

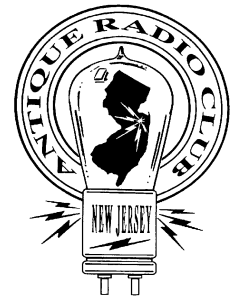


The Jersey Broadcaster

NEWSLETTER OF THE NEW JERSEY ANTIQUE RADIO CLUB

March 2007

Volume 13 Issue 3



**MEETING/
ACTIVITY
NOTES**

Reported by Marv Beeferman

THE ON-LINE BROADCASTER

The New Jersey Broadcaster is now on line. To date, 78 of your fellow NJARC members have subscribed, saving the club some \$1,400 per year. Interested? Send your e-mail address to: mbeeferman@cs.com
Be sure to include your full name!

The helm was in the able hands of Vice President Richard Lee at the February meeting. As a warm-up to the second phase of the Ed Lawlor auction, our resident video visionary, Dave Sica, offered a viewing of "On the Air" produced by the Chevrolet Motor Division of General Motors. An overdramatized black-and-white documentary from the early 40s, the film traced the transmission of a program of musical numbers from a typical radio station to the listener's living room.

Under the direction of Richard Lee, Al Klase and Sal Brisindi, the Ed Lawlor auction went very smoothly and some very nice pieces were hammered down at very reasonable prices. A few of the results are offered in this month's *Broadcaster*.

Ray Chase reports that, in spite of the cold weather, quite a bit of progress is being made at InfoAge:

- The "hands-on" room is essentially completed and carpeted and is ready to give kids a real "feel" for science.
- A heated storage room has been set up for excess NBHF and museum artifacts. Electric heating elements are being considered for the museum's HVAC unit; the 3 or 4 electric heaters presently in use are enough to protect our displays but were not



MEETING NOTICE

The next meeting of the NJARC will take place on Friday, March 9th, at 7:30 PM at the David Sarnoff Library in Princeton, NJ. Contact President Phil Vourtsis (732-446-2427) or visit us at <http://www.njarc.org> for directions. We'll be awarding prizes to the winners of our 2007 BCB DX contest and judging our Homebrew Contest entries. We'll also continue to collect 2007 dues, so please have cash or a check at the ready (\$20 for single membership/\$25 for joint).

enough to heat the museum for Sunday traffic. Hopefully, we're done with the super cold temperatures of last month.

- A DVD player was installed in the utility room and several more blinds and their valances were repaired.
- The large RCA, air-cooled transmitting tube donated to the museum was set up for display.

base.

- The Jacobs Ladder display has been moved to the museum and Ray is taking steps to "turbo-charge" the Tesla coil.
- A plan is being developed to feature an InfoAge exhibit every week in an article mailed to all newspapers in New Jersey for their free "Local Events" sections. Ray has provided the first two write-ups:

"See Your Sound" and "Remember Vacuum Tubes" which describe two current displays at the museum.

- We are reviewing three volumes of books published by the Exploratorium Science Museum in San Francisco. They provide the details for setting up science displays at a fraction of the cost of purchased displays. Ray will be providing a list of items to keep your eyes out for at flea markets, auctions and equipment sales that could be useful.

Ray also says that we have a large Dumont model RA-110 console TV at the museum that was donated by its original owners who gave it the smoke test about 10 years ago. It's in very nice, original condition and would be great to view vintage TV shows on. Are there any volunteers to taken on the task of making the set operational?

Steve Goulart reports that InfoAge was featured on the Weekends Perspectives show coming out of Philadelphia (channel 6). The initial segment was planned to focus on Dr Johnson's film *No*



What in the world! No, not a long lost experimental radio but some of the "apparatus" in the Mad Science Lab at the Infoage haunted hotel this Halloween. Included was a Jacobs ladder, Tesla coil and a bunch of stuff chosen to look weird and scary with lots of meters, tubes, dials, etc.

- The Marconi picture in the entry to the museum was repaired and titled.
- A telegraph relay was added to the telegraph sounder display on a new, larger

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 \$20 per year and meetings are held the second Friday of each month.

