Restoration and Conservation of circa 1931 Delco RA-3 & RB-3 Broadcast Receivers.

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For some years I have had an interest in the history of broadcast receivers specifically designed for rural populations without access to AC power lines.

Of course virtually all radios made before 1925/26 were battery powered and maintenance and replacement of batteries was an on-going chore and certainly no small expense for the owner. By 1927/28 reliable AC powered radios began to make up a significant part of the urban market.

In 1930, there were still millions of rural families and they were just as eager to tune in to the ever expanding slate of network and local radio station offerings. Being in rural districts, average income was significantly lower than around population centers. The fact that AC power was not yet available for these folks made the operation of battery powered radios an even greater burden on the pocketbook.

But the potential market was large enough to convince radio manufacturers that money could be made by producing new chassis designs where economy of operation was paramount. In 1929, Lisle Tatro of Decorah, Iowa patented a receiver design that could operate off the *Delco-Light* 32 Volt DC farm lighting system. In the early years of his business, Tatro lacked the manufacturing or marketing organization to sell large quantities of radios. However, *Delco-Light* was a large business, by then owned by *General Motors*, with well over a half million rural lighting systems in use.

This company had a large distribution network, manufacturing and engineering capacity to design and build broadcast receivers at a factory in Rochester, NY. By the second half of 1931 they were ready with their first radio products. Radio models RA-3 & RB-3 This same chassis was also punched out for the addition of a rectifier and other parts to offer an AC version. Within months there was another chassis for the superheterodyne circuit.

American Agriculturist 29 August 1931 Vol 128 #9
7 (131)

A MODERN
ELECTRIC RADIO
FOR ELECTRIC PLANT OWNERS

NO "A" BATTERY
... just plug into the light socket

Better radio reception . . . at a big saving of trouble and expense!

The Delco Console

THE DELCO-COMPACT

This is the Delco Compact. Handsome walnut finished case. Tone selector. Volume control. Four screen grid tubes. Two of the new Pentode tubes. Big dynamic speaker. This set is also built in a splendid Console model.

The new Delco 32-volt electric radio operates direct from any individual electric plant socket.

Forget the recharging nuisance and cost of "A" batteries forever . . . you don't need them with this modern set.

Think of the pleasure this finer radio will bring you and your family, all winter long! The finest music . . . the latest news . . . all sorts of entertainment . . . and all you have to do is plug into your light socket and turn the dial.

Act *now!* Mail the coupon below. And ask your Delco-Light dealer to show you this new Delco radio. You can own it on unusually convenient terms.

DELCO
32-VOLT
RADIO
Also All-Battery or A. C. 110-Volt

DELCO APPLIANCE CORPORATION,
Dept.B-14, Rochester, N. Y.

Without any obligation, I'd like to know more about:

☐ Delco 32-volt Radio ☐ Delco A. C. Radio
☐ Delco Battery Radio

Name.....
R. R.....City.....
1-77
County.....State.....

Their first 32 Volt DC radio uses the Type 36 screen grid & Type 38 pentode tubes. The Type 38 tube could not provide adequate audio power output with just a nominal 32 VDC for the plate circuit. So their first two models, RA-3 (table model) and RB-3 (floor model) only used the 32 Volt system to light the tube filaments. You still needed three - 45 Volt 'B' batteries to provide a nominal +135 Volts for the audio output stage to deliver reasonable audio power.

