

Introduction to Collecting and Restoring Vintage Vacuum Tube Amateur Radios

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Ver 0.7.4

<http://www.ne7x.com>

Presentation Agenda

- **Who is NE7X**
- **Contributors**
- **Why Collect and Restore Old Radios**
- **Vintage Manufacturer Names**
- **Shack Photos**
- **Vintage Equipment To Obtain**
- **Where to Acquire Vintage Radios**
- **Where to obtain parts**
- **Cosmetic Repairs**
- **Warnings!!!**
- **Cautions !!!**
- **Electrical Repairs**
- **Repair Bench/Test Equipment**
- **Electrical Troubleshooting**
- **Vintage Operating Frequencies**
- **RME-45**
 - **by: WA0KDS (before/after)**
- **Reference Information**



Who is: NE7X

- Tom Boza, Phoenix Arizona USA
- Licensed since 1964
- Currently hold Extra class license
- Operate all modes:
 - AM/CW/SSB/FM/Digital
 - Satellite/QRP/IRLP
- Currently working for IBM as UNIX software Engineer
- Prior to IBM, I worked for Intel for 25 years supporting UNIX and networks
- Prior to Intel, I worked 13 years as a bench technician for a Sony affiliated repair shop
- Love to homebrew & DX



“Contributors” To This Presentation

- **WA0KDS**
- **WO7T**
- **KO6SM**
- **KI7V**
- **K7TOP**
- **W1DRY**
- **WB0UGO**
- **K7SA**
- **N7RK**



Why Collect and Restore old radios?

- **Preservation of Amateur Radio history**
 - No longer manufactured
- **Nostalgia**
 - I can now obtain and afford all the equipment I only dreamed of having during my high school years
- **Collecting**
- **Investment ???**
- **Resell for profit**
- **Its fun doing the repairs!**
 - Over 85% of the radios I have in my collection, when obtained, were non-functional, in poor cosmetic condition, or both
- **It's a "Labor of love" for the hobby !**
- **Pride in Radio Art /Skill**





Vintage Manufacture Names

- R.L. Drake
- Collins
- Heathkit
- Hallicrafters
- National
- Hammarlund
- Gonset
- E.F. Johnson
- Military
- RME
- Knight (Allied)
- Eico
- Lafayette
- Etc.....



NE7X - Main Operating Position



NE7X - Vintage Equipment Racks



NE7X -AM Station



WB0UGO Vintage Heathkit Station



K7SA Vintage Station



KO6SM Vintage Station



N7RK Vintage Station



Vintage Operating Position
Hallicrafters SX-28 and PM-23 Speaker
National RAO-7
National HRO-5TAI and Factory Speaker
RCA ACR-175 Receiver (1936)
Meissner Signal Shifter Xmtr- 8 watts CW
Various telegraph keys

Hallicrafters SX-11, Hallicrafters SX-100
National NC-98, National NC-46
NC-200 & Factory Speaker, NC-100ASD
RME-84, NC-100 "Art Deco" & Factory Speaker
Breting 12, Howard 440, Howard 430
Hallicrafters SX-9, RME-69 & Factory Speaker



WA0KDS Vintage Drake Station



Vintage Equipment to Obtain

- Whatever turns you on
 - I prefer 1960 to 1970 vintage
- Good equipment to look for:
 - Items which will increase in value once they are restored
 - Items which are rare
 - Items which are cosmetically in good shape even if they don't work
 - Electronics can easily be fixed
 - Look for original knobs, meters, logos, etc...
 - Parts radios
- "It worked the last time I tried it" should be taken with a grain of salt



Where to Acquire Vintage Radios

- Ham Fest / Swap meets
- Friends
- Estate sales
- <http://ebay.com>
- <http://eham.net>
- <http://qrz.com>
- Other collectors



Where To Obtain Parts

- <http://ebay.com>
- Swap meets
 - Look inside those boxes on the ground
- Cannibalize another radio
 - Sell what's left
- Retail outlets
 - Surplus Sales of Nebraska
 - Fair Radio Sales
 - Antique Electronic Supply
 - Giga parts
 - <http://mouser.com>
 - <http://digikey.com>
- Schematics/manuals
 - <http://w7fg.com>
 - <ftp://bama.sbc.edu> (free)