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Short Climb which featured the first black scientists and technicians hired for defense work at Camp Evans during WW II. However, when the producer started seeing InfoAge, he expanded the segment so it also features all the work being done on site. Several of the interviews are conducted in the NBHF with our exhibits as background. We should be able to show the video at a future meeting.

Steve also reports that there are plans to set up a Technical Library on the second floor of the hotel. If you're interested in helping out with this project, contact Steve at 732-749-3318 or 732-371-6116 (cell). Dewey decimal system experience might be a plus since the library has been expanded by some 4000 books from the Fort Monmouth Technical Library.

Upcoming InfoAge Events:

April 21: OMARC ham flea market at the Diana site

May 5: New Jersey Shipwreck Symposium

May (?): NJARC Crystal Set Symposium

June 2: "Wall of Honor" dinner and fundraiser

June 9/10: Northeast Vintage Computer Fest

June 16: Antique & Classic Car Show

July 28: NJARC Swapmeet

Sept. 15: WW II USO style dance and canteen

Oct. 11-27: Haunted Hotel and Hayride

Our gracious host at the David Sarnoff Library, Executive Director Alex Magoun, reports that on David Sarnoff's 116th birthday (February 27th), he received a check for \$5,000 from Vizma Sarnoff. This is the largest individual donation ever received by the Library. Alex says that this and additional gifts will allow him to begin hiring some part-time staff - an education coordinator to begin planning and scheduling field trips to the Library's exhibits, and a marketing and development director to build on the various initiatives that he has started in promoting the Library's activities.

Alex would also like to encourage us to support David Sarnoff's charter induction into the New Jersey Hall of Fame by voting for him in the Enterprise category at www.njhalloffame.com/bestandbrightest.htm. Right now, Buzz Aldrin is leading in this category so please vote and encourage

your friends and associates to join in.

In the "this isn't your father's radio" department, I recently came across a news release for Silicon Lab's Si4730/31, the industry's first fully integrated, 100% CMOS AM/FM radio receiver IC. Powered by 2.7 to 5.5 VDC, the chip only requires two external components and less than 15 square millimeters of board area excluding the antenna inputs. Among its features, the IC offers interference rejection in both AM and FM bands and optimum sound quality under varying reception conditions via digital signal processing. It also has advanced seek algorithms, soft mute, auto-calibrated digital tuning, FM stereo processing, analog or digital audio outputs and a programmable reference clock. And if this wasn't enough, a digital processor for the European Data System and North American Radio Broadcast Data System enables broadcast data such as station identification and song name to be displayed to the user. Finally, the receiver needs no manual alignment. WHEW! I will attempt to obtain a sample of the chip for potential display purposes at the museum, illustrating the road to miniaturization.

Finally, although not exactly radio-related (I get to do these things as editor), I noticed in *NextTECHS* that a company was searching for a funding and development partner for a product which will passively inhibit wireless signals within restaurants, theaters, libraries, places of worship, etc. Just the perfect cup of tea for someone whose annoyance factor has reached the boiling point as a result of wireless phone rings, inane, second-hand conversations and the disturbing light in a darkened theatre from a portable phone's screen.

The proposed technology is interesting - it doesn't use signal grounding. An incoming radio signal impinges on a coating of dielectric material which acts like a mirror. This "mirror" reflects a certain portion of the signal and decreases its strength. The remaining radio signal then impinges upon a special pattern which creates interference. The pattern, called the Interference Generating Pattern (IGP) is used essentially to create a box through which radio signals can pass only at very much reduced strength. This reduction of strength makes communications ineffective. Amen!

THE BTA-250L TRANSMITTER MOVE

PART II

In the January 2007 issue of the Broadcaster, we ran an article on the club's acquisition of an RCA BTA-250L AM transmitter and supporting console from station WMID AM (1340) in Atlantic City. The club hopes to some day use these components as a basis for a simulated AM broadcast station at InfoAge. But what was probably more inspiring than the transmitter itself was the dedication and the enthusiasm a few NJARC members to move a very large piece of heavy and cumbersome equipment in order to preserve a little piece of radio history.

