

# VINTAGE RADIO

By JOHN HILL



## What to do about the loudspeaker

**The loudspeakers used in vintage radio receivers are many and varied. They range from primitive horns to permanent magnet types, with electrodynamics in between. This month, we take a look at some of these ancient speakers and the problems they pose for the vintage radio enthusiast.**

Radio programs in the mid-1920s were, in the main, received on headphones — an arrangement that was hardly satisfactory for family listening. Although loudspeakers were available at the time, they were very expensive.

There were many ways of overcoming this problem. One method was to place the headphones into a large bowl so that the sound was

“amplified” by the shape of the bowl, thus allowing many listeners to hear the program. Apparently, there was great debate at the time as to whether a crystal or wooden bowl gave the better tone!

Another early loudspeaker alternative was an acoustic adapter that connected a pair of headphones to a number of stethoscope like attachments. This gadget provided

multiple listening stations from the one set of phones.

Still another interesting technique used a gramophone sound arm to “amplify” the sound. The gramophone needle was placed on the headphone diaphragm, thus redirecting the sound through the gramophone horn for all to hear. |

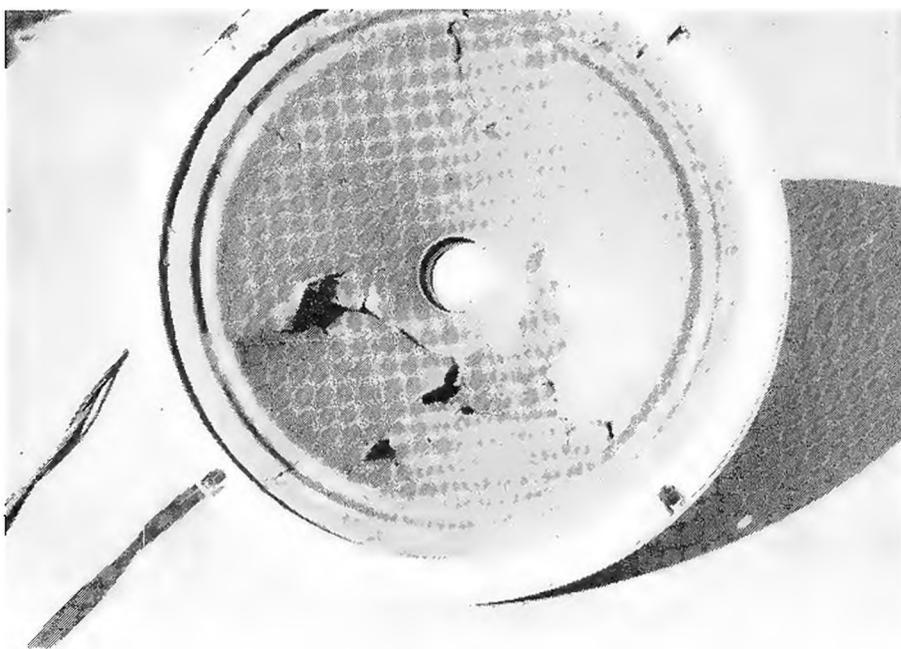
### Commercial loudspeakers

At the time, commercially produced speakers operated on a similar principle to headphones and were nothing other than a large single headphone piece with a sound horn attached. While we may smirk about such things today, in the 1920s a horn speaker was the last word in loudspeaker technology.