DELCO-LIGHT
SERVICE NEWS

Vol. IV. No. 3 — *Confidential to Dealers and Servicemen* — September 1931

Delco Appliance Corporation — Rochester, New York

SPECIAL RADIO SERVICE NUMBER

DELCO RADIO

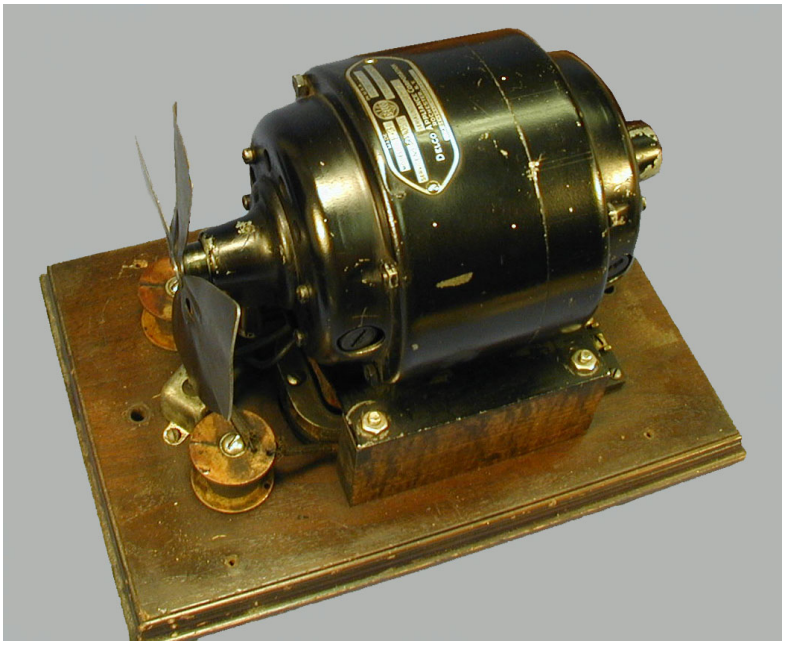
DELCO RADIO

It appears that advertisements for their first radios are rare. The same applies for service literature containing photos. This image of DLSN was found in a Web photo archive without links to origin.

Fortunately these radios are well documented in United Motors Service publications.

(See appendix.)

Since Delco had long experience in designing one-cylinder gasoline powered generators to charge banks of lead/acid batteries for their 32 Volt lighting system and was already building 32 Volt DC motors to run cream separators, washing machines, well pumps, fans and the like; it was not too unusual for them to think that it might be possible to design a motor/generator (dynamotor) that could provide this high voltage. And so it was... The product was given the name *"Electrifier"* and was sold as an accessory to provide high voltage (140 Volts DC) for these radios.



Still, this *"Electrifier"* was relatively expensive and was not considered for use by any other manufacturers at this time. By 1933, vibrator power supplies were becoming available for the automobile radio market and were certainly less costly to manufacture even though the motor/generator was probably more reliable. By 1933 Delco had moved radio production to a facility in Kokomo, Indiana. Farm radios built there used vibrator power supplies.

I first became aware of the *Electrifier* in conversations with Fred Crews of West Virginia. At that time, I was not aware that any manufacturer of home broadcast receivers had ever taken this design approach.

When an *Electrifier* appeared in the auction at the 2005 AWA Conference at Henrietta, NY., I just had to have it... Now that I had the *Electrifier*, I started looking for the table model of the first set advertised to use the *Electrifier*... This is the Delco Model RA-3.

Geoff Bourne was aware of my interest in acquiring this set and found one at the MARC – Lansing meet in 2009.

The cabinet was sound but the finish was badly lifted, opaque and extremely yellowed, way past the point of being salvaged. The chassis was even worse. Corrosion from mouse urine had eaten through half the chassis metal thickness in places. The audio output transformer was missing along with the dial light socket, a tube shield and local/distant switch. One surprising thing, to me, is that the radio had all of the original S-12 glass envelope *DELCO* branded tubes still in place. (Most likely made by Sylvania.) Since these tubes were not known for any particular longevity, it is likely this radio saw little service. Maybe the farm failed and was abandoned as the Depression hit rock bottom or was replaced by a set with rapidly improving technology or the AC "High Line" reached their home.

Since I was missing a few parts, I set a search on eBay in hopes of finding the transformer, tube shield, lamp holder and maybe a few spare tubes.... In less than a year a true junker RA-3 appeared on eBay. The cabinet was in beyond horrible condition, no speaker or output transformer but it did have a badly rusted tube shield, lamp holder and at least a couple of tubes. I was stunned when late bidding ran the deal up to $90 with shipping additional... That was just too rich for my blood.