Since I wasn't present for the move, I asked those involved for some photos and a short summary. But it was a nice surprise to receive some personal impressions in addition to the material I requested. I'd like to share these thoughts with you.

"At one point, most of the 1300-pound transmitter came down on my right middle finger. I swore to God that I would never give anybody the finger again. Ouch!

Sal (Brisindi) deserves most of the credit. He found someone willing to donate the transmitter, coordinate the move and provide transportation (a landscape trailer that worked out very well). Ray (Chase) and Ray (Facinelli) handled pulling the big iron (plate, filament, modulation transformers and maybe a filter choke) to try to lighten the beast. Me? I tried to stay out of the way, unless called upon to lend a hand. It was a lot of fun and good camaraderie.

You can really see how the radio business has changed. There were four generations of obsolete formats at the station: 78s, 45s, LPs, 4-track cartridges and CDs. Now everything is MP3. I guess you could store the station's entire collection on a good-sized iPod!

The station's new AM transmitter was a small, rack-mounted unit that looked like a large, fancy microwave oven. Times really have changed - the station was like a trip back through radio broadcasting, 1940s thru 1980s."

John Ruccolo

"I volunteered for this because I knew it would be an experience that I will remember for the rest of my days on this planet. I met with Ray Chase at his home and drove to the station in A.C. The transmitter was in the back room of a ranch type house with a hall in the middle and rooms on both sides where the radio people worked. Ray, Steve and I removed 4 large transformers from the inside of the unit to lighten it up. We then moved it off the wooden platform it was on, laid it on its side onto a dolly and moved it through the hall onto the trailer. It was a little bit of a struggle, but with big John and Sal, it was a piece of cake.

No one stays at the station except for a visit by the engineer once a week. What is really funny is the transmitter they have - solid state, about 18 inches by 2 feet square. They also have a standby unit the same size as the one we removed.

I tell my story of the rescue of a piece of history to all the hams that I talk with on 80 meters and everyone shows great interest. Too bad this world is moving so fast. Who needs it?

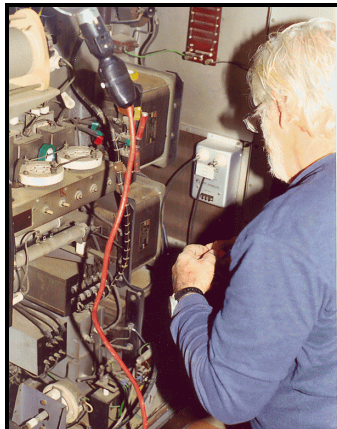
Ray Facinelli



John Ruccolo, a strict environmentalist, tells us to "watch out for those PCBs."



Station WMID



Left-Steve Goulart pulls some heavy iron. Right-Pattern for the side dimensions of the transmitter to determine how many file cabinets needed moving for maneuvering the transmitter out on its side. Ray Chase got the original dimensions from a tech manual; his scheme worked perfectly!

HOW BEAUTIFUL ARE THOSE BLACK BEAUTIES?

By Marv Beeferman

It started with a Reflector posting by Dave Sica for one of those ridiculous eBay auctions for overpriced Black Beauty "bumble bee" capacitors. Dave suggested that "if you buy these caps, I suppose you also have to use Western Electric solder to install them." Nick Senker followed up with a suggestion that someone comment on these capacitors. "I've seen them and have some but don't know anything about them."

John Ruccolo posted the following reply:

"These caps were known in the trade as Sprague "Black Beauties." Some have the color-coded bands (the "bumble bees"); others have normal markings. They were decent-quality (but not top-quality) in their day. Some may have been made by manufacturers other than Sprague (not sure).

Dave Sica is correct - they are original equipment in vintage guitars and amps and are very sought after today, depending on the value. Frankly, the prices have reached really ridiculous levels. There's even a market for used ones!

