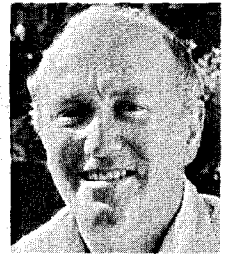


# VINTAGE RADIO

By JOHN HILL



## A new life for old headphones

**A good pair of high impedance headphones is a must for the serious vintage radio collector. Recently, I decided to restore some ancient units that had been hidden away amongst the cobwebs in my junk shed.**

A small part of my vintage radio activities involves making crystal sets and one and 2-valve regenerative receivers.

It would appear that I'm not alone in this regard and whenever I feature one of these simple sets in Vintage Radio, they are always well received (excuse the pun) by collector friends and readers alike.

There is one restricting aspect of these simple receivers and that is they require the use of high impedance

headphones. Fifty years ago that wasn't a problem. Today virtually no-one makes them and a good pair of old headphones is often quite difficult to find.

Early radio and high impedance headphones went hand in hand and numerous receivers, both valve and crystal types, used headphones. This was because so many of these radios lacked the output power to drive a loudspeaker.

Radio headphones were a steal from

telephone technology which dates back to 1876. The telephone was well established by the time commercial broadcasting became a reality and it was not difficult to adapt the medium impedance earpiece of the telephone to high impedance radio use. The telephone microphone also found use in the new science of radio.

It is interesting to note that early radio literature often used the word "telephones" where one would have expected to see "headphones". Some old receivers from the 1920s era even have "TEL" inscribed on the headphone terminals.

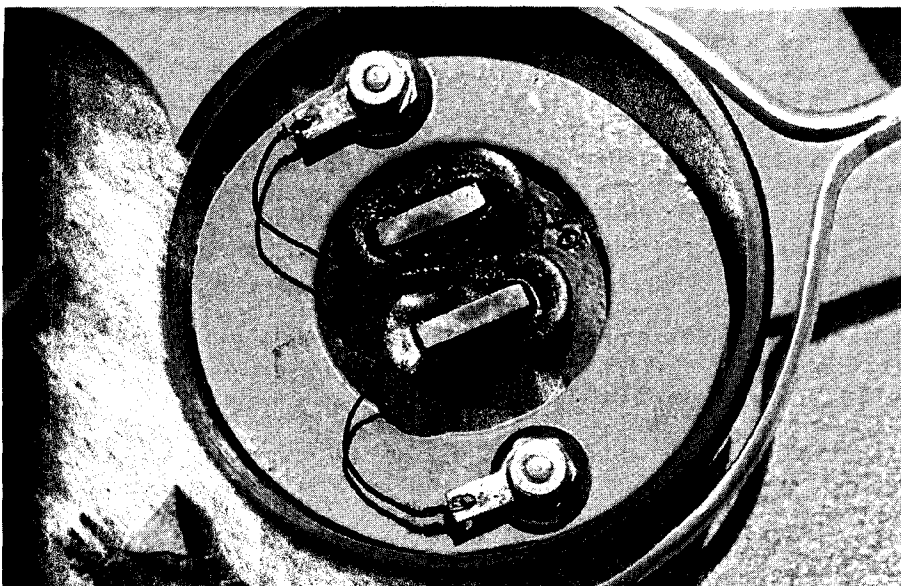
### Modern substitutes

A pair of modern 8-ohm stereo headphones combined with a small output transformer (eg, Dick Smith Cat. M-1100) can make a practical substitute for high impedance phones. This scheme offers several advantages, including better sound reproduction and considerably greater wearing comfort. The disadvantages are a slight drop in volume and the non-originality of modern equipment.

(Editorial comment: a variation of this concept surfaced in the late 1930s when there was a resurgence of interest in regenerative receivers. However, by that time, many of the available high-impedance earphones were no longer working, the fine