Links: <https://www.youtube.com/watch?v=SIoUXUGfC4>

Paul Hart tackled a 1941 Philco table radio owned by the Percoco family, father and son. The radio would play only for a short time and then cut out. A few capacitors were replaced but the same problem re-appeared. Further work was required but Mr. Percoco noted that "Mr. Hart was very helpful and knowledgeable and my son learned by watching."



New member and RTM docent trainee Jim Doran teamed up with Tom Provost to check out a Grundig Majestic 4006 U stereo radio. The radio was functional but Jim wanted to get his "feet wet" on evaluating a radio under the watchful eye of one of our "experts." Three tubes were found to be weak and would require replacement and the radio will continue to be checked out. Jim said that he found the day educational and interesting and he learned a lot about tools and techniques as well as radio history and evolution.



Although Len Newman only brought in the chassis to his 1941 Zenith 10H571 "Spinette," I couldn't resist adding a photo of what the typical cabinet of this beautiful radio looks like. Besides the broadcast band and short-wave, it could tune the early FM band. The radio featured all the sales pitch features of the time - a high frequency diffusing sound deflector, a bass reflex chamber, dual wavemagnets, a double limiter and something called "Radiorgan" which was supposed to give "tone mastery on all stations." It sold for \$139.95.

Working with Jules Bellisio, Len identified the 32 paper capacitors that would need replacement and noted the typical deteriorated rubber insulation found on Zenith's of the period that would have to be addressed. Len and Jules efforts were mostly focused on parts replacement identification and collection.



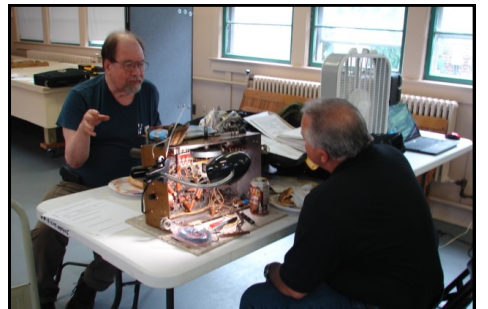
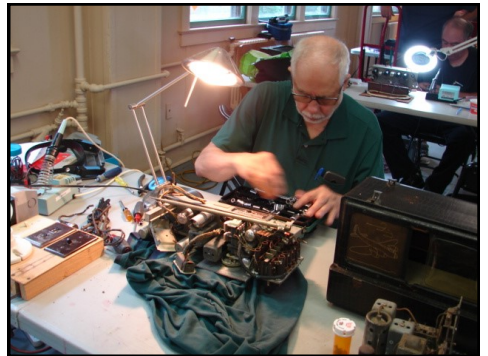
Bob Bennett worked on a 1953 RCA 2X61 plastic table radio. The radio uses six tubes, runs off AC or DC and has a phono input. It is owned by John Grady and was dead on arrival.

Bob tested and reseated tubes and replaced the filter caps resulting in a radio with no hum, low volume and no dial lights. The 270 ohm resistor on the rectifier read over 400 ohms and was replaced along with two coupling capacitors. The tap for the dial lights on the 35Z5 tube was found bad and the tube replaced. Finally, a noisy volume control was cleaned and the radio is now "a player."



Don Irish cleaned up the connections on a Crosley "Pup" and tried to get receipt of at least one station. These radios are quite simple in construction and there's not much that can go wrong. Like the Crosley 51, the Pup has a book condenser and spiderweb coils and feedback is via a smaller spiderweb moved by a square shaft. The radio would regenerate but it seemed like conditions were not going to cooperate. Perhaps more experimentation with tubes (199, WD11, UX200) and plate voltages are in order.

It Goes Without Comment



TESTING THE 26 AND "BATTERY-TYPE" TUBES

By
Marv Beeferman

I've been working on a Truetone model D3840 battery/line-operated radio powered by 105-125 volts AC-DC or a 9.5 volt "A" supply and 90 volt "B" supply. It uses a 1U4 RF amplifier, a 1R5 converter, a 1U4 IF amplifier, a 1H5GT detector/AVC/AF amplifier, a 3Q5GT power output tube and a 117Z3 rectifier. All tubes tested well above their "minimum value" on my TV-7D/U tube tester except for the 1U4's which were below minimum.

While considering a source for replacing the 1U4's, which run off a 1.4 volt filament voltage, a lightbulb went off in my head...something I read about in Ludwell Sibley's *Tube Collector*, the bulletin of the Tube Collector's Association. Sure enough, in the October 2017 issue, I found an article by Paul Hart titled "Testing High-Current Tubes on a TV-7 and its Relatives." The article deals with low filament voltages in tube testers relating to testing such tubes as the 26, the 2A3 and battery tubes such as the 1U4.

