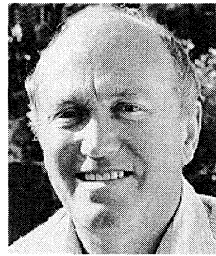


# VINTAGE RADIO

By JOHN HILL



## A fault with a difference

**One intriguing aspect of vintage radio repairs is the number of obscure faults that one has to deal with from time to time. Few repairs are straightforward and there is often a hidden and challenging problem to solve.**

It's not really surprising that vintage radio receivers can produce obscure faults. No doubt the age and poor condition of some of these old receivers has some bearing on the matter.

A classic example of this was a fault in an old 1932 model Precedent, an early 5-valve superhet with 2.5V valves and an 8-inch (200mm) electrodynamic loudspeaker.

The restoration had been without incident and the set worked quite well

for an old timer. However, there was an annoying problem that resulted in noticeably distorted sound when the set was hot. Turn the set off and then on again a few hours later and it would be OK.

It took quite some time to establish a connection between the fault and the length of time the receiver was in operation. The problem never became apparent until the set had been operating for several hours. From then on, the distortion would gradually creep

in. After several unsuccessful attempts at locating the fault, the problem was finally traced to the loudspeaker.

To cut a long story short, gradual heat build up in the field coil created physical distortion between the speaker frame and the field coil housing. Twisting the housing with one hand would increase or decrease the audible distortion, depending on which way it was twisted.

This heat induced warp eventually caused the voice coil to foul the centre pole of the electromagnet. Once that happened, the sound deteriorated until the unit was switched off and the speaker cooled.

It was noticed that although the voice coil did not rub on the magnet when the speaker was cold, it was very close on one side. As there was no central "spider" on the cone, I decided to reposition the pole piece to see if that would solve the problem.

One favourable aspect of early electrodynamic loudspeakers is that they are held together with good old-fashioned nuts and bolts. This allows them to be taken apart for repairs. In later years, speakers were riveted or spot welded together, which made dismantling extremely difficult, if not impossible.

### Several nasties

The Precedent speaker was of the nuts and bolts variety and it required little effort to remove the field coil and the central pole piece of the electromagnet. This revealed several nasties.

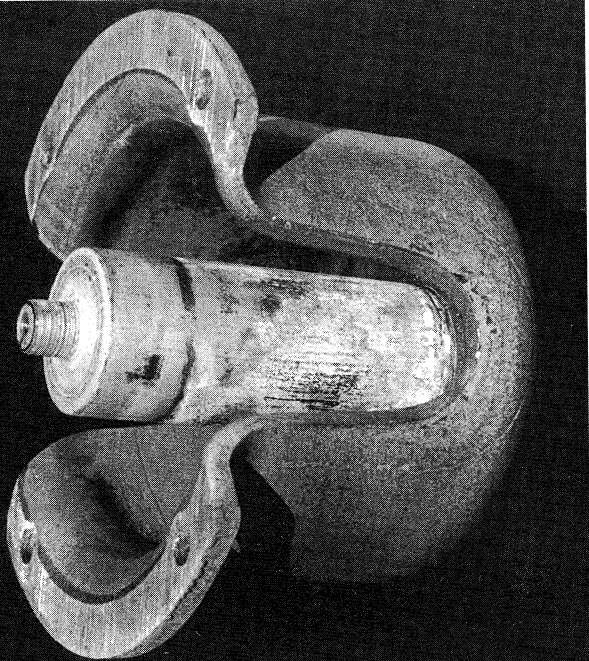
First, despite being plated, the pole piece was now very rusty. This had the effect of enlarging its diameter, thus reducing the clearance between it and the voice coil.

Second, the field coil was wound on a cardboard spool which was a



The large bolt head on this Precedent loudspeaker at top holds the central pole piece in place, making it easy to remove for repairs.

This pole piece shows obvious signs of damage. Note the scuff marks at the end where the voice coil has been rubbing against it.