Today, they are notoriously leaky and frankly, really are not that good. But don't tell that to the audiophiles! I suppose NOS (New Old Stock) ones will work well...for a while. My advice: sell 'em. I strongly recommend modern Vishay/Sprague "Orange Drop" caps in any serious piece of vintage audio gear. I've always gotten excellent results with them."

After doing a little research on the topic, John's advice, for the most part, would be well-taken. One source (Rod Elliot, The Audio Pages - Capacitor Characteristics) noted the following with regard to Black Beauties: "...these are notoriously unreliable (especially NOS), sometimes unbelievably over-priced and should be avoided for anything more technologically advanced than land-fill."

If you examine audio electronics, test instruments or consumer electronics from

the late 1950s, chances are you'll encounter one or more "Black Beauty" capacitors. Introduced by Sprague Electric sometime in the 1950s, these capacitors originally featured a molded Bakelite case surrounding a foil/paper-wound capacitor. A filling of oil added through a brass tube, later soldered shut around an inserted wire lead (identified by a solder blob at the end of the capacitor), provided extra insulation. Over the years, these capacitors earned a reputation for poor reliability. Traces of acid in the dielectric paper provoked electrical leakage, and the brass filling tube leaked oil. When overloaded, this model's Black Beauty case would crack open like a peanut shell.



Two early Black Beauties. Note the solder blob and fill tube at the left lead of each capacitor-prime paths for dielectric leakage.

Later-model Black Beauties didn't include oil-filler tubes, which reduced oil leakage and thus improved reliability. However, they were still constructed of Mylar and paper with a mineral fill. Descriptive terms such as "Telecap" and "Difilm" (also applied to the Sprague "Orange Drop") were also added to the Black Beauty name.



A later model Black Beauty, distinguished by red markings and lack of a filler tube.

Still, those of us who restore vintage radios, audio equipment and test instruments routinely replace, or "shotgun," every Black Beauty capacitor we find. So, why do new and used Black Beauty capacitors sell at auction on Ebay for as much as \$4 each (or more)?

Let's start with one example that puts the issue in a historical perspective. The tone capacitors for all Gibson Les Paul "goldtop" model guitars prior to 1955 used a brown, waxy looking tubular Sprague capacitor called the "gray tiger." By 1956, this changed to Sprague's "bumble bee," which was black and covered with colored value stripes. These capacitors were used from 1956 until 1960 for all pre-SG Les Paul models (Juniors, Specials, Standards and Customs). In 1968, the same capacitor was again used on the single cutaway Les Paul standard reissues, but, by this time, Sprague had changed the marketing name of the capacitor to Black Beauty.

Today, some electric-guitar players and audiophiles swear that Black Beauties lend desirable sonic coloration to amplified sound. A great deal is made of the "sound" of capacitors. When pressed, they offer subjective comparisons with modern capacitors. One can agree that, when used for input or interstage coupling, certain capacitors can introduce audible distortion, but not when serving as AC-line bypasses! It is true that designers of low-performance consumer goods can easily get away with choosing barrel-of-nails capacitors and audiophile-grade equipment does demand better, but one can easily draw the line at idiosyncratic comparisons of Black Beauties to any other type of capacitor.

There are some sites on the Net showing that different caps have different properties, and this is often used as "proof" by many people that the differences are audible. Some sites make wild claims of irreparable damage to the signal by using the wrong type of cap. In some cases, you can read things like "listening tests have indicated..." But no mention is made of where the data is, who conducted the test, how it was conducted...or was the test really conducted at all. It appears that most claims of this nature indicate a hidden agenda.

Dielectric losses (dissipation factor, dielectric absorption) are featured heavily in most claims. Dissipation factor (DF) is the ratio of the effective series resistance

(ESR) of a capacitor compared to its reactance at a given frequency, generally given in percent. Dielectric absorption (DA) is a measure of the inability of a capacitor to completely discharge. The charge that remains after a determined discharge time is expressed in a percentage of the original charge; it's also called "capacitor memory" or "battery action."