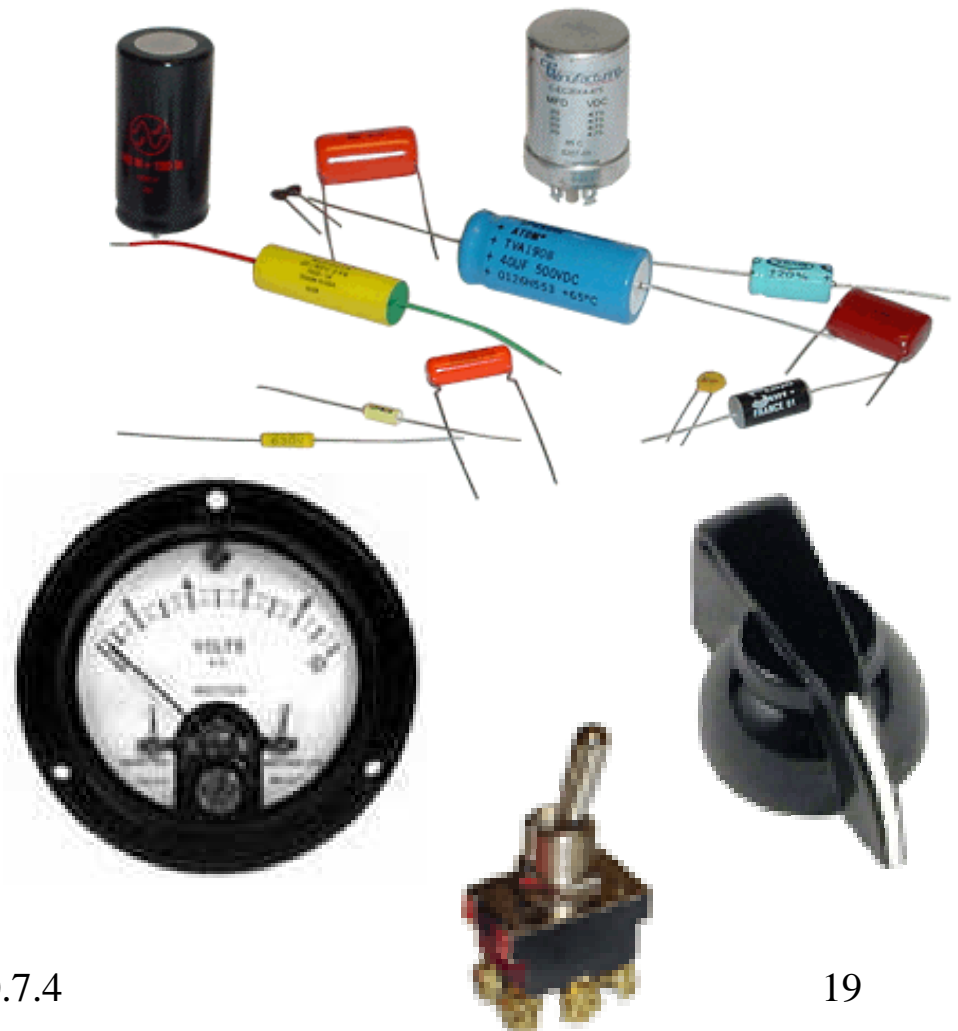
Cosmetic Repairs



- **Cleaning**
 - Simple Green
 - Goof -Off
 - Windex (???) Caution
 - Rubbing Alcohol
 - Dish soap and water
 - Murphy Oil Soap
 - Cotton swabs
 - Auto carburetor cleaner on chassis
 - For steel chassis, repaint silver
- **Tools**
 - Tooth brush
 - Dremel Tool
 - Cotton swabs

Cosmetic Repairs

- **Knobs/Meters/Trim/etc**
 - The closer to original, the more the value
 - Try to keep as close to original as possible
 - Acquire parts from a second cannibalized radio
 - You can find preproduction manufactured parts
 - Front panel and cabinet parts are more critical than internal components
 - ie: resistors, capacitors



Cosmetic Repairs

- **Painting**

- Computer match paints
- Home Depot and Lowe's has good color selections
 - Not a perfect match, however in most cases, close enough
- Don't spot paint, paint the whole cabinet or not at all
- Wet sand with fine grit sandpaper
- Air-Brush, if your good at using it



Cosmetic Repairs

- **Oils / Lubricants**

- WD-40
- 3-in-1
- Silicone Spray
- DeOXit
- Canned air
- Light weight gear grease

- **Lettering**

- Computer water decal lettering transfers
Bel Inc., Tel 305.593.0911
<http://www.decal-paper.com/>



Cleaning Compounds



Warnings !!!

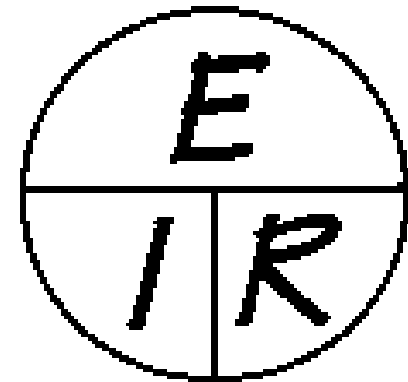
- There are *lethal high voltages* inside vintage radios, especially in transmitters
- DC voltages can exceed +800 Volts
- Before attempting any electrical repairs, make sure you understand proper safety procedures
 - Refer to ARRL handbook
- Use a AC variable power supply when first powering up old radios
 - Vintage radios were designed for 110VAC operation. With today's AC home voltage near 125VAC, some older components inside the radio may short out or explode !

Cautions !!!

- Weight of old radios
 - Watch your back (ouch!) when lifting
 - Can weigh up to 100 pounds or more!
 - Make sure the operating desk can support the weight
- Do not use acetone or gasoline for cleaning
 - Destroys paints
 - Flammable
- Super-glue fumes can be bad around some plastics
 - Causes it to fog/cloud, even melt
- Replace AC power cord with 3 wire ground plug type
 - Avoid electrical shock due to voltage potential between chassis.

