DVHRC builds men.
C'mon in, we'll build you one.

OSCILLATOR

DELAWARE VALLEY HISTORIC RADIO CLUB

The Official Newsletter of the DVHRC *Vol. 5 No. 8, August 1997*

UPCOMING MEETINGS

August (Tuesday the 12th) will feature a good-sized tailgate auction, including catalogued material from an estate. The event will start early, at 7 PM. See the catalog below for details. There's some interesting material: two Trans-Oceanics, numerous tube testers, a mess of table radios, lots of tested oldie tubes, literature, tube audio gear, amateur gear, a Crown 10" professional recorder, etc. Don't miss this sale!

NEWER SCOOP

MUSEUM DEACCESSION SALE PLANNED FOR ROCHESTER

As reported last month, a major technology museum is auctioning duplicate/surplus material from its collection. Excess broadcast radios, cathode-ray tubes, and low-level stuff have just been auctioned at the Radiofest event at Elgin. The "hotter" items are to be offered in the AWA auction at Rochester in September. There won't be a formal list of items, but it appears that there will be a Poulsen Telegraphone, a Lowenstein table-top rotary spark gap, two or three quenched spark gaps, telegraph gear including a Tillotson "box relay" and "wireless" keys. There may also be a collection of early X-ray tubes. The Western Television disc TV that was expected has been withdrawn.

ALIVE & WELL

BARKER & WILLIAMSON STILL AROUND

Pete Grave called in just after last month's *Oscillator* was done, with news of an auction of property of Barker & Williamson in Bristol. The announced goods included metal stock, copper wire, test equipment, office furniture, production fixtures . . . sounding a typical liquidation sale. Mike Tannenbaum attended, and harvested a big group of transmitting parts, some tubes, and other goodies.

This naturally generated fears that this old-time Philadelphia-area manufacturer was gone forever. Not so: with some checking around, it turned out that the company's still in business, but now in Florida. The move took place in March, and the Bristol sale was just leftover material.

B & W, "since 1932," became a well known manufacturer of commercial and amateur equipment, with its biggest sales in the '50s. Founded by Barrie Barker, W3DGP, and Jack Williamson, W3GC, in Ardmore, the company started out with a line of transmitting coils. It got the contract to make BC-939 antenna tuners for Hallicrafters' famous SCR-299/399/499 series of mobile radio stations during WW II. B & W moved to Upper Darby in 1943. Their line of "air wound" coils and "Miniductor" coil stock was highly successful after the war, as was their Model 5100 AM transmitter (later adapted to single-sideband). They also made the more obscure 6100 transmitter and the L-1000 and LPA-1 linear amplifiers. Besides design and production of the famed T-368/URT transmitter (part of the AN/GRC-26D truck-mounted station), they also made gear for the commercial community - distortion analyzers, wideband HF antennas, etc. Moving to Bristol in 1957, in later years they continued to offer miscellaneous test equipment (grid dippers, RF wattmeters) and amateur accessories (phone patches, antenna tuners, keyers, audio compressors, TVI filters, etc.) The founders sold their interest in the firm in 1964.

The company still uses the "Barker & Williamson" trade name, and has just put out a new catalog of products. It is focused more on commercial and military gear than on amateur products, plus original-equipment-maker items like coils; new products include a stainless-steel version of their broadband transmitting dipole, with more antenna products in the offing. The new address is 603 Cidco Rd., Cocoa, FL 32926, phone (407) 639-1510.

Jack Williamson still lives in our area, in retirement at age 90, and is in frequent contact with Bob Thomas, W3NE.

THE OSCILLATOR

Newsletter of the
Delaware Valley Historic Radio Club
Post Office Box 41031,
Philadelphia, PA 19127

The *Oscillator* is published monthly by members of the non-profit DVHRC. Its purpose is to provide a forum to educate, inform, entertain, and communicate with collectors and preservers of vintage radio technology.

We welcome and solicit information relating to radio history or collecting. Submissions should be carefully researched, typed and accompanied with clear photographs or diagrams. Material on-disc (3-½" or 5-¼ DOS) is particularly welcome.

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To join: DVHRC dues is $10 per year. The membership year runs January-through-December. Please mail to the club PO box above.

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may be sent to the editor at 44 E. Main St., Flemington, NJ 08822, (908) 782-4894.

COPY DEADLINE: The 20th of each month.

NEXT MEETINGS: Aug. 12, Sept. 9.

LOST-&-FOUND DEPT.