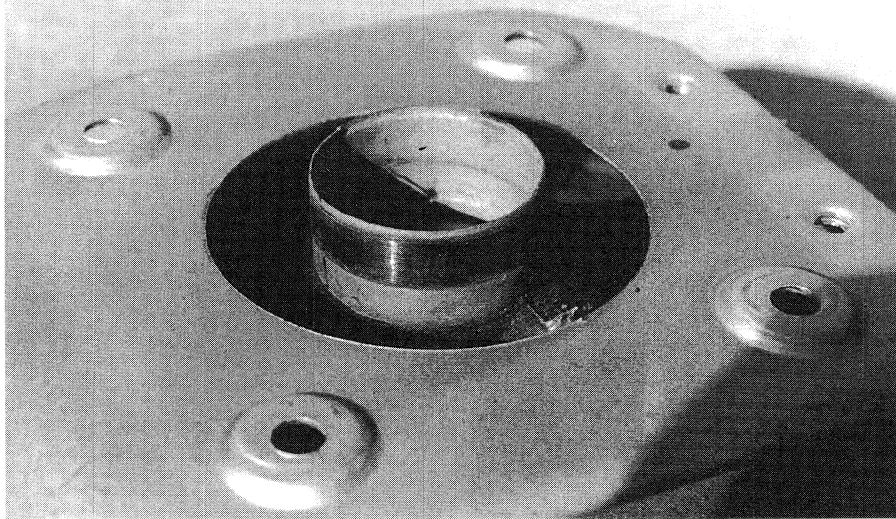
The speaker cone on this unit is still attached to the frame. Note the "spider" in the centre of this model, which is used to position the cone.

loose floating fit on the pole piece. Shrinkage over the years had caused this problem.

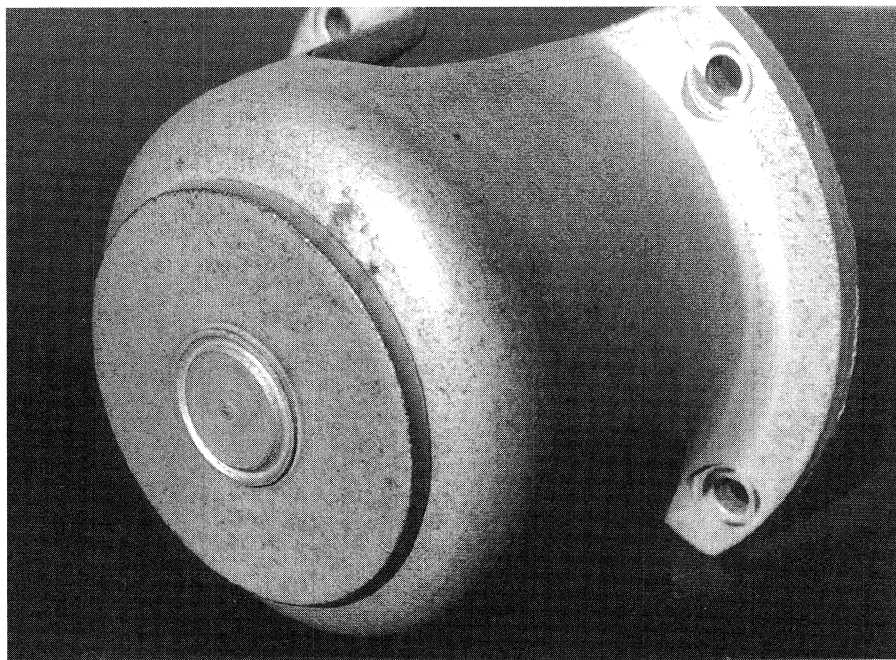
The cardboard spool is perhaps the cause of most faults that develop in electrodynamic loudspeakers. The spool absorbs moisture from the atmosphere when the speaker is not in use. When the field is operative, the heat generated within the coil drives

the moisture out of the cardboard and it condenses on the cold pole piece. Even though the iron was originally electroplated, 60 plus years of heating and cooling can eventually result in severe rusting and a fouled voice coil.