So I continued to watch eBay. This is when the console version of this radio appeared in October 2011. While the cabinet appeared very bad, the chassis was complete and it had the *Electrifier* dynamotor. I was delighted when I found that I was the only bidder. The only problem for me was that the seller was located in Elmira, NY and I am located near Charlotte, NC. However I found out that Bruce Roloson lives not far from there and he was kind enough to get the set and store it at the AWA Museum until I could pick it up while attending the 2012 AWA Conference.

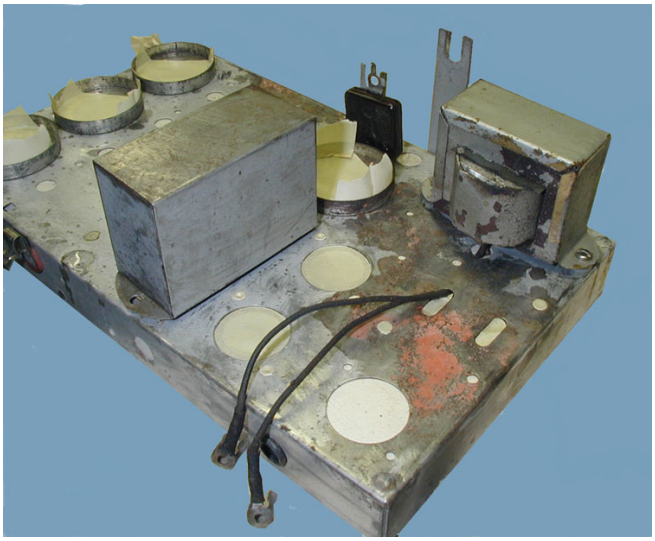
While these radios were in poor shape, I thought they were worth extra effort to preserve because they represent the very first series of radios made by a major manufacturer. It also represents a unique (for the time) method of solving the problem of needing relatively high voltages to make existing vacuum tubes deliver significant (room filling) audio power.

Three years later Grunow would make a small number of home broadcast receivers, Model 6HB, using a very compact dynamotor not nearly as reliable. (I would love to have this model, please let me know if you have any leads.)

Challenges to Restoration
Table model RA-3

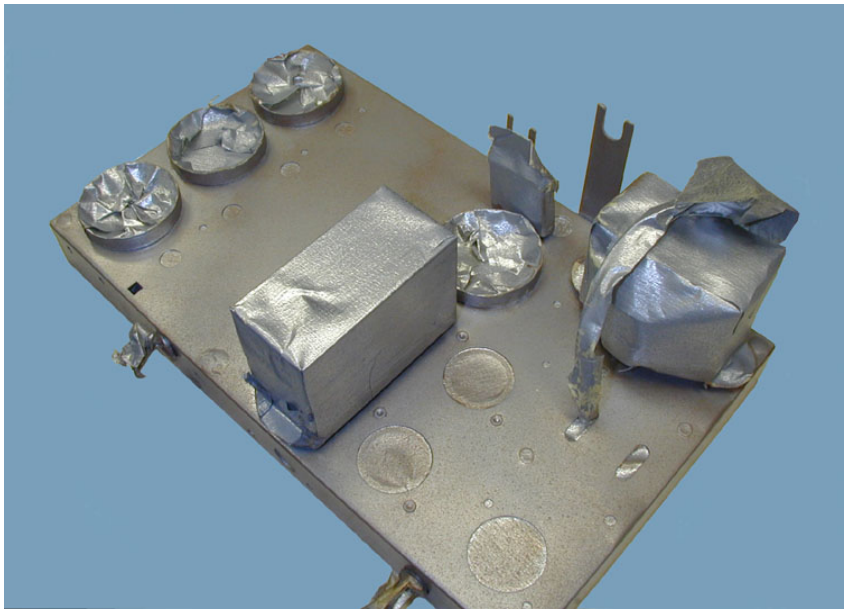
1. **Cabinet finish deteriorated beyond conservation. New finish required. (Solvent stripping, grain filling, staining and lacquer coats.) Cabinet branded on the bottom as made by *Union Chest & Cabinet Corporation* – Rochester, NY**
2. **Missing output transformer. A year of searching before the correct transformer was located. (In the AWA 2012 flea market.)**
3. **Two part tube shield missing and no replacement could be located. Therefore a replica was made using metal spinning methods; something I had never done before. I was surprised at how well this first effort turned out.**

4. **Pilot light with custom bracket missing. Replica made.**
5. **Local/Distant switch missing. Near replica was made.**
6. **Chassis rust was severe. Chassis partially disassembled, rust removed and automotive glazing putty used to level surfaces. Painted to duplicate look of oxidized cadmium plate.**



The key, I think, to painting a chassis that was originally plated with cadmium or zinc is to use a multi-layer coating process.