Hart notes that issues related to low filament voltages in tube testers are not new. He was able to make measurements on a TV-7/U that provided only 1.1V on the 1.5V setting. In addition, extracted transformers from TV-7's measured a 1.3V or slightly higher filament voltage on the 1.5V setting tap (#22) with 93V on the primary. Hart also noted that, without exception, the 1.5V position transformer tap was marked "1.2V."

The TV-7 military technical manuals provide the lowest acceptable values for the 1.5V filament position: 1.25V for the TV-7/U and 1.42V for the TV-7A/U,B and D versions. But Hart notes that the most frequently encountered value is about 1.32V. "From this information, it is confirmed that the design of the TV-7 compels testing at the 1.5V filament position with voltages below those which might be expected."

Hart goes on to speculate why the military might have accepted TV-7's with low values at the 1.5V filament position. With the type 26 tube (one of the first U.S. generation of AC-heated tubes) drawing about 1 amp of filament current and most battery-type tubes drawing only 50 or 100 mA, there probably wasn't much use for the 26 from 1952 onward (the year that the TV-7 was first intro-

duced). Second, battery-type tubes were probably extensively used in walkie-talkies where the oscillator was the weak link. With batteries for these units being hard to obtain: "It may have been considered prudent to deliberately handicap the testing of battery-type tubes to clear for service only those that would deliver the last possible bit of operation as a battery neared the end of its useful life. Use of a lower-than-specified voltage might assist in rejecting tubes that might fail early as the batteries in portable equipment discharged."

Hart reviewed the results of tests for the type 26 on an "engineering tester." At 1.35V, it was found that there was a very small difference between the G_m readings and those at 1.5V. Below 1.35V, the results started to gradually drop. With 1.1v on the filament, results began to decay quickly.

On a Hickok 6000A, the filament switch is marked "1.4", and provides about 1.35V to the filament of a 1U4 (very close to its rating). Hart found that the G_m reading for this tube was consistent with measurements made on other testers. However, when a 26 was tested, the filament voltage dropped to about 1V. "Unfortunately, unless proven otherwise, it is fair to presume that lower-level testers of other types may also provide low filament voltages when testing the 26."

In the case of the Hickok 539B, a filament setting of "1.4" delivered 1.35V, and both the 1U4 and 26 tested well. Hart attributes this to the fact that the tester has separate filament and test supply transformers. The TV-7 has a single transformer serving both functions. However, the 1U4 and 26 tested well on the single transformer Triplett 3444, regarded as a "high-end" tester.

Based on the above information, Hart determines:

"...it is fair to conclude that testing a 26 with 1.1V on the filament is too low. A TV-7 or any variant should provide a minimum of 1.25V to test a 26. Even this low a voltage is most likely to be encountered only in a TV-7/U. Most TV-7s will provide 1.3V and some as much as 1.35V. A tester that provides lower voltages is likely to be either out of calibration or have an out-of-specification power transformer, or both."

Hart suggests a "cheating" remedy to test a 26 on a TV-7. Connect a voltmeter to the filament pins. If the filament voltage is below 1.3V, adjust the "Line Test" to reach 1.3V. (This will also increase the plate and bias voltages, but these in-

creases will tend to offset each other.) When the test button is pushed, the filament voltage will decrease - this is normal. Take the reading quickly and release the test button.

Hart notes that all of the testers he looked at appear to provide appropriate test values on battery-type tubes requiring 100mA of filament current or less. But many TV-7 testers apply filament voltages somewhat below the rating for testing battery-type tubes. "This appears to be systemic and intentional." The result is that some battery-tubes might be rejected although they may be fine at their rated filament voltage.

The TV-7 testing problem may also apply to the 2A3 which draws 2.5A of filament current at 2.5V. Some TV-7s will provide as low as 2.1V at this setting. Therefore, it is important to verify 2.4V on the filament before testing this tube. This caution also applies to large tube testers like the 539-series because of their long wire runs.

Finally, Hart provides a blanket caution that may be applied in all cases: "Be sure your tester, regardless of make and model, is providing sufficient energy to the tube filament to achieve a valid test."

I opened this article with my concern about low readings on two 1U4s in a radio I was working on so I decided to take some additional readings based on Hart's findings. I obtained the following data on my TV-7D/U:

<u>Line Adjust</u>	<u>Volts</u>	<u>Meter</u>
<u>Tube 1:</u>		
Center	1.22	20
+3	1.34	26
<u>Tube 2:</u>		
Center	1.23	18
+3	1.36	30

The minimum meter value for a 1U4 is 22 which corresponds to a G_m of about 500. As you can see, with the Line Adjust at its center "Line Test" mark, both 1U4s were below minimum and the filament voltage was about 1.22V. When the Line Adjust was increased three divisions above center, the increased filament voltage brought the G_m above its minimum. In addition, the filament voltage did not change when the test button was pushed. This was expected since the 1U4 draws a filament current of 50mA as opposed to 1 amp for the 26.