Moisture in the field coil spool can also cause electrolysis which was possibly the main cause of field winding failure. If moulded bakelite had been



This back view shows the speaker frame and voice coil. The coil is wound on a thin cardboard former which often goes out of shape over the years, especially if the cone has sagged.



A typical field coil housing. Unlike the Precedent loudspeaker, this unit has the pole piece riveted in place which makes repairs more difficult.

used instead of cardboard, electrodynamic speaker fields may have been more reliable.

### Proposed repair

The proposed repair for the Precedent loudspeaker was to clean up the pole piece and reposition it centrally in the voice coil. However, the job would not really be complete unless something was also done about the moisture absorbent cardboard. So, after leaving the spool out in the Sun

to dry for a few hours, it was given several coats of clear lacquer to seal it.

A couple of thin cardboard washers were also made, so that the field coil would be held firmly in place and these washers were sealed from moisture too.

All that remained was to reassemble the speaker and the distortion problem would be solved. Unfortunately, one cannot really expect to solve difficult problems as easy as that.

It would appear that electrodynamic

loudspeakers were originally assembled from rear to front. In other words, the cone was glued into position last. Putting a speaker together with the cone already in position is not so easy. No matter how the bolts that hold the frame and field housing together were jiggled and twiddled, the voice coil always rubbed on the pole piece.

After going through this routine often enough to realise that it wasn't going to work, the situation called for drastic measures. The pole piece was set up in a lathe and a quarter of a millimetre was turned off its diameter at the front where it fits into the voice coil.

After that, no further problems were experienced with the speaker's assembly. The cone moved freely without a hint of interference.

Now one would expect that increasing the clearance between the pole piece and the voice coil would reduce the speaker's sensitivity. If that's the case, it was by no means noticeable. What's more, if the same problem arises again with other speakers, I will have no hesitation in taking a skim off the pole piece in order to give it adequate clearance.

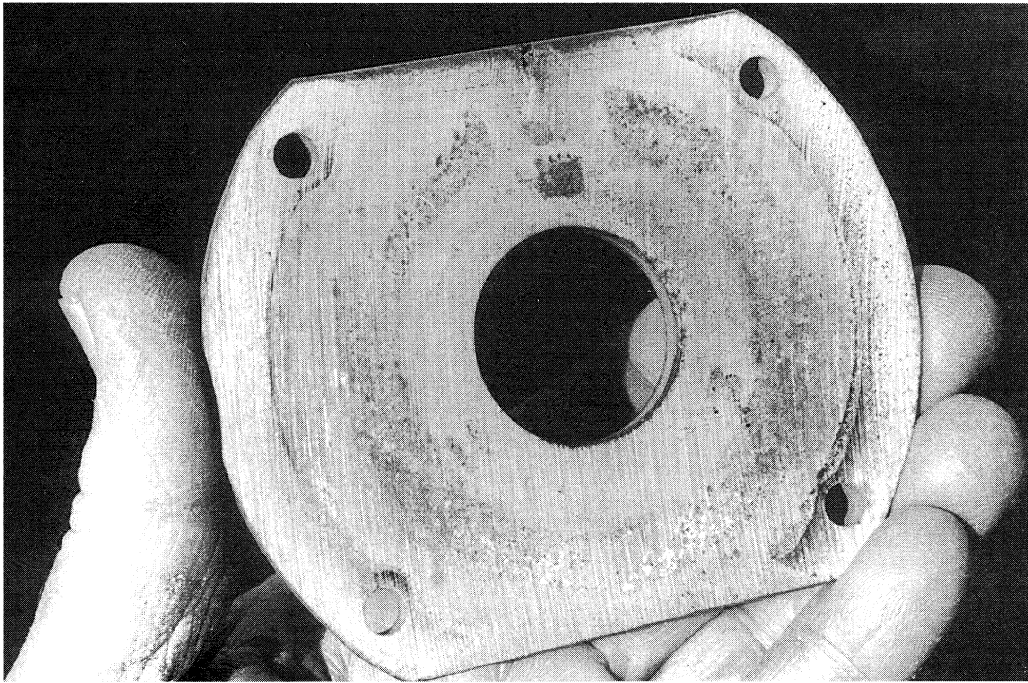
Because the voice coil is wound on a thin cardboard former, it is asking a lot to expect it to be perfectly round 50 or 60 years after it was made. Reducing the pole piece diameter is one way of compensating for an out-of-shape voice coil. A cone that sags and loses its form is one reason that voice coils go out of shape.