Electrical Repairs

- **Most common repairs**
 - **Tubes**
 - **Testing** **Transconductance Mu checking**
 - **Replacement**
 - **Re-capping**
 - **Paper, mica and black-beauties**
 - **Power supply electrolytics**
 - **Alignment**
 - **Caution not to crack iron slugs**
 - **Peak using S-meter or oscilloscope**
 - **RF signal generator or crystal calibrator**
 - **Carbon resistors go up in resistance value with age**
 - **Switch contact and pot cleaning**
 - **Put circuit back to original**
 - **Add only trusted validated modifications**

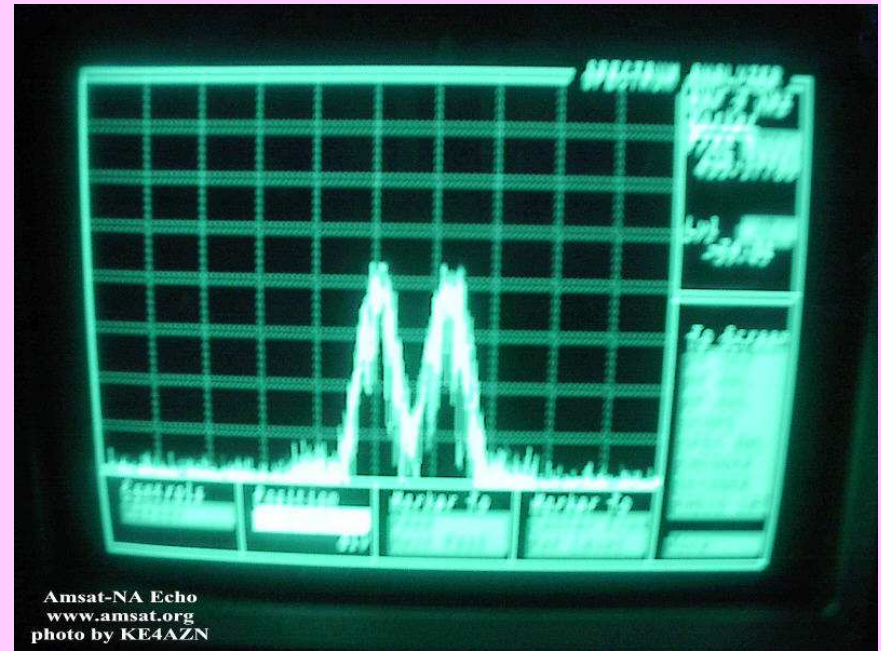


The difference in repairing an older radio now as compared to repairing it in it's early years

- **When it was fairly new, you were looking for a probable single point of failure; now there are probably multiple points of failure**
- **Capacitors can fail over time whether the radio has been used or not**
- **If you have just acquired a radio that hasn't been turned on in 20 years - it probably won't be in working order**

Repair Bench Requirements

- Minimum of 4x6 foot work space**
- Several 120VAC 15 Amp power outlets**
- Good lighting**
- **Directional flood light a big plus**
 - **Magnifier lens a plus for older eyes**
- Hand tools**
- **Needle nose and jaw pliers**
 - **Philips and flat blade screw drivers**
 - **large and small tips**
 - **Wire cutters**
- Analog VTVM**
- Oscilloscope**
- Stable RF Signal Generator**
- SWR RF dummy load**
- Soldering Station**
- **Solder wick (#4)**
 - **High and Low wattage irons**
- Ver 0.7.4



- **Lots of Time**
- **Speaker**
- **Antenna**
- **Manuals**
- **Variable Isolated AC Supply**

NE7X - Workbench



Electrical Troubleshooting Procedures

- *Receiver*

Power supply

120 VAC and 6/12 AC for filaments (VTVM)

B+ DC (VTVM)

Audio (Scope)

Test audio path from volume pot to speaker

Oscillator / Mixer (Scope)

RF front end (RF generator or Xtal calibrator)

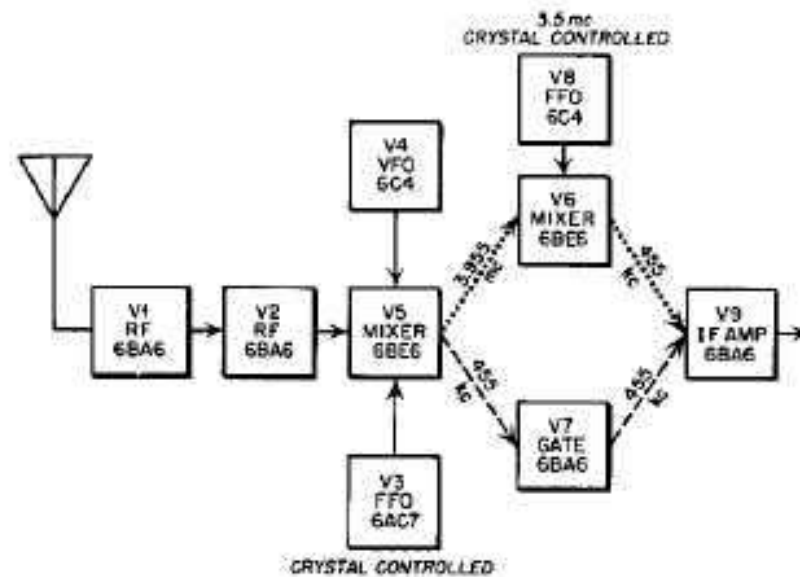
Tube BIAS, HV, AGC (VTVM)

Dial alignment to WWV (5/10/15/20 MHz)

IF (RF Generator)

Tube BIAS, HV, AGC, open coil (VTVM)

Detector (RF probe connected to VTVM or scope)



Electrical Troubleshooting Procedures

- Transmitter
 1. Power supply
 2. Oscillator / VFO
 3. Driver
 4. RF output
 5. Modulator



OK, now that you have your vintage radios restored, who can you talk to and what frequencies can you use them on?