A HAVERTOWN LEFTOVER

An "orphan" radio, possibly valuable, was left behind at the Havertown meet. If this set may be yours (we hesitate to identify it more fully), please contact Mike Koste on (215) 646-6488.

"INDUSTRY" NEWS

EXTRAVAGANZA and RADIOFEST

Our lively field reporting team has reported back on two of summer's main events: "Extravaganza" in Michigan and "Radiofest" in Illinois. Extravaganza's flea market featured some choice stuff: two Federal 58s and a 110, an Airphone one-tuber, a Radiola V in the original box, a Radiodyne 10, chromed Scotts including a two-dial All-Wave, a Lambert crystal set, a French-made wireless tuner, a Ducretet key in-the-carton, etc. The auction had two Sparton mirrored table sets. It appears that Jim Clark and his Michigan club carried off another success.

Illinois' Radiofest started off half a day early, on Tuesday afternoon; by sundown, about half of the ultimate crowd of flea-market vendors was in operation. The number of vendors was perhaps down a bit, despite unusually fine weather. "Nice stuff" offered included an odd British loose coupler ($200), an extravagant Leutz '20s receiver, a one-tube Audiola, a Zenith 4A, numerous AK breadboards priced at $650-$750, interesting keys, etc. There was some reported consternation among transistor collectors, based on a single aggressive buyer having snapped up a big volume of the more desirable sets in the flea market.

READERS' COMMENTS

THE ARCA MERGER

The open letter to AWA president, Bill Fizette, in the recent issue of the *Oscillator* seems timely and appropriate to me. My wife and I enjoyed the ARCA programs and we were sorry to see it fold, but felt that if it had to go, folding it into AWA was the best way to salvage traditions. Instead, it seems to have just disappeared. I somewhat remember receiving a notice that the balance of my ARCA dues would be applied to my AWA dues, but have never received an accounting and have continued to pay my AWA dues as usual.

AWA has always been close-mouthed about the business and finances of the organization, and I believe that is to the detriment of the group. I support the focus points of the *Oscillator* letter and believe that following through on them would go a long way to restoring member confidence that AWA supports a National program and is not a local club for Rochester-area individuals. (Name withheld by request.)

ON THE HORIZON

Aug. 9	Juniata Valley Hamfest, Lewistown, PA, at Decatur Twp. Fire Company, on Rte. 522 North, 8 mi. toward Selinsgrove. Coffee & donuts, lunch items.
Aug. 23	SCARS hamfest, Bridgewater, NJ, at Somerset county 4-H Center on Milltown Rd. (off US 202).
Aug. 24	Mullica Hill (NJ) Hamfest, 4-H Fairgrounds, Rte. 77.
Sept. 3-6	AWA conference, Rochester, NY
Sept. 27	NJARC swapmeet, Freehold, NJ (details next month)
Oct. 4	Central PA meet (tentative), Danville

ESTATE MATERIAL FOR DVHRC SOUDERTON AUCTION

DVHRC will conduct an estate/tailgate auction at 7:00 PM on Tuesday, Aug. 12. The site will be the parking lot behind the usual meeting location at 105 Main St. in Souderton, PA. NJARC members are cordially invited.

The material below is from an estate being liquidated. No minimum price applies to the estate items. Attenders will bring in additional items of their own for auctioning. The usual 10% of sales goes to the club.