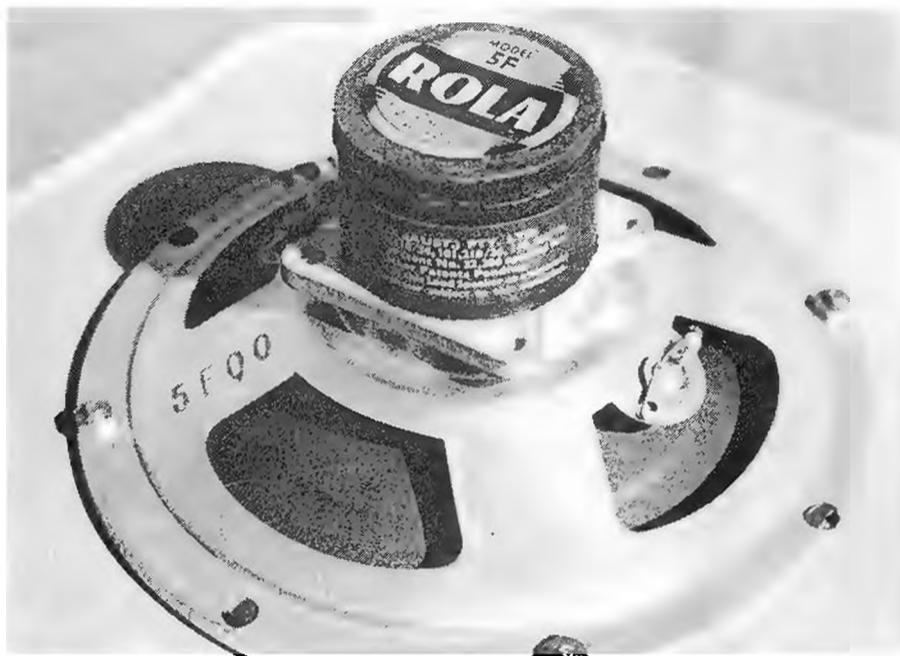
Of course, the sound reproduction of the old horn speaker left much to be desired. It had a high-pitched metallic sound that totally lacked bass or any tonal quality. There was plenty of room for improvement and improvements there were.

In a time span of just several years, loudspeakers went through several stages of development, including some cone types of incredible size. But none of these did much to really improve the quality of the sound until the dynamic or moving coil loudspeakers came on the scene. The moving coil speaker was the big breakthrough in speaker technology and modern speakers are the result of on-going refinement of this original idea.

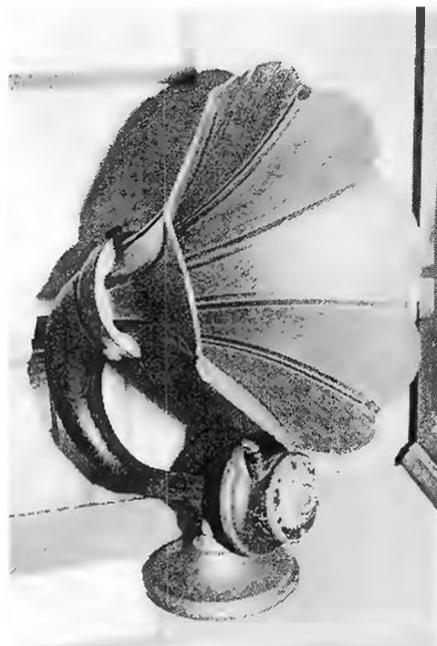
To my knowledge, nearly all of those very early loudspeakers prior to the dynamic speakers were permanent magnet types. However, the early dynamic speakers up until the late 1940s were mostly elec-



Speaker cones in this sad state of repair can be made to work again if one is desperate or determined enough. In this case, a replacement loudspeaker would be the best alternative.



This Rola permag loudspeaker still has the flange and bolt holes where the field coil bolted on in an earlier design. A number of manufacturers retained the field coil frame in their early permag speakers.



The Amplion "Dragon" was a popular horn-type loudspeaker from the mid-1920s era. By present day standards, it sounded absolutely dreadful. (Photo courtesy Orpheus Radio Museum, Ballarat).



The field coil impedance of an electrodynamic speaker is usually marked on the back of the field coil. If the marking is no longer visible, it can be checked with an ohmmeter.

trodynamics, where the speaker magnet is an electro-magnet. This development went hand in hand with the ever increasing use of AC-powered sets.