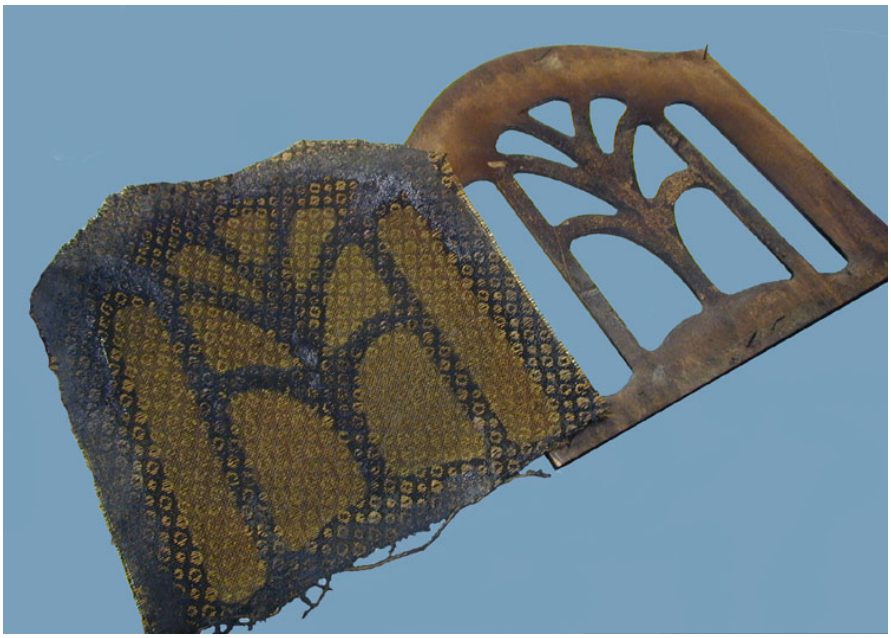
1. Apply clear coat of adhesion promoter.
2. 'Chrome' lacquer.
3. A light dusting of gray primer.
4. Then you have fun with applying 'faux rust & oxidation' here and there.
5. Finish areas with an overcoat of clear satin lacquer to get the correct sheen.



Keep in mind that your eye <u>expects to see</u> blemishes in old parts. Like new surfaces just scream REFINISH! Keep your work subtle you do <u>*not*</u> want to detract from the overall appreciation of the original intent of the designers and workers that made the item.

7. **The same process applied to tuning condenser shielding.**
8. **Conserve original grill cloth.**

Shave off grill cloth with razor blade. Clean with alcohol. (I have not had good experience cleaning with water base materials.)



Challenges to Restoration
Console model RB-3

1. **Speaker grill area of the 3 ply cabinet front panel was totally delaminated and pieces of the core layer were missing. Core of plywood was replaced with 5 ply cabinet birch of the exact same thickness.**
2. **Other areas of the front face were delaminated. Veneer glued to core layer.**