---

100. Lafayette 99-456 microphone on desk stand.
101. Precision EV-20 VTVM.
102. Western Electric 2B signaling test set.
103. Astatic 10D microphone on desk stand.
104. Box lot of automotive stuff: tuneup meters, tachometer, etc.
105. Philco '40s AC-DC table set; needs refinishing.
106. Weston 798 mutual-conductance tube tester.
107. Electro-Voice 664 microphone on desk stand.
108. GE ST-2A 5" oscilloscope.
109. Zenith F720 clock-radio, beige plastic.
110. Solar Model CE capacitor checker.
111. Tektronix 514AD 5" oscilloscope.
112. Frequency standard, rack-mounted military-style, outputs at 125 and 1000 kHz.
113. Monarch FM-100X tube FM stereo tuner.
114. Home-built power supply in bench case.
115. Portable phono, with Balfour "Princess" changer.
116. Heathkit RF signal generator.
117. GE 401 AC-DC table radio, ivory bakelite.
118. RCA Victor 66X11 AC-DC table set, brown bakelite.
119. Sony 8F-37 AM-FM solid-state table radio.
120. Hallicrafters HT-40 transmitter.
121. Crosley 58TL AC-DC table set, artfully painted with '60s peace sign.
122. Heathkit HW-110 "Shawnee" 6-meter AM xmtr-receiver.
123. Philco 610 tombstone, less speaker and grille cloth.
124. GE 408 AC-DC AM-FM bakelite table set.
125. Air Chief 4-A-25 AC-DC set, ivory bakelite.
126. Moss TV-50 "Genometer" signal gen., 0.1-180 MHz.
127. Stancor "Master Pack" battery eliminator, 6 V @ 12.5 A (enough to light 50 UX-201As at once!).
128. Hallicrafters HT-18 VFO/transmitter.
129. "Medical battery" induction zappers: boxlot of five wood-cased antiques.
130. Precision E-200C signal gen., 0.09-30 MHz.
131. Heathkit IG-42 "lab" signal generator, 0.1-30 MHz, w/ book.
132. RCA 100A cone speaker; exc. finish but front grille cloth troubled (rear cloth OK).
133. Heathkit VF-1 VFO.
134. "Golden Classic 40" tube stereo amp.
135. Silvertone 4524 two-volt AM-SW farm set.
136. Pilot FA-670 AM-FM mono tube tuner.
137. McMurdo Silver "Vomax" VTVM.
138. Heathkit portable reel-to-reel tape recorder, with book.
139. Heathkit HM-102 SWR meter.
140. Lorain "Flotrol" regulated battery charger/power supply, 10-20 V @ 5 A.
141. Realistic "Concertmate 8" AM-FM stereo portable radio.
142. National Radio Institute electronic multitester.
143. Thordarson "Victory" toy transformer, 8-12-20 V, an oldie with Edison screw plug.
144. Westinghouse 157 AM wood table set (needs dial restringing).
145. Zenith AM-FM clock radio, brown bakelite.
146. Triplett 3413 tube tester.
147. Knight-Kit KG-680 capacitor checker with book; eye tube is bright.
148. Philco 48-206 leatherette AC-DC set.
149. Sprague KT-1 capacitor tester.
150. Heathkit IG-18 solid-state sine/square audio generator w/ book.
151. B & K 1077 flying-spot TV test signal gen., w/ copy of book.
152. Precision 912 tube tester.
153. Paco capacitor tester; eye tube is bright.
154. Confidence Automatic tube tester, remarkable design with 60-position switch for "every possible" tube; newest tube listed is the 89; crisp cond.
155. Zenith C835E AM-FM wood table set, lurid '50s blonde case.
156. Precise 111 tube tester; measures both mutual conductance and emission.
157. Box lot of radios: Westinghouse H839N5, RCA Victor RFB11V FM, GE 432 clock radio.
158. Solar Model CE capacitor checker.
159. Zenith 5H40 Trans-Oceanic with replaced 1L6.
160. Cabinets for '20s battery sets (6): Freed-Eisemann NR-5, Radiola 18 (less lid), Miraco, three others.
161. Tubes: boxed octal/loktal and large-size; ca. 75 total.
162. Seco drugstore tube tester, display sign troubled, rest very good; has hidden "calibration" control to adjust profit level.
163. 12" speaker, PM type, with output transformer.
164. Bookshelf speaker enclosure, '50s?, homebuilt.
165. 12" speaker, PM type, with "whizzer" cone.
166. Tubes, transmitting: 4-400A, 4D32, 807s, 829Bs, 832As, 1625s, 5894, 5933; plus a 7735 vidicon.
167. Books: Sams "Counter-Facts" covering replacement parts.
168. Jensen A12-PM "Concert" speaker, plus box of lesser types.
169. Heathkit FM-3 FM tuner with book.
170. Books: military training manuals; Sams auto-radio series (AR-8, AR-28, AR-57), Tektronix 545A scope, Radar Circuit Analysis (USAF), etc.
171. RCA Victor 9Z571 AM radio, brown bakelite.
172. Tubes, *tested* big-pin: "balanced portfolio" of 24A (2), 26 (2), 27 (2), 30, 33, 35, 36, 42, CX-345, 45, 56, 77 (2), 71A, 78, UX-280, 80 (2), UX-281, 2A3, 5Z3, 6C6, 25Z5. Nice shop stock for restoration use.

173. Box lot of radios: Emerson airplane cloth portable, Tele-Tone 190 portable, Admiral 7T10E-N AC-DC, Soundesign 2443 AM-FM-police portable.