Dielectric losses are blamed for "smeared" high frequencies. This implies that as frequency increases, the problem gets worse. However, as the frequency increases, the amount of signal across the cap falls and at the highest frequencies, the capacitor is effectively almost a short circuit. Thus, to the contrary, the influence of any coupling capacitor diminishes as frequency increases, and is most significant at the lowest frequency of interest.

With regard to dielectric absorption problems, it would have to be assumed that caps will be charged and then discharged in an audio system. However, this does not happen in normal audio circuits; to do so would cause signals to be generated that, after amplification, would mean instantaneous speaker disintegration. Once the cap is loaded with normal circuit impedances, the effect goes away almost completely. The result, even in filter circuits, is an immeasurably small loss of signal and nothing more. Contrary to audiophile claims, dielectric absorption does not magically create reverberation, sub-harmonics, background "glare," "whiteness" during silent passages or "image smearing."

There are many other persistent myths that exist in the audiophile world regarding capacitors that, when exposed to the technical light of day, are similarly exploded. They include:

- * All ceramic capacitors introduce distortion;
- * Dielectric absorption compresses dynamic range;
- * Polypropylene dielectrics are lossy and inefficient;
- * Capacitors look inductive at audio frequencies;

It appears that similar to the Western Electric solder fiasco, once unfounded rumors start, they take on a life of their own and it becomes almost impossible to get the discussion back into the land of reality.

While searching through my junk box,

I discovered a bunch of early 60s NOS "Difilm" Black Beauties in their original plastic display boxes and wondered what condition they were in. All capacitors were rated +/- 10% at 600 volts, except for the 1 and .047 mfd values (1000 volts) and the .15 mfd value (400 volts). Using a Sencore LC102 AUTO-Z dynamic capacitor tester that I use at work, I randomly selected one capacitor from each value and tested it at its working voltage. The results are found in Table 1.

<u>Value (mfd)</u>	<u>Tested Value (mfd)</u>	<u>D/A(%)</u>	<u>Leakage (uamps)</u>
.5	.495	5	.30
.1	.101	8	.26
.01	.015	20	.01
.002	.0033	32	.08
.03	.0392	37	.00
.003	.0042	25	.05
.01	.0138	27	.02
.15	.1563	9	.10
.047	.0482	11	.10
.005	.0065	26	.01
.001	.0022	29	.12

D/A = dielectric absorption

As you can see from the data, the Black Beauties performed quite nicely with regard to value and extremely well with regard to leakage. The results for dielectric absorption were expected. Aluminum and tantalum electrolytics are considered failures at values above 15% and ceramics at 10% which are associated with high leakage. However, for this type of capacitor, its low leakage characteristics makes the D/A test effectively meaningless.

But, as I have discovered through many years of test experience, the only way to verify the reliability of a NOS capacitor (especially one that has been sitting around for some 45 years) is to test it after applying its working voltage for a number of hours. The results for three .01 mfd, 600 volt black beauties are found in Table 2.

<u>Value (mfd)</u>	<u>D/A(%)</u>	<u>Leakage (uamps)</u>	<u>Time of applied voltage (600V)</u>
.01378	29	0.00	Initial
.01343	33	0.00	16 hours
.01385	27	0.00	Initial
.01380	28	0.00	9 hours
.01393	31	0.00	Initial
.01378	32	0.00	6 hours

Notice that these NOS black beauties performed quite respectably. So what kind of conclusions can be drawn? Well, based on the information offered on the web and a very unscientific test:

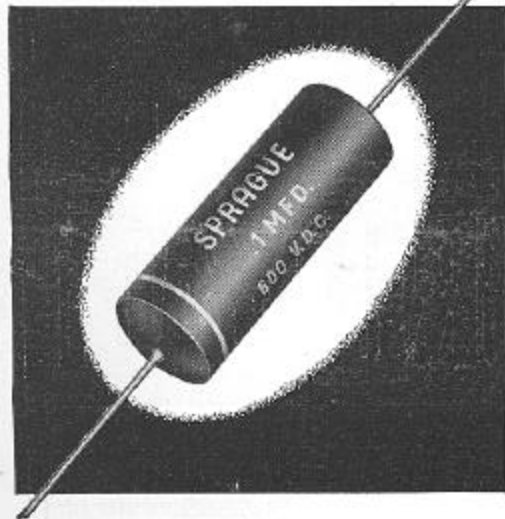
1. In general, standard capacitors are perfectly acceptable for audio, and will rarely (if ever) compromise sound quality unless used beyond their ratings or a completely inappropriate type is selected for the application.
2. Always replace Black Beauties with filler tubes.
3. If it's going to involve quite a lot of work, think twice about replacing Black Beauties produced in the late 50s (no filler tube) or using NOS for replacement applications. But if someone wants to offer you \$4 each for your used or NOS Black Beauties, I'd jump on it.

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HOW MANY JARS IN YOUR RADIO?

Or More Esoteric Facts About Capacitors

By Ray Chase

For those of you who subscribe to the Tube Collectors Association reflector, you know that it is peopled by many knowledgeable engineers, physicists and other "boffins", (definition of a "boffin" supplied upon request) who are ready and willing to debate almost any technical subject. Recent discussions of the relative merits of the International SI based measurement systems over CGS, English or other conventions have presented some revealing and interesting comments and discussions.

In relating some prior ancient and odd units of measurement such as gills, ells, grains, minims and halves, the subject of using JARS as a unit of capacitance finally came up. This was serendipitous as Al Klase and I were at the Ft. Monmouth

museum a short time ago and observed a WW I era European style tube amplifier (possibly used by Major Armstrong himself) that had a paper schematic in its lid on which the capacitors were labeled in JARS.

Now I had heard of the use of JARS to denote capacitance values, but had not seen any examples. Al was also aware of the term JARS and also wondered how capacitance could be defined in cm's which he also had heard of. Well, from the panel of experts on the Tube Collectors forum, I'm here to reveal all to you.

JARS go back to the primordial days of electricity when the only capacitors were Leyden jars. Incidentally, I'll use the term capacitors synonymously with condensers, which was the terminology used in the "early days". Leyden jars would be connected in series or parallel as needed and most early spark transmitters used banks of Leyden jars to store energy for the spark. If you do not know what a Leyden jar looks like or how it is constructed, I suggest you Google the words and a wealth of pertinent information will be forthcoming.

Actually, one forum commentator re-

called that some British Navy textbooks continued the use of the term JARS almost up until just before WWII; those Brits are stubborn to change. The value of a JAR is equal to $1/9 \times 10$ to the minus 8 F or about 1.1 nF. Therefore, 1.0 uF would equal about 900 JARS. Also, a JAR = 1,000 cm.

Now how the heck does a centimeter relate to capacitance? Well, early physicists determined that one cm = the capacitance of a one cm diameter sphere in free space. In the electrostatic system, a charged body has unit capacity if its potential is one ESU of potential when it is given a charge of one ESU. The unit is called the centimeter.

More trivia: The Leyden jar is certainly the original capacitor and Pieter van Musschenbroek in Leiden, Holland, invented it around 1725. In Dutch it would be a "Leidsche flesch" or a bottle from Leiden.

Nowadays, we just want to keep our capacitors from leaking, shorting or changing value and be thankful that they can be made smaller than the original Leyden jar devices!

Ed Lawlor Auction - Part II



Heathkit SB-303: \$60



R-390A: \$380

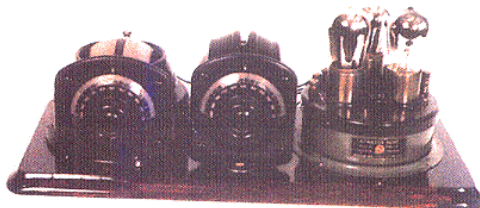


Eagle Radio Co. (Newark): \$90



National HRO 50T: \$180

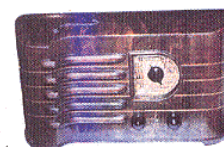




New Jersey Antique Radio Club's — **SPRING SWAP MEET** —



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