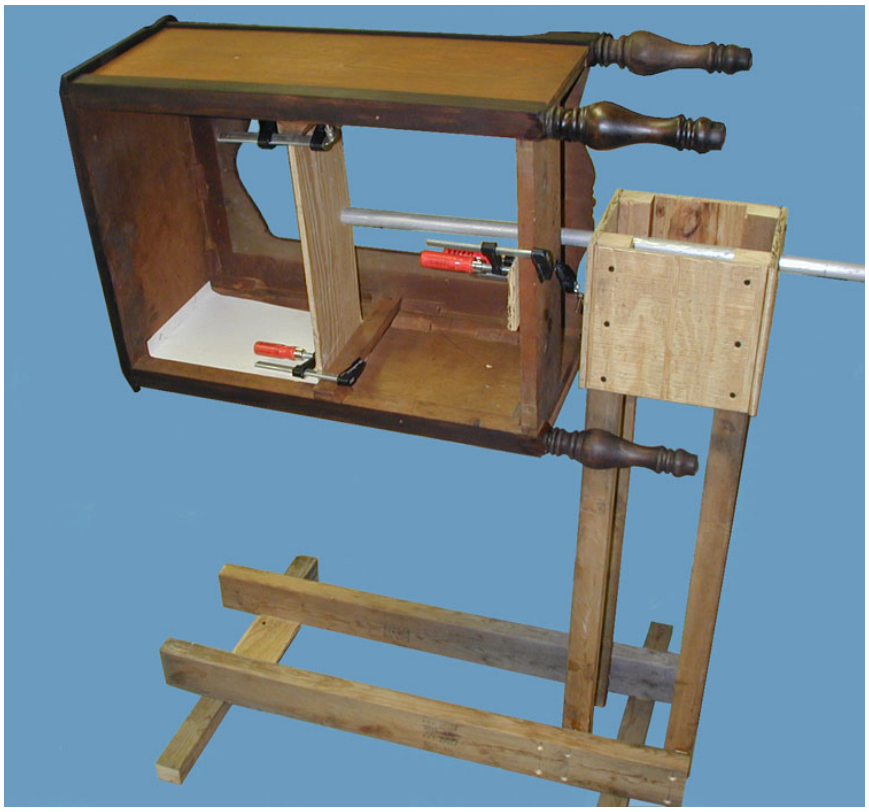
3. **Strips and chips of walnut veneer were missing along three sides of the cabinet top. One edge had significant dry rot. Therefore new sheet of walnut veneer was installed. I noted that the replacement veneer that I could obtain does not have nearly as tight a grain structure.**

4. **The molded ornaments were warped and much of the coloration damaged. Significant work done to repair.**

5. **The finish on the wood cover of the *Electrifier* was beyond conservation. Therefore solvent stripping, grain filling, staining and lacquer coat operations were performed.**

6. **Thorough cleaning of chassis. Some of the original *DELCO* branded tubes are missing and substituted with other brands. (These tubes are apparently very rare today even in collections of members of the TCA. I have only located one Type 38 with the S-12 bulb that is branded *DELCO*.)**
7. **Identical grill cloth shaved off and cleaned as mentioned above for the RA-3**

My work space for cabinet refinishing is very unsuitable for the task. To make it easier to spray surfaces without causing runs I use this crude stand.
I can easily rotate the cabinet to the side that needs to be level & facing up. After about 15 minutes, I can rotate to the opposite side.



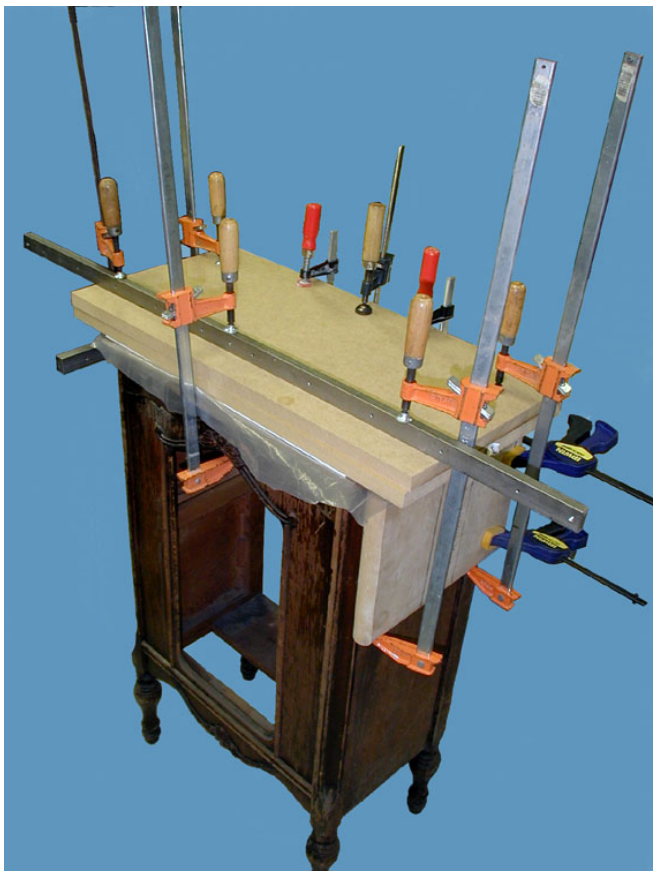
Spraying is done with a small conventional 'detail gun' and shop air at about 30 p.s.i.