- West cost AMI (*AM International*) 75 Meter AM net meets every Wednesday night at 2100 MST on: **3.870 MHz**
- Greater Phoenix Arizona area 2 Meter AM net meets every Tuesday night at 1930 MST on: **144.450 MHz**
- Arizona 40 Meter AM net meets every Saturday & Sunday mornings at 1000 MST on: **7.293 MHz**
- Heathkit net, 20:30 GMT **14.292 MHz** on Sunday afternoon
- World Wide AM calling frequencies:
 - **14.286, 21.400, 29.000 and 50.400 MHz**
- SSB & CW vintage frequencies are the same as for any modern radio used today
- Many more, refer to: Electric Radio Magazine

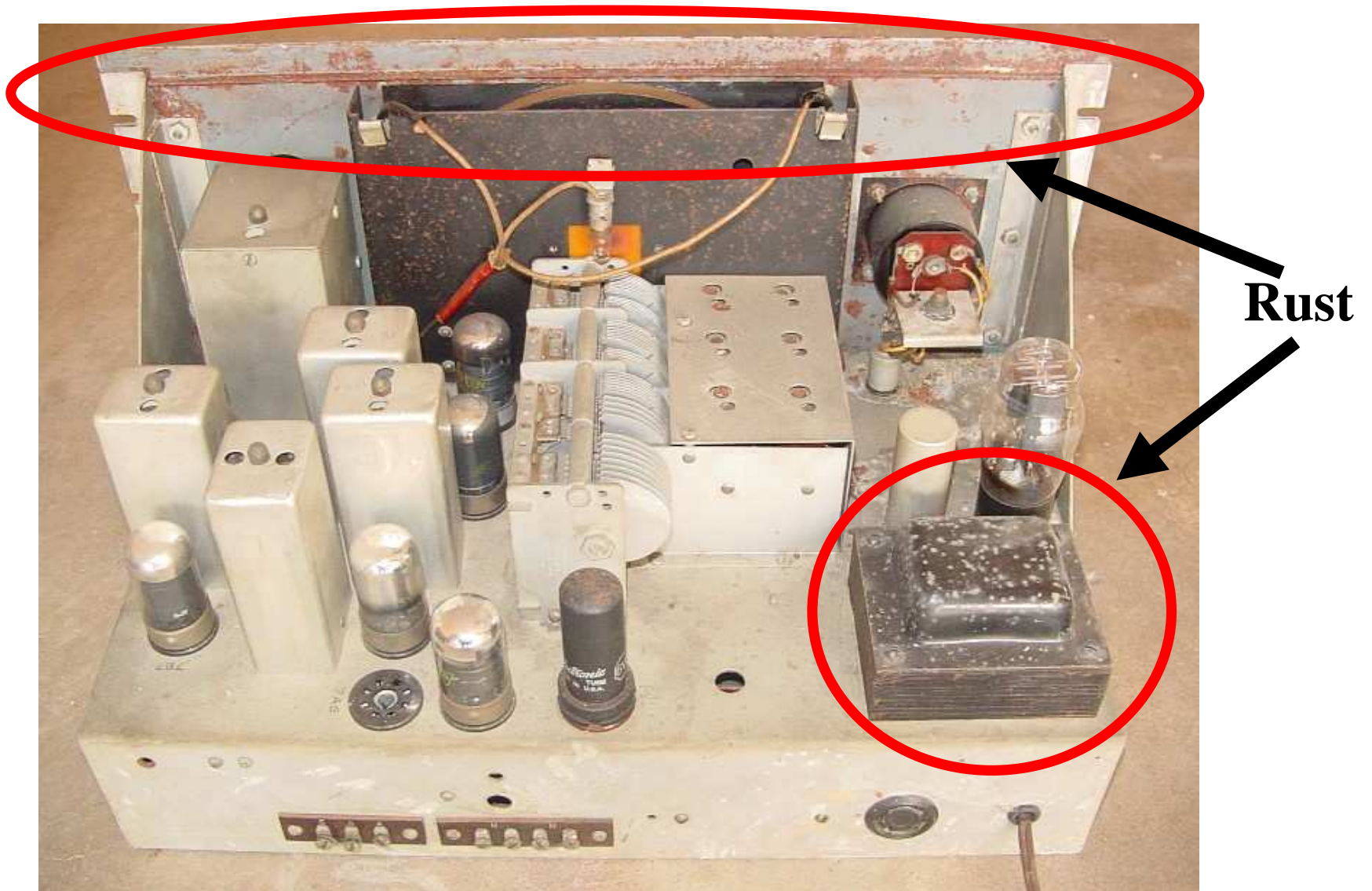
Here Is An Outstanding Example Of Before & After