174. Books: Mathematics for Electricians & Radiomen, Typical Oscilloscope Circuits (Tektronix), UHF Radio Simplified, Radio Operating Q & A, etc.

175. Hickok 600A mutual-conductance tube tester.

176. TS-375A military VTVM.

177. Tubes: big-pin gradeouts - but what lovely stuff - blue Arcturus, etc.

178. Books: RCA RC-28 tube manual, GE "Essential Characteristics" tube manual, 1958 Pep Boys catalog, Lafayette semiconductor substitution guide, FM Simplified, Radar System Fundamentals (Navy), etc.

179. Mercury 1100 tube tester.

180. Readrite three-meter '30s set tester.

181. Volume controls: CTS assortment of universal snap-together shafts, elements, and switches; a 14-box "Master Packer" distributor stock, in VG cond. Remarkable opportunity for anyone doing serious restoration.

182. Astatic '30s crystal phono pickup/arm, boxed.

183. Philco 38-17 AC table set.

184. Zenith 6L40 Trans-Oceanic with replaced 1L6.

185. Books: 1932 Official Radio Service Manual, Zenith Service Notes ('40s), BC-348 and BC-779 tech manuals, 1929 Majestic and 1932 American Bosch service data, Stromberg-Carlson "Sound Engineer's Manual."

186. Heathkit signal tracer; eye tube is bright.

187. Books, National Radio Institute: NRI training course, '40s "Service Notes," and "Extra Money Jobs and How to Do Them"; also some NRI TV training material.

188. Books, amateur radio: ARRL Handbooks 7th Ed. '30 (repeat: '30!), '36, '63, '68 (2), '73, '76; '78 Callbook, etc.

189. Books: *Radio News* 1942 Radio & TV Data Book, S-C Sound Equipment, Mallory-Yaxley Radio Service Encyclopedia (1937 first ed.), U. S. Navy 1932 International Code of Signals, S. Gernsback's Radio Encyclopedia (reprint). Manuals for AN/VRC-2 transceiver, Link 50-UFS radiotelephone, and Heathkit SB-610 scope. *Radio-Electronics* 50th anniversary special section (2 copies). RCA "Special Red" tubes and Taylor Tubes. *Science & Mechanics*, Feb. '38.

190. Books: Essentials of Radio, Practical Radio Communication, Inside the Vacuum Tube, etc.

191. Radio trainer-demonstrator breadboard kit, '30s home-built.

192. Books: Coyne Radio-TV Encyclopedia series.

193. Parts cabinets (2), with oldie Rs and Cs, etc.

194. Books: Coyne three-volume reference set; assorted later Photofacts; manuals for Heathkit AB-600, and GW-12; etc.

195. Books: Library of Practical Electricity, Precision Measurement and Calibration (National Bureau of Standards), 1930-38 *QST*s (11), etc.

196. Variable capacitors, boxlot of receiving and transmitting.

197. Capacitors, boxlot of electrolytic, Vitamin Q, silver mica, etc.

198. Books: TV service data, '63 and '73 Callbooks, Dynakit PAS-2 manual, etc.

199. Books: Handbook of Noise Measurement (GR), Color TV Servicing (RCA), RCA TV Service Data, 1950-54 and 1955-61; Radio Handbook, 10th ed., 1946; GE "Essential Characteristics" tube manual; *Popular Science* Radio Annual, 1943; Majestic DX logbook (unused); tube substitution guide, etc.

200. Books: RCA RC-25 tube manual, ARRL FM & Repeaters and Antenna Book, etc.

201. Sams' Photofacts, dual boxlot in the 410-560 area.

202. Transistor radios, small boxlot: Orion, etc.

203. Grid-dipper with coils.

204. Tubes, *tested* big-pin: UX-200A, 19, 24, 24A, 26 (2), 27, 30, 35, 42, 45 (2), UX-245, 56 (2), 58, 71A, 77, 78, 80 (3), 83, 85, 2A3, 6B7.

205. Tubes, *tested* big-pin: 24, 24A, 26 (3), 27 (3), 30, 34, 42, 43, 45 (2), 55, 56 (2), 77 (2), 78, 80 (3), 112A, 5Z3, 6D6, 25Z5.

206. Tubes: boxed miniature, ca. 110.

207. Tubes: boxlot of "raw" min./octal.

208. Tubes, *tested* big-pin: UX-201A, 24A (3), 26 (2), 27 (3), 30 (2)42, 45 (2), 47, 58, 71A, 77, 78 (2), 80 (3), 1-V, 5Z3, 6C6.