The lacquer is Deft Clear Brushing Lacquer thinned about 15% with lacquer thinner. I add a few drops of 'fish eye destroyer' to each filling of the paint cup.

Because of poor working conditions and my lack of experience, I found it necessary to apply two fairly heavy coats of lacquer then wet sand these coats level using 600 grit silicon carbide paper. A top coat thinned about 25% was then applied. After waiting two weeks, the finish was rubbed out with rottenstone & waxed.

The finishes on both radios are somewhat darker than I suspect they were originally. This is probably due to the age of the wood and the way it takes stain after having been solvent stripped.

When applying the new veneer to the top of the console I should have spent more time on leveling the core veneer sheet just under the walnut. Sanding should have been somewhat more aggressive but I did not want to risk sanding completely thru that core layer. Even sanding would not get it completely level because there was a slight bow in the surface. Clamping was difficult. To partially compensate for the bow, I added a thin closed cell foam plastic pad between the poly sheet protecting the veneer sheet and the two sheets of MDF shelving material.



Note that I used a piece of thick MDF board on one side of the cabinet. It is positioned to catch the overhang of the top so that heavy clamp pressure is along all edges. On the other side I had a stainless steel bar to do the same thing. A length of 2”x4” runs in the middle from front to back. Another length of 2”x4” runs along the back edge.

More than 100 in-process photos were made before and during the restoration/conservation work on these two radios… You can never be sure which photos just might bail you out during reassembly. Also you need them to help justify and document work you have done.

So where were these radios actually made? I don't know yet….

The tags on the back of both of these DELCO radios say "DELCO Appliance Corporation, ROCHESTER, NEW YORK; U.S.A."

General Motors Corporation had purchased Delco-Light in 1922.

Alan Douglas in his 3 Volume *Radio Manufacturers in the 1920s* (1-154) tells us that GM acquired the Day Fan Electric Company in Dayton, Ohio in 1929 to form the General Motors Radio Corporation primarily to obtain a going business that had RCA manufacturing licenses.

In 1929 North-East Electric Company of Rochester, New York was purchased and consolidated within Delco-Remy operations in Plant 1, Department 21. The product line of North-East was large starting motors and this was the beginning of the heavy–duty starter business for Delco-Remy (Delco-Remy history 2005). In 1927 a Mr. Ed A. Halbleib was listed as Secretaary-Treasurer of North-East Electric Co.

Alan Pellnat found the 1931 Rochester city directory listing under Electrical Supplies & Equipment Mfgrs. – a Mr. Ed A. Halbleib as President & GM of North East Appliance Corp. and President of Delco Light Co. 1932, Mr. Halbleib listed as President & GM of Delco Appliance Corp. (North East Elect. gone)

I found that the chassis of the GM Radio model 110 of 1931 known as the "Little General" bears a very strong resemblance to these Delco radios. There are obvious common parts but not all. It is hard not to think that many of the parts were produced at the same factory in Dayton.

The one confusing thing to me is that I find it hard to think that an Ohio operation would be importing cabinets from Union Chest & Cabinet Corp. – Rochester, N.Y. There would have been too much risk of damage on such a long trip.

So maybe these radio chassis were assembled in Rochester primarily from components being manufactured in Dayton. The chassis being loaded into locally sourced radio cabinets.

We do know that the radio manufacturing operations were moved to Kokomo, Indiana by 1935.