I then decided to perform similar tests

on my Hickok 752. At the "1.4" V filament setting, I measured a filament value of 1.4V. The minimum G_m was listed as 275; values of 335 and 285 were obtained. Therefore, it appears that the Hickok does not suffer from the same problems as the TV-7.

It would have been nice to have tested a 26 and 2A3 but I didn't have any immediately available. Perhaps I can give you some data in the October *Broadcaster*. In the meantime, why don't some of you take some data for your own tube testers and send me the results? Measuring the filament voltage is easy by using a socket extender that has test points as shown below.



WHAT IS HIGH-FIDELITY?

By
Marv Beeferman



"Oh, Wi-Fi; I thought you said hi-fi."

In his article describing the speaker demonstrator at the RTM in this month's *Broadcaster*, Al Klase suggests that high-fidelity was born in the movie theatres to provide a faithful representation of the original performance. Just prior to WWII, commercial "high-fidelity" radios were making their appearance with associated select circuitry and in coordination with specialized radio stations to maxim-

ize frequency response. Wikipedia defines high-fidelity as a term used by listeners, audiophiles and home audio enthusiasts to refer to the high-quality reproduction of sound. Ideally, high-fidelity equipment has inaudible noise and distortion, and a flat (neutral, uncolored) frequency response within the human hearing range.

When manufacturers discovered that the term could be associated with a host of entertainment devices, the flood gates were opened. However, there were a few adventurous souls that thought that the term was too loosely defined and more specifics were in order. This is reflected in an editorial by W.A. Stocklin, editor of *Electronics World*, in his ...for the Record column in the March 1963 edition. His article, "EIA Defines 'High Fidelity,'" is reproduced below.

Although not all of the facts have been made public as yet, we do know that the Electronic Industries Association has agreed on a definition of the term "high fidelity." Their recommendation will be presented shortly to the Federal Trade Commission in the hope that it will help them to determine what may or may not be advertised as a "high-fidelity" product.

There is obviously a need for a realistic definition, but we suspect that the EIA recommendation will be identical to their previously published proposal. If this is so, it will be one of the biggest fiascos of 1963. Imagine a definition that permits the term "high-fidelity" to be applied to any product that (1) will produce 5 watts of music power output and (2) has a frequency response within -3db at 100 cps to -6 db at 8000 cps. No mention is made of many other important characteristics such as distortion, hum, power response, etc. Why? There are many table radio sets that could qualify as "high fidelity" under these standards.

The EIA even apologizes in that they point out that their standards are inadequate from an engineering and technical aspect and that only minimum standards were set. If they are not satisfied, why make such a recommendation? It is unfortunate that those manufacturers who produce minimum-standard equipment will be given the same recognition as those producing truly high-quality designs.

None of our readers will be misled but, unfortunately, the uninformed consumer will become even more confused about high fidelity than he already is.

Why not call the low quality units

simply "radios and phonographs"? Then set realistic standards for high quality designs. We might even set a number of different standards to denote various levels of performance.

We hope that the FTC gives considerable thought to the recommended definition before accepting it, since the standard, as proposed, will not help them solve their problems regarding high-fidelity equipment.



Perhaps the audiophiles have the answer. As a noun, audiophiles use the term "high-fidelity" to describe the seemingly endless pursuit of finding the perfect sound-reproduction system. They might describe a sound as bright, dark, warm and dry, among other things. Some use the word *ambiance* to describe the way a listening environment makes them feel. They say that certain venues imbue recordings with a particular sound or mood, and with hi-fi equipment you can recreate the sensation of actually being at the venue during the performance.

An audiophile would tell you that a good hi-fi system would pick up every nuance of an original performance, even claiming that he or she could identify the brand of guitar played by a musician based on how it sounds on a hi-fi system. Perhaps the definition of a hi-fi system is one that recreates sound perfectly. If blindfolded, you'd be unable to tell if you were listening to a recording or if a musician were in the room playing right next to you.

When you think about it, though, sound quality is somewhat subjective. One person might think a sound system stresses the treble range too much but another might think the sound is perfect. There may even be psychological factors that influence sound quality.

In the end, I'd stay away from definitions and enjoy the music any way you want to listen to it. And don't get me started on "high-definition audio" and HD radio!



New Jersey Antique Radio Club's

Fall Swap Meet



Parsippany PAL Building

33 Baldwin Road

Parsippany, NJ 07054

Just off Route 46,

Adjacent to Smith Field



Saturday November 3rd, 2018



Refreshments Available

(70) 8 Foot Tables

\$25.00 for members

\$30.00 for non-members

Reserve Additional Tables \$20.00

At the Door \$25.00

Open to the Public

8am to 12 noon

Vendor setup at 7:15 AM

\$5.00 ENTRANCE FEE

CLUB DONATION

For Directions

Visit our website: www.njarc.org

or Mapquest

33 Baldwin Rd Parsippany NJ 07054

Vendors Make Your Reservations Now!

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