Early AC sets used a high tension choke to filter or reduce the 50Hz mains hum that is a characteristic of rectified DC. The choke was incorporated in the loudspeaker where it performed the dual role of

choke and speaker magnet. This built in choke is known as the "field coil".

When it comes to vintage loudspeakers, the one that comes to mind as far as most collectors are concerned is the electrodynamic type. This is the speaker I will concentrate on for most of this article. Horns and the very early cone speakers are relatively rare. The

average collector, particularly if he is new to the game, is unlikely to have many radios in his collection that are pre-1930.

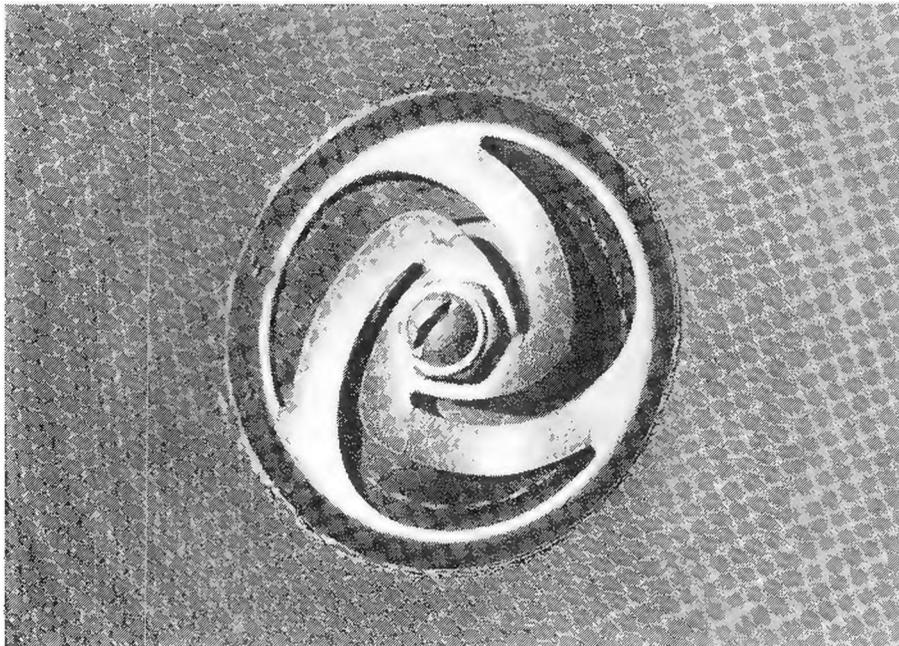
On the other hand, collectors who have been scrounging for quite some time are likely to have much from the 1920s era.

Although I am a relatively new collector, I have still managed to collect six horn speakers. However, I have really gone out of my way to get them. I might add that some of them cost a lot more than perhaps they are worth but if you want something badly enough you pay the going price.

### Keeping it original

Electrodynamic loudspeakers will vary widely in their general condition. Wherever possible, a collector should endeavour to keep a radio as original as possible and the electrodynamic speaker should be either retained or replaced with a similar unit.

Such ideals are not always possible, nor are they very important apart from the originality aspect. If originality is not a matter of life or death, then a more modern perma-



The "Spider" at the centre of old speaker cones acts as a damper on cone movement and holds the voice coil centred in the gap. If the voice coil is fouling the magnet, the cone can be repositioned by temporarily loosening the screw.

ment magnet loudspeaker is the logical replacement. A modern loudspeaker will usually improve the sound of an old radio quite considerably.

When replacing an electrodynamic speaker with a permag type, something must be done about the field coil circuit. As explained last month, the field coil forms a vital part part of the high tension circuitry and must be retained if the set is to function correctly. There are several ways of overcoming this problem.