In order to complete this project, I should work to assemble some history of the radio manufacturing operations at *DELCO* in this time period. Allan Pellnat – KX2H has spent some time in researching the city directories of Rochester and assembled a two page reference. It would probably be necessary to go to libraries in Rochester in order to expand this information into a readable narrative.

The combined work to conserve and restore these radios required some 200+ hours. You may note that I have not told you anything about how I repaired the electrical functionality of these radios. This is because these radios have not been modified with new components to make them work.

It is my understanding that these two radios may be the only surviving examples, in presentable condition, of the first radios sold by a major retailer of home broadcast receivers. By comparison of the two radios, it was possible to determine with great certainty that these radios had never undergone chassis repairs and parts substitutions since the day they left the *DELCO* manufacturers factory. i.e. They remain accurate historical references to the technology and fabrication methods of the day.

The components that went into these radios never did have a design requirement to remain functional for 80+ years. Therefore I think it a disservice to our continued historical understanding of technological advancement if one were to eliminate examples of

period artifacts (components) for no other reason than to make a 'hybridized device' function for a few more years until even more components fail.

Had these radio chassis been found in significantly worse condition with many missing or undocumented parts substitutions, I would have little objection to someone rebuilding them for the fun of seeing it work or to demonstrate their ingenuity. However I would not want future generations to regard such items as accurate historical artifacts.

Note: Appendix begins on the next page.

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Appendix

Formal references not yet obtained.

From Internet searches and e-mail correspondence the following leads could be investigated.

1. From Kokomo Tribune article on milestones of manufacturing.

In 1935 Crosley Radio Corp. starts building Chevrolet radio line at the former Haynes Automobile Co. body plant site, which the company received free from the chamber of commerce.

1936**:** General Motors buys the Crosley Radio Plant in Kokmo, IN and manages the operation until it becomes the Delco Radio Division. Operations started in one building and employed 428 people.

2. From Delco-Remy history .pdf

GM had been on a buying spree for years in order to build a totally vertically integrated manufacturing company.

In 1929 North-East Electric Company of Rochester, New York was purchased and consolidated within Delco-Remy operations in Plant 1, Department 21. The product line of North-East was large starting motors and this was the beginning of the heavy –duty starter business for Delco-Remy.

Some development work done on radios which is then turned over to the General Motors Radio Corporation in Dayton. Operations started in one building and employed 428 people.

3. From Radio Manufacturers of the 1920's, Douglas: Vol. I – 154

The primary reason for the purchase was to own an already-existing company with an RCA license which they could take over, without arousing suspicion of collusion with RCA.
(The joint stock ownership was a tightly-kept secret for some time. as RCA was already under fire for its monopolistic practices. This organization had been created by the buyout of Day-Fan Electric Co in 1929 owned 51% by GM and 49% by RCA, GE, and Westinghouse.). The Department of Justice did file an anti-trust suit in May 1930, and as part of the response, RCA and GM liquidated the General Motors Radio Corp. about November 1931. (Douglas 1-154).

4. From research of Rochester, NY city directories by Alan Pellnat:

1931 Rochester city directories listing under Electrical Supplies & Equipment Mfgrs. – Mr. Halbleib listed as President & GM of North East appliance Corp. and President of Delco Light Co..

1932, 33 & 34 Mr. Halbleib listed as President & GM of Delco Appliance Corp. (North East Elect. gone.)

5. Observation.

Bottom of the cabinet of this model RA-3 is hot branded Union Chest & Cabinet Corp. – Rochester, NY

6. Comments from readers on Antique Radio Forum.

On ARF comments that Delco sets were made by Stewart-Warner and GM Radio…. I looked at my S-W Tudor console with 102 BC receiver and 103 SW converter advertised in late 1931, I don't see clues to chassis construction that would leave me to think the RA-3 was made on that production line.

THEN I did a search on 1931 GM radios and hit on Radiola Guy and his page on the GM model 110 radio called the 'Little General' Thanks to the fine pictures, I can see a VERY STRONG similarity to the chassis construction techniques… The tag on the back of the set is not sharp enough to read.

So still want to know where the factory was for these radios. - If GM Radio was in Dayton (implied from one ARF'er), it seems strange to me that they would get their cabinets from Rochester, NY.