209. Boxlot: coils and '20s dials, mainly Atwater Kent.

210. Boxlot: Heathkit V5 VTVM with book, Simpson meter sample case, spool of NOS white zip cord, knobs (Heathkit, '40s Collins, etc.), resistors, etc.

211. Boxlot: meters, relays, etc.

Final estate material: several boxlots not catalogued here.

MEMBERS' MATERIAL (PLUS BRING-INS)

(Minimum prices may apply).

Tubes: boxlot of "raw" min./octal; octals are mainly "radio" types.

Tubes: boxlot of approx. 50 big-pin types including 24, 27, 36, 37, 41, 42, 80, etc. All checked and reboxed.

Crown four-track 10" open-reel recorder, Model SS824, with manuals and spare parts. Has new road case.

Tubes: 10 boxes of "raw."

Heathkit T4 signal tracer.

Parts cabinets.

Koss ESP-9 electrostatic headphones - two pairs.

Heathkit IM-16 solid-state voltmeter (2).

Heathkit IM-25 solid-state voltmeter.

Heathkit IG-18 audio generator (2).

Heathkit IM-58 audio harmonic distortion meter.

Hickok 239A tube tester.

Altec Astor receiver.

Leeds & Northrup Type H strip-chart recorder. (2)

Bogen BT-35A 12-V PA amplifier.

Ballantine 300 AC voltmeters (2).

Raytheon 250-watt voltage stabilizer.

Sola 120-VA voltage stabilizer (for information on using these as low-cost isolation transformers, see *Radio Age* for June, p. 7).

Sola 60-VA voltage stabilizer.

Boxlot of solid-state switches.

Parts cabinets with contents.

Resistors and cabinet.

Note: "tested" tubes in the estate were checked by a dedicated tube fanatic, making sure that 2.5-volt tubes (45s and 2A3s) were measured with an accurate 2.5 volts on the filaments. However, "your results may vary"; as with all auctions, the goods are as-is, where-is.

"DON'T MISS THIS"

ABRAMSON ON-STAGE AT ROCHESTER

DVHRC's video wizard, Dave Abramson, is scheduled to demonstrate his award-winning RCA TRK-120 mirror-in-the-lid TV set as part of a major show of early TV equipment at Rochester. This will take place between 1 and 6 PM on Thursday, Sept. 4. Be sure to check this session - it promises to include heavy-hitter TV historian-collectors showing a raft of seldom-seen gear in operation: scanning discs, a WW II military TV system, a GE "octagon" set, a mirror-screw mechanical receiver, etc.

WANT ADS

Free exposure for your desired or excess stuff! Unless requested otherwise, we'll run each ad for two months, and will send ads to NJARC's *Jersey Broadcaster* for double coverage.

FOR TRADE: 1963 Columbia Torpedo Special 24" boy's bicycle, black and white with chrome fenders, luggage rack, headlight, white-wall balloon tires, real nice original condition. Will swap for a high-style radio of equal value. Whattaya got? Can deliver to August tailgate auction. Mike Koste, (215) 646-6488. (8-97)

FOR SALE: Tektronix oscilloscopes 535 and 547 with extra plug-in units and Scopemobile. Tektronix 575 transistor curve tracer. General Radio 805B RF generator, 1021P2 UHF generator. GE TV alignment sweep and marker generator set. Manuals for all. Other test gear and surplus equipment coming up for sale - stay tuned. Mark W. Hilliard, N3NBL, 921 S. Edward St., Allentown, PA 18103, (610) 432-8089. (7/8-97)

FOR SALE: Join the Lore Corps! The ever-handy reference Tube Lore gives 186 pages of insightful scoop on about every North American tube ever invented. Eric Barbour called it "an instant classic" in his review in *Vacuum Tube Valley*. The book's available from all the favorite booksellers and will be on sale at Rochester. Or, it's available from Ludwell Sibley, 44 E. Main St., Flemington, NJ 08822 for $19.95 postpaid in the U. S. and Canada, $24.95 by air overseas. Clubs get a discount on multiple copies. (7/8-97)

Tube Lust? . . . Tube Allure? . . . Tube Alloys? . . . Tubes Galore?. . . Tub-u-lar? . . . Tube Lush? . . . No - it's Tube Lore!