- **RME 45 receiver**
- **Restored by: Ron, WA0KDS, Phoenix Arizona**
- **Single Conversion, 9 tubes**
- **455 KHz IF**
- **AM/CW**
- **550-33000 KHz**
- **Made in USA**
- **1946-1948**



RME 45

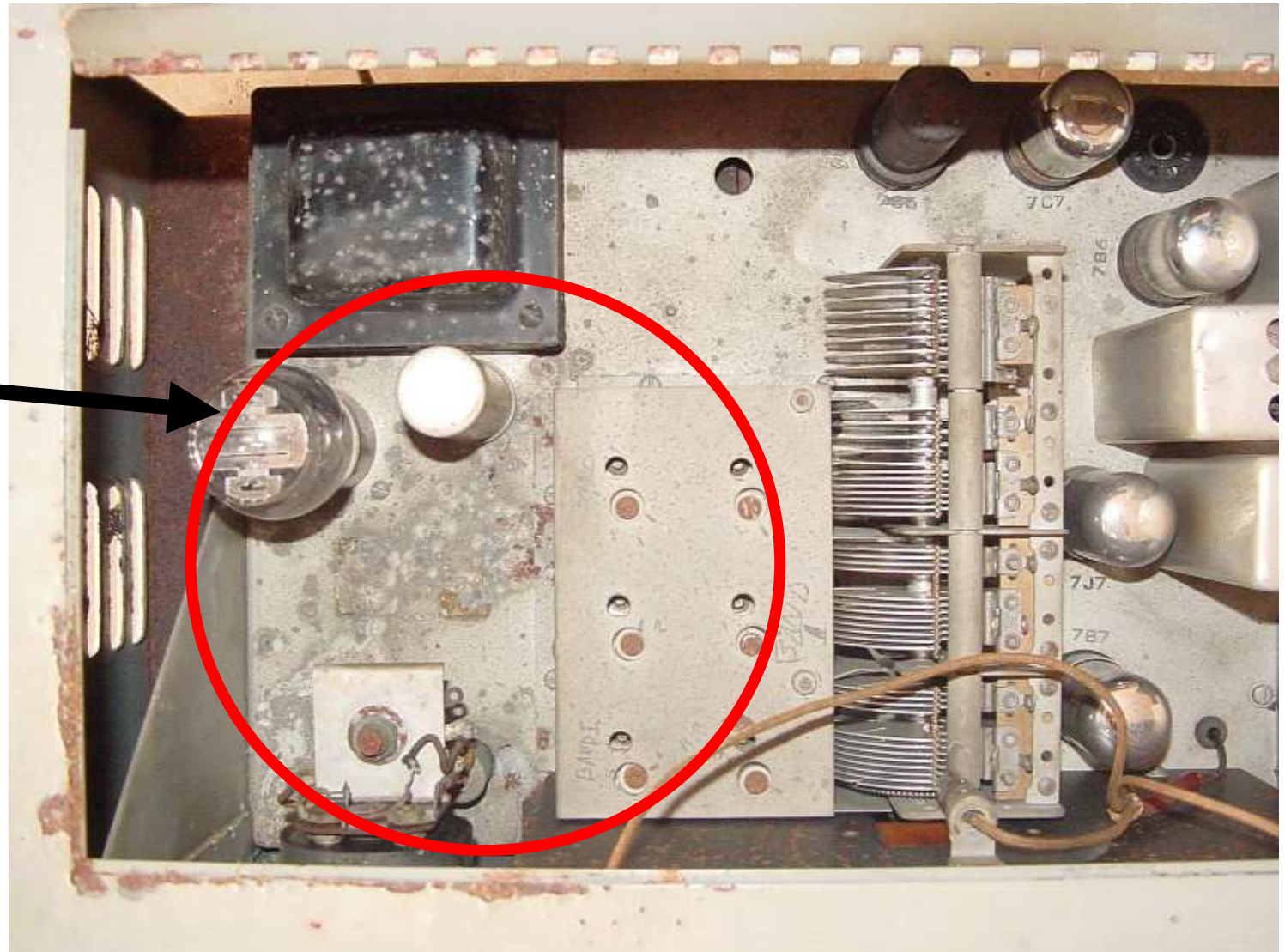
Before, Picture #1



RME 45

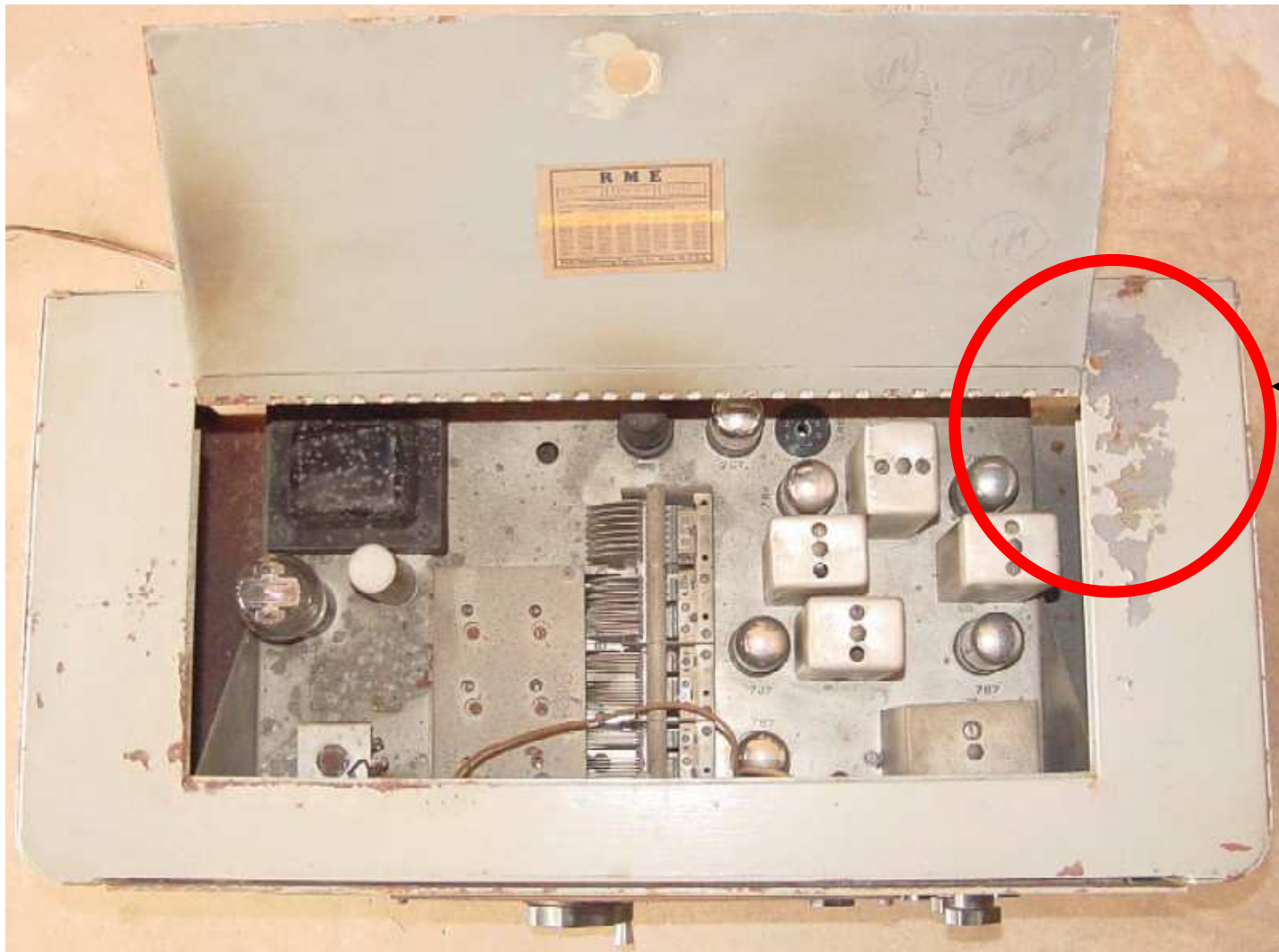