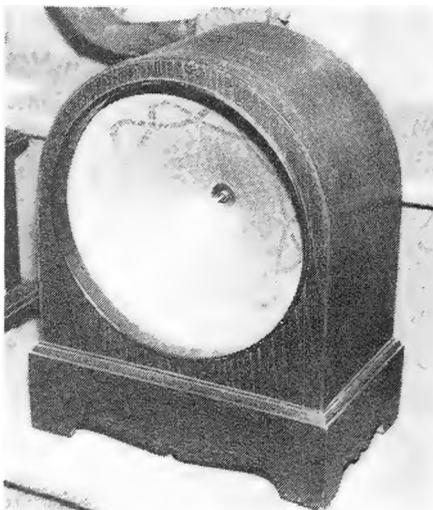
Perhaps the easiest way out is to replace the field coil with a 20 watt resistor of the appropriate value. Field coils generally range in impedance from  $1k\Omega$  to  $2.2k\Omega$ , although some go as high as  $8k\Omega$ .

The substitute high-wattage resistor would need to be of similar impedance to the field coil. The resistor should also be mounted where the dissipated heat will not affect the operation of other components. A heatsink-type resistor that can be bolted to the chassis is the best for this purpose.

Another way is to substitute a separate choke of the same impedance as the field coil. This can be mounted on or under the chassis, wherever space is available. Unfor-

tunately, suitable chokes are not always available with the desired impedance and you may have to wire a choke and high-wattage resistor in series to match the speaker field coil.

Still another option is to mount the field coil of the old loudspeaker under the chassis or in some inconspicuous part of the cabinet. While the speaker itself may be unserviceable, the field coil may be



Early cone-type loudspeakers were housed in their own cabinets instead of sharing a cabinet with the radio set. (Photo courtesy Orpheus Radio Museum, Ballarat).

quite OK and there is no reason why it shouldn't be used as a choke.

If desired, both the field coil and the speaker transformer can be chassis mounted. This has the advantage of keeping all the high tension confined to the chassis which is desirable from a safety point of view.

Regarding safety, it is unwise to handle an electrodynamic speaker while the set is operating. It could prove quite a "shocking experience" if the wiring is faulty.

## Repairing loudspeakers

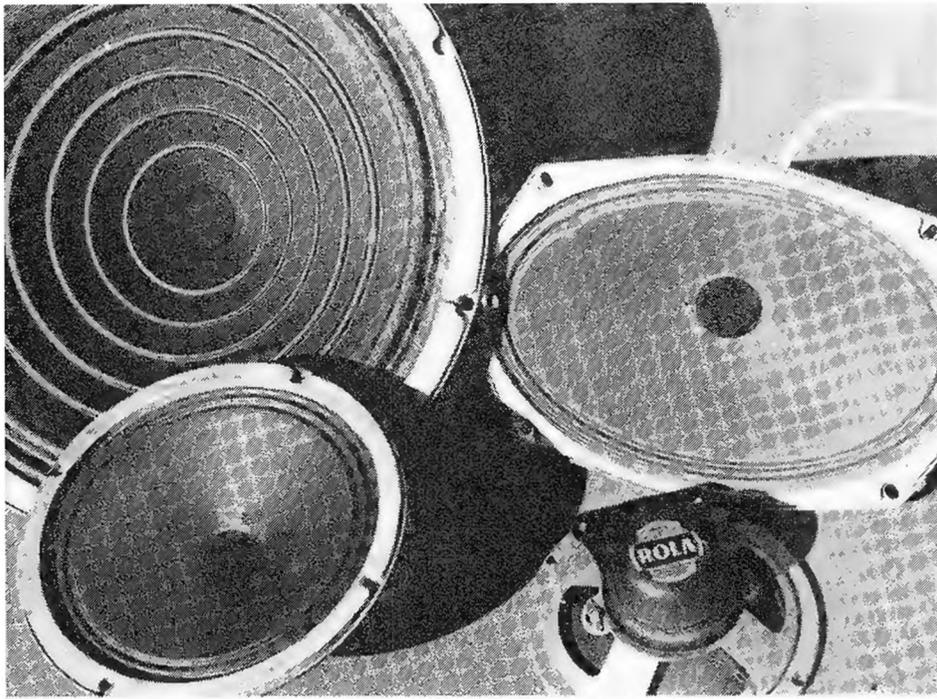
Back in the good old days, when electrodynamic speakers were in common use, they could be rebuilt without much trouble. It was often cheaper to rewind a field coil, fit a new speaker transformer or even replace a damaged speaker cone rather than discard the whole unit and buy a new one.