While on the subject of voice coils, remember that they are only glued to the speaker cone and a touch of lacquer to reinforce the area of attachment is highly recommended. If you have ever encountered a speaker with a loose voice coil or voice coil winding, you will appreciate the need to pay attention to that part of the speaker while it is accessible.

### Other methods

There are other ways of clearing fouled voice coils without having to resort to the drastic methods previously described.

One way is to move the cone in and out while applying sideways pressure to the cone. In other words: try to loosen the dust, grit and barnacles by forcing the inside of the voice coil to rub gently on the pole piece. After that treatment, lay the working speaker



The hole in this backing plate is a neat fit around the voice coil. In some instances, this hole may require enlarging so as to clear a coil that has gone out of shape.

face down on the workbench for a while so that any rubbish can work its way out of the gap.

If that fails to do the trick, slide a thin piece of shim brass between the voice coil and the pole piece, working it all the way around if possible. This procedure is likely to be more effective than the previous method. Once

again, give the speaker a run in the face down position so that the gritty granules can find their way out.

In my case, the repaired Precedent speaker was reinstalled in its cabinet before I realised it had the potential for a Vintage Radio story. So for the purpose of supplying photographs, another electrodynamic loudspeaker was

used. Unfortunately, this speaker is of slightly different construction, which just goes to show that some may be easier to repair than others (note the "spider" shown in the photograph of this model).

One problem that would arise if doing a similar repair on this second speaker is the fact that the pole piece is riveted in place instead of being held by a bolt, as was the case with the Precedent speaker.

### No money

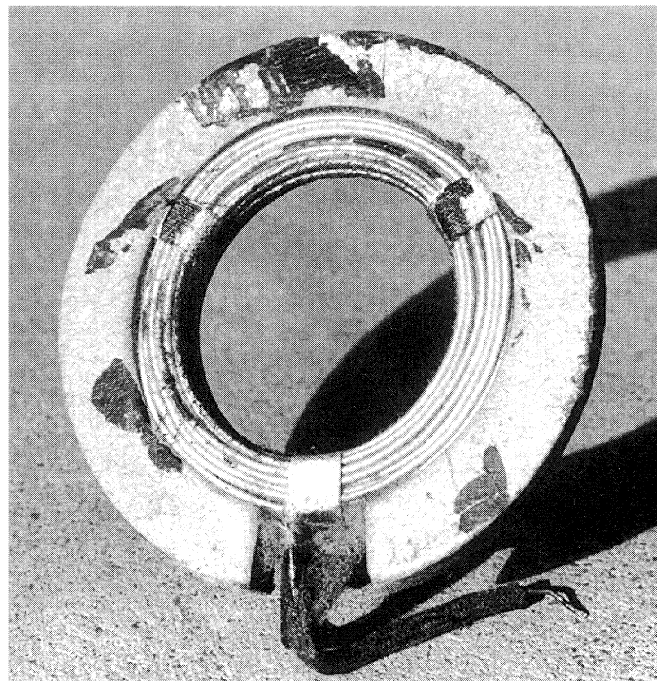
In conclusion, I see little point in spending large sums of money on old radios, especially when the price of some repairs exceeds the receiver's value.

This particularly applies to replacement field windings and speaker cones where one can easily spend \$100 on an old speaker restoration.

Why pay to have these things done when they can often be restored by either a straightforward repair or by combining various good components into one working unit? **SC**



This 2.5kΩ field coil is wound on a cardboard former. Sealing the cardboard with lacquer will help to moisture-proof it.



Most electrodynamic loudspeakers employed a hum-bucking coil which was used to neutralise hum induced by the field coil.