FOR SALE: The DVHRC tube program offers clean, tested, boxed tubes at very reasonable prices with availability at any club meeting. Proceeds go to the club. About 300 types are currently in stock. Of course, donations of radio-type tubes in any condition are welcome. See Charlie Class at any monthly meeting to obtain or donate tubes.

FOR SALE: Books: Essentials of Radio Electronics, Slurzberg and Osterheld, 2nd. Ed., $20; Fundamentals of Radio, Gorder and Hathaway, $20; Basic Electronics, Grob, $20; Fundamentals of Radio, Everitt, $20; Elements of Radio, Marcus and Marcus, 4th Ed. Prices do not include postage. Elwood F. Hunt, 308 Georgetown Rd., Carney's Point, NJ 08069-2512, (609) 299-5259. (8/9-97)

FOOD & DRINK: a good place to join fellow collectors for dinner before meetings is the Hillside Tavern, half a block uphill from the meeting site.

RECOGNIZING AND DEALING WITH AGC PROBLEMS

Al Klase

Do you reach for the RF gain control when you tune in your local AM broadcast station? One of the most commonly heard complaints from owners of "boatanchor" communications receivers and other vintage high-performance radios is: "The audio is distorted on strong signals." While audio distortion may be the result of an inoperative or poorly tuned stage or stages in the receiver, once the first-order bugs are exorcised and full sensitivity is realized, this distortion is almost always an AGC problem.

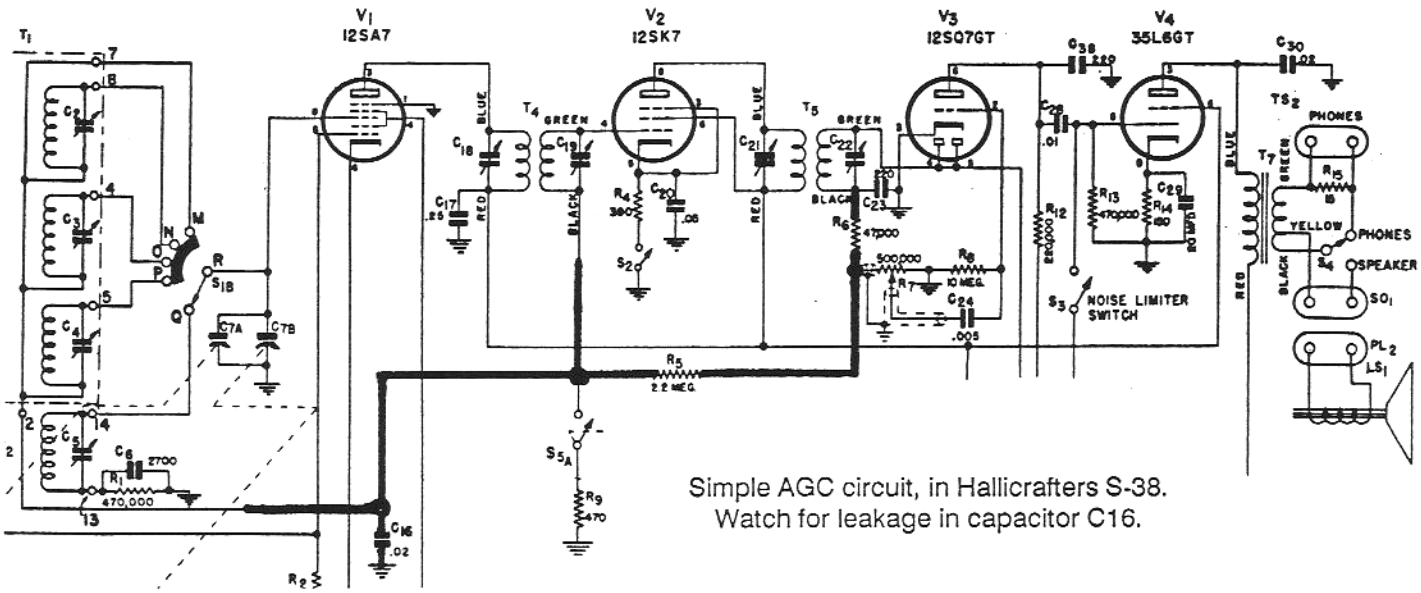
THE NEED FOR GAIN CONTROL

The overall combined maximum voltage gain through the RF and IF stages of common receivers is on the order of a million. For AM and SSB reception, all of these amplifiers must operate in a linear mode, i. e. they must not saturate or clip, if the signal's modulation envelope is to be reproduced accurately. Obviously, the full gain of the receiver is needed only for the weakest signals.

In tube-type receivers the RF and IF gain control is almost universally accomplished through the magic of the remote-cutoff pentode. The gain of amplifier stages using these "variable mu" tubes, such as the 6K7, 6SK7, and 6BA6, can be varied electrically by changing the bias on the signal grids. Because the gain of a single stage cannot be reduced to zero, gain-control signals are generally applied to all the RF and IF amplifier stages and sometimes to the mixer(s).

AUTOMATIC GAIN CONTROL

In almost all receivers since the early 1930s, especially for AM reception, the RF and IF gain is controlled automatically. This not only accommodates fading, but avoids "blasting" on strong signals or missing weak signals altogether when tuning across the band. Throughout the 1930s and early '40s this function was referred to as automatic volume control (AVC). In the WW II era, with the introduction of systems, such as TV and radar, where the parameter being controlled is not audio volume, the term automatic gain control (AGC) began to creep in. For our purposes, it means the same thing.



Simple AGC circuit, in Hallicrafters S-38.
Watch for leakage in capacitor C16.

In broadcast receivers, the AGC function is universally present, but is generally hidden from the user. The "volume" control knob affects only the gain of the audio amplifier. Communication receivers usually have both automatic and manual RF gain controls. The manual control is intended for use in situations, such as CW reception, where the AGC circuit may not function properly. Any quality communication receiver, in proper operating condition, will receive all but the most grotesquely strong AM signals with minimal distortion in the AGC mode with the manual gain control wide open.

IMPLEMENTATION

AGC is accomplished by recovering a DC signal from the detector stage that is proportional to the signal strength and applying it to the gain-controlled stages in such a way as to reduce the gain as signal strength increases. In tube-type receivers, the AGC voltage will always become more negative with increasing signal strength. The AGC signal must be low-pass filtered to remove the audio component of the signal, lest the AGC system suppress the modulation of the incoming signal.

In most common applications, the AGC signal is picked off from the junction of the last IF transformer secondary and the detector-diode load resistor (which may be masquerading as the audio gain control potentiometer). The AGC signal will pass through a series of high-value resistors on its way to the control-grid return connections of each of the gain-controlled stages. This AGC "bus" will also have a number of capacitors from the various resistor junctions to ground. The larger caps, at the detector end of the bus, establish the basic AGC time constant, while the others further filter the AGC signal and bypass stray RF signals to ground.

THE PROBLEM

The receiver is in ostensibly good operating condition: All stages have known good tubes with the appropriate voltages on their elements. The set is aligned properly and all the adjustments can be peaked. And, you can hear weak signals at least down to about 10 microvolts. When tuned to a distant AM station the audio sounds good. When tuned to a local, distortion is obvious, and goes away when you switch to MGC and reduce the gain. The condition can also be observed by connecting a modulated signal generator to the antenna terminal. You should be able to bring the signal level up to the better part of a volt before serious distortion can be heard or the audio output "folds back" to a lower level.

The AGC bus is generally a very high impedance circuit so as not to load the detector circuit unduly. Furthermore, because the gain of the controlled stages increases EXPONENTIALLY with a decrease in AGC voltage, even small amounts of leakage will cause the AGC system to malfunction. The source of this leakage is almost always the capacitors on the AGC bus. How much leakage is acceptable? Al's Law: *10 megs is a significant problem, 1 meg is a disaster.*

THE FIX

In receivers with paper caps, especially the dreaded "Micamolds" or anything coated with wax: REPLACE ALL THE PAPER CAPS. In fact, do this before you even turn the set on and save yourself a lot of trouble. A quality vintage receiver can often be brought back to life and play quite nicely by just shotgunning the caps and making no adjustments at all. Then a "light" alignment puts it in primo condition. I keep coming back to an observation I heard from an old-time race-car mechanic: "Don't even try to tune junk."

So you do the above, and things get better, but there's still a problem with strong signals. What now? Make a Xe-

rox copy of your schematic, and highlight the AGC bus. Disconnect the bus from the diode-load resistor and measure the resistance from the bus to ground. It should be essentially infinite. This will enable you to find any caps you missed (or decided to ignore like those inside IF cans), other leaky components (I'm starting to find leaky postage-stamp mica caps) or physical shorts. Most digital meters measure to 20 megs and are usually adequate. The Hewlett-Packard HP 410 series of meters will read hundreds of megs and are recommended for the truly paranoid.

Some receivers, the R-390 family in particular, have a high-value resistor to ground at the far end of the AGC bus. You need to disconnect it to perform the above test.

When you look at a schematic, the AGC circuit is all but invisible. So it's not surprising that it's often overlooked as a source of trouble. Hopefully, this article will help get the old sets playing properly again.

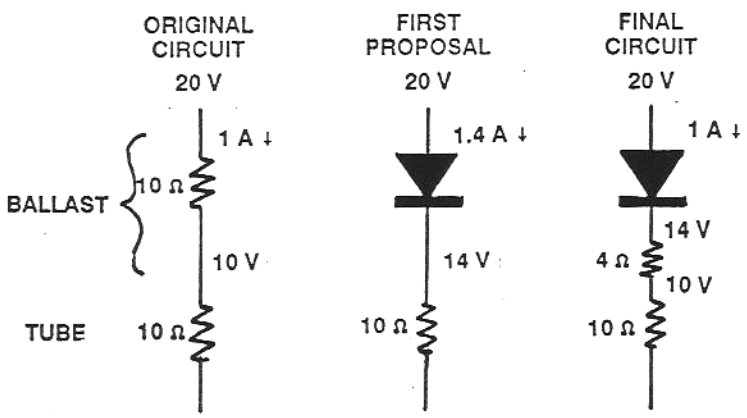
CHESTNUTS ROASTING ON THE INTERNET, PART II

Alan Douglas

Last month's analogy was to Galileo; this time, it is to Edison, and the mathematicians who "proved" that his electric distribution system could never be more than 50% efficient. The proof was correct - maximum power transfer occurs when the source and load impedances are equal - but the assumptions were faulty. Edison outfoxed them by making his generator impedance as close to zero as he could get it, so it dissipated essentially no power.

Okay, this one is for R-390A receiver owners who are tired of replacing the expensive ballast tubes that drop 24 VAC down to 12 V for oscillator-tube heaters. Assuming that the original regulating function is unnecessary (no one's line voltage varies from 90 V to 130 V), one solution is to replace the ballast tube with a power resistor to drop 12 V. this works fine, as does a 12-V tube like a 12BY7 - with the correct warm-up characteristic even), but of course gets fairly hot.

Someone on the Boatanchors discussion group suggested a series diode in place of the resistor, but someone else "proved" that this would actually result in double the power dissipation in the oscillator-tube heater, so it was a terrible idea, and shame on you for even thinking of it!



NUMBERS ROUNDED OFF FOR EASIER THINKING
1.4 IS ≈ √2

Again, the math is correct, but the assumption is wrong. Yes, the diode by itself won't drop half the voltage (it "drops" half the power), but the combination of a diode and a smaller series resistor will drop the (equivalent of the) correct 12 volts. And this smaller resistor, four-tenths of the original dropping resistor, dissipates only 4/10 as much power. So the diode *is* beneficial, in allowing a smaller and cooler-running resistor to be used. But no one does it this way.

Incidentally, the same principle applies to ballast resistors or resistance line cords in AC-DC radios. A diode avoids six-tenths of the power that would otherwise be dissipated in a substitute ballast or line cord.

BUSINESS IS PICKING UP

Arthur L. Lippmann, in *Judge*, March 7, 1925

"I want a radio set that will pick up Chicago," announced the brusque, impatient business man, darting into the radio shop." "Very simple, sir," announced the suave salesman with a confident smile, "just be seated before the loud-speaker."

The salesman turned to a small, efficient-looking set and twirled the dials. In a moment, distinctly and clearly, the announcement floated into the store: "You will now listen to Station WEBH, Chicago." A satisfied smile played over the prospective purchaser's face and the sale was closed.

Ten minutes later, a native-born Californian stepped in. "Just try and pick up Los Angeles for me," he timidly suggested. "Very simple, sir," answered the enterprising salesman. Again, his skilled fingers caressed the dials. In a moment, even more clearly, the announcement was heard: "Station KHJ, Los Angeles." A look of delight illuminated the features of the diminutive Californian as he hurriedly purchased the set.

Six o'clock came and the store prepared to close up for the night. The efficient salesman walked over to the cellar door and cupped his hands. "Oh, Joe," he shouted down, "come on up - it's quitting time." In a few moments Joe appeared with a telephone transmitter strapped around his chest.

"Good work, Joe," his companion announced, "we sold two sets to-day, but be sure to study up to-night on your Spanish and Irish dialects. There's a feller coming from Mexico City and another from Killarney to-morrow to hear that set."

FIRST CLASS MAIL

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