These old speakers were built to be serviced and all the bits and pieces, including new speaker cones, were readily available. Unfortunately, after 40 years or so, these much needed parts are no longer available. While field coils and transformer troubles aren't difficult to solve, speaker cones can be a bit of a problem. Patching the old one is about the only alternative.

I have seen speaker cones in tatters yet they still function surprisingly well. Great splits, tears and holes seem to make little difference. Often, the only adverse effect is a buzzing sound as the loose bits of cone flap about. If one cares to stick up all the tattered bits, an old speaker cone can be given a new lease of life.

Almost any reasonable glue and thick drawing paper can be used to fill the large holes and missing sections of a damaged cone. It is surprising how well a damaged speaker cone can be repaired if the desire to get it working again is there.

One particular part of a speaker cone that does wear out is the ridge (or ridges) around the outer rim where the cone flexes. Modern speakers often have a special super flexible synthetic reinforcement strip around the edge of the cone. Such a cone gives greatly prolonged



A vintage radio restorer needs a good selection of spare loudspeakers. If possible, you should always salvage the loudspeaker when scrapping a vintage receiver for parts. Other parts such as high-tension chokes and speaker transformers should also be salvaged.

life compared to the old paper type.

Old speaker cones can wear very thin around the rim and holding the speaker up to a strong light will soon reveal any problems. If the light shows through, it is only a matter of time before the cone detaches itself from the rim.

This particular problem is easily solved by applying a generous application of "Silastic" (silicone rubber) to the grooves at the outer edge of the speaker cone. The rubber compound needs to be rubbed in fairly firmly to ensure good adhesion to the paper.

Silastic seems to be an excellent rejuvenation agent for tired speaker cones. It adheres well to the paper and provides flexibility where it is needed. Although silicone rubber was never intended for such use, it appears to be well suited to the task.

### Voice coil fouling

Old electrodynamic speakers often have a terrible buzzing sound in them which is usually caused by the voice coil at the centre of the cone rubbing against the magnet. If the speaker has a central locating device (the "Spider"), the problem

can usually be cured by repositioning the cone.

To do this, first undo the screw in the centre which releases the spider. The cone can then be repositioned and the screw tightened again. With a bit of luck, the cone will now work in a position where the voice coil no longer fouls the magnet.

If you don't get it right the first time, loosen the locking screw and try again.

Another way to solve this problem (sometimes) is to remount the speaker upside down. Often a speaker cone sags and distorts a little due to its own weight and the passing of time. Simply inverting the speaker can reposition the cone sufficiently to eliminate the problem. It doesn't always work but it's worth a try.

### Bigger is better

The sound of an old radio can be improved many ways and one trick is to use a larger speaker than was originally fitted. This can be done without too much trouble with console type radios because there is usually plenty of room. Fitting a 25cm or 30cm speaker will really

make the windows rattle.

Smaller mantel radios can respond to the same treatment and often a larger speaker can be worked in without too much trouble. Bigger speakers give better sound.

The quality of any sound system depends greatly on the quality of the loudspeaker. Even an old reaction type radio from the 1920s sounds surprisingly good when played through a modern speaker. The same set through an old horn speaker sounds absolutely dreadful.

In summary, the vintage radio restorer often has to choose between sound quality and originality. Occasionally they can have both for some old speakers perform remarkably well — but not often. Many old receivers were seriously handicapped by inadequate loudspeakers.

Loudspeakers, like so many other things we now take for granted, have come a long way in the past 60 years.

Next month, we will take a look at restoring dials for vintage radios.