Before, Picture #2

Chassis Pitting



RME 45

Before, Picture #3



**Rust &
Paint
missing**

RME 45

Before, Picture #4



**Rust &
Lettering**

RME 45

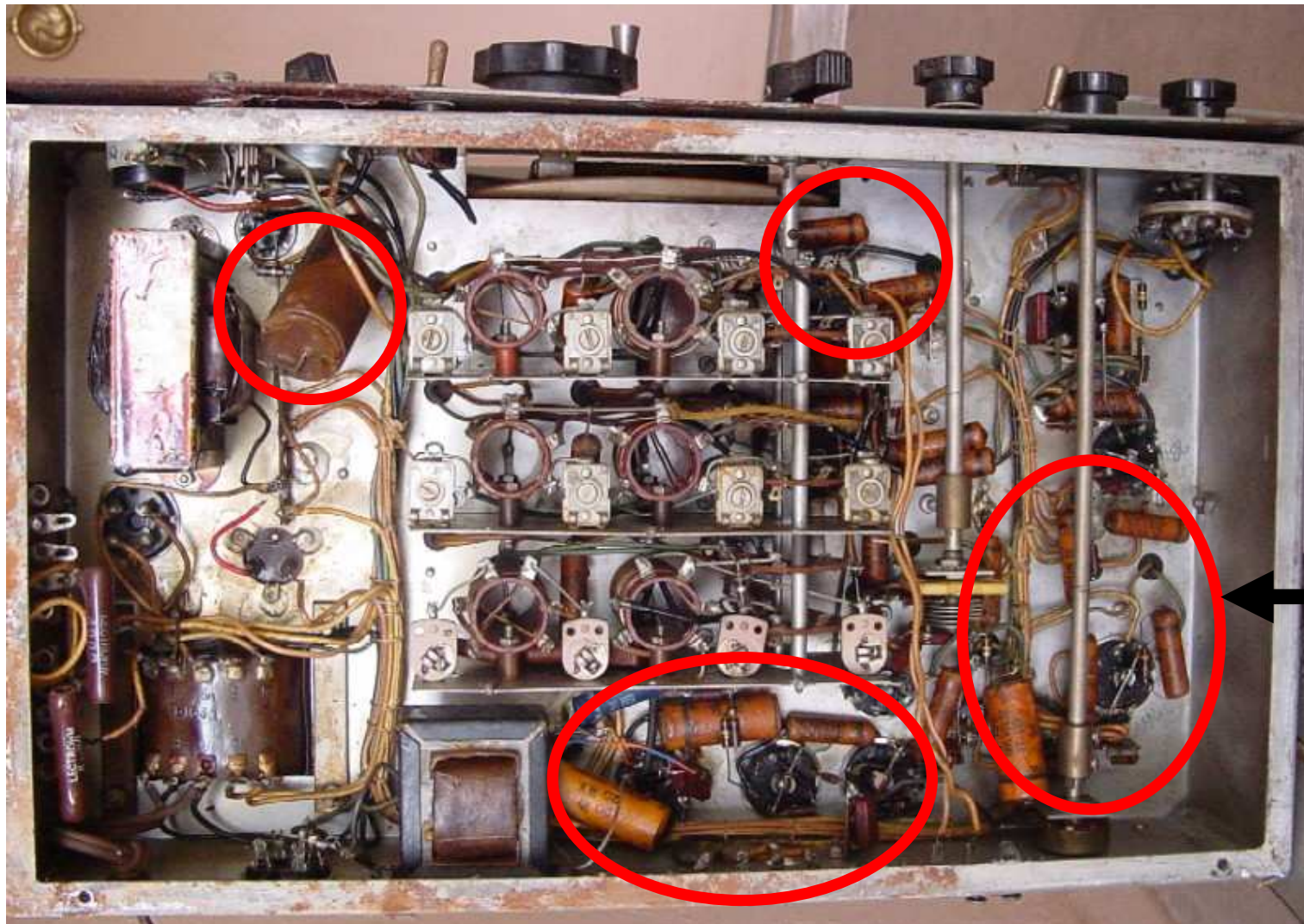
Before, Picture #5

Rust &
Lettering
→



RME 45

Before, Picture #6



Paper
Caps

RME 45

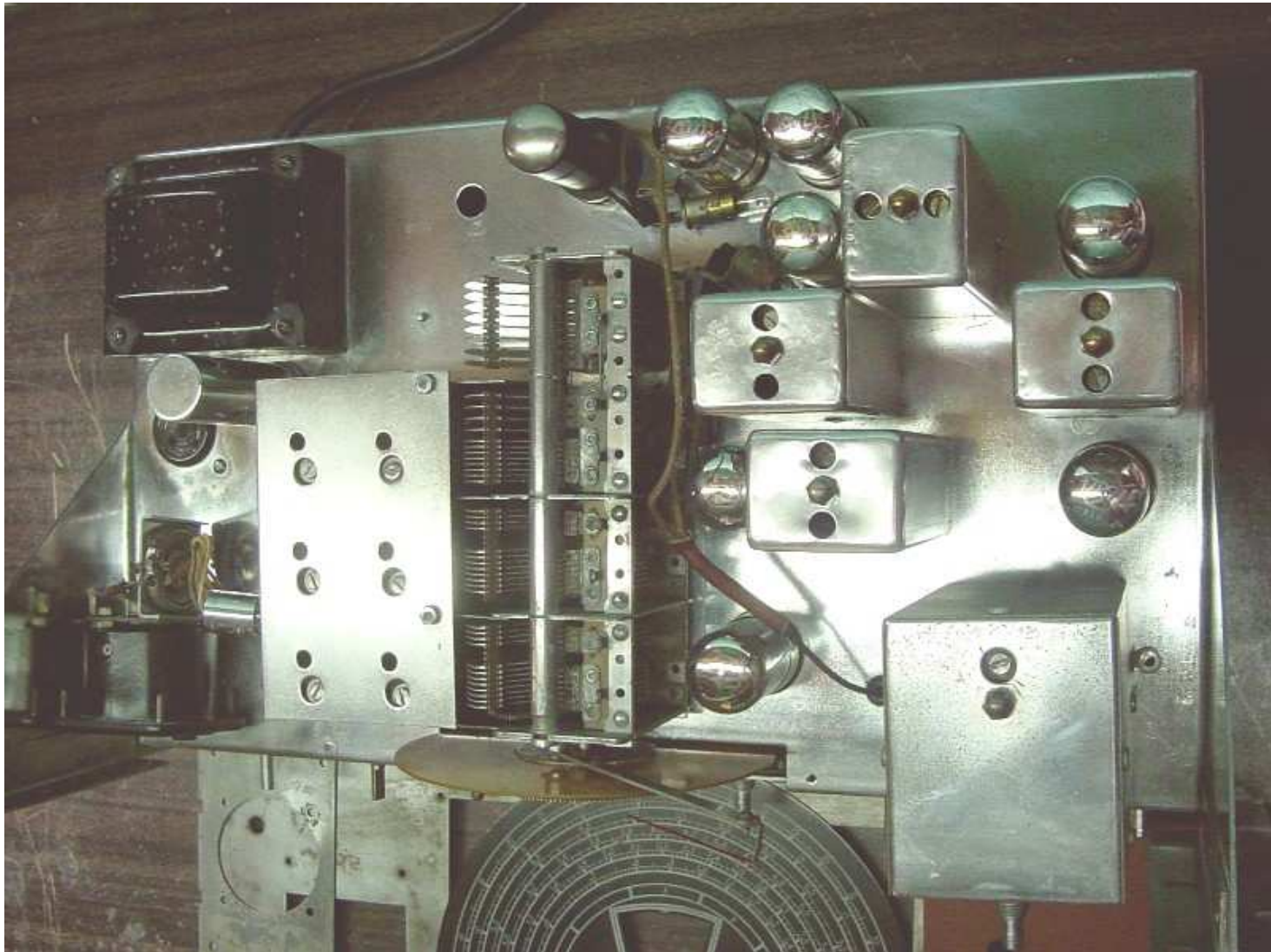
After #1



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RME 45

After #2

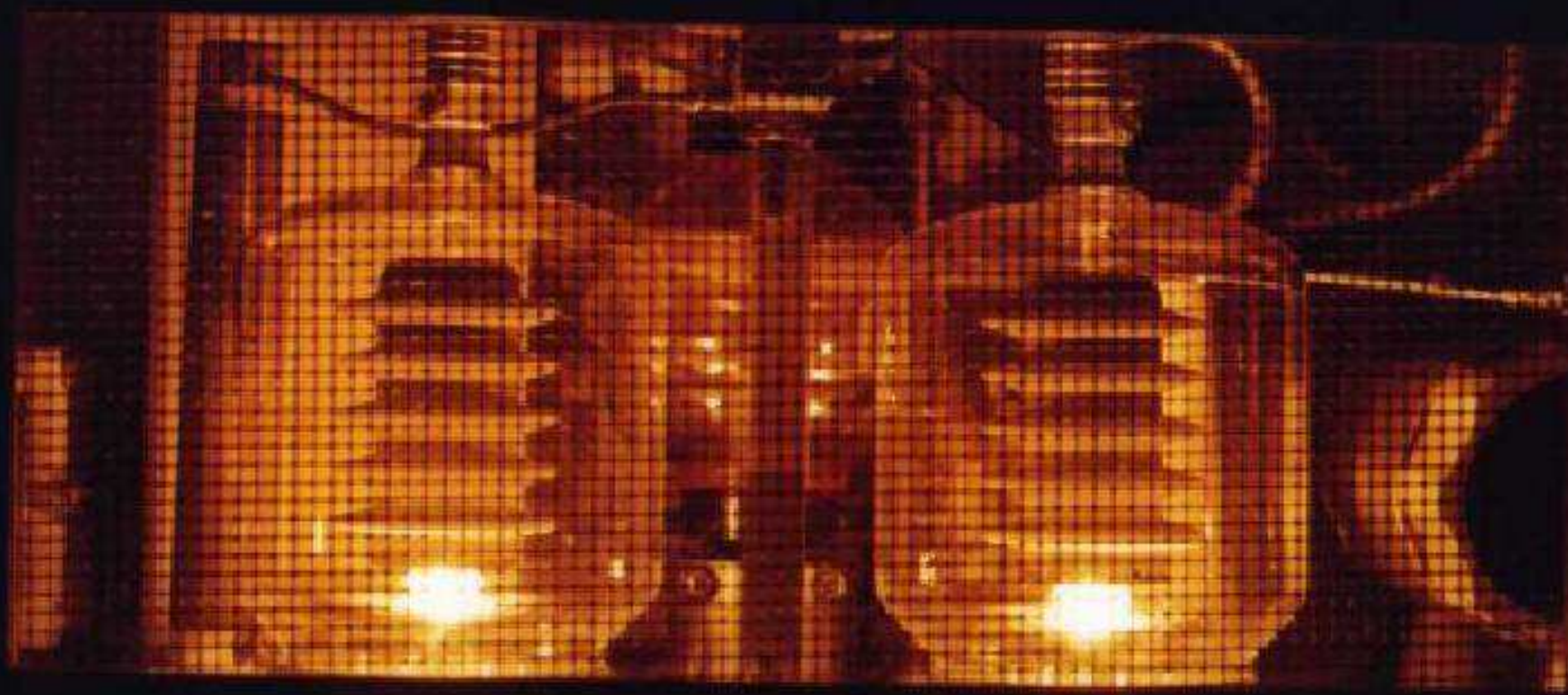


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Reference Information

- **Electric Radio – Publication**
 - PO Box 242, Bailey, CO 80421
 - <http://www.ermag.com/>
- **Receivers, Past & Present – Book**
 - By: Fred Osterman
 - <http://www.amazon.com/>
- **AC6V web site: <http://ac6v.com/antique.htm>**
- **NE7X web site: <http://www.ne7x.com>**

73s And Keep Those Filaments Glowing !!!



Real Radios Glow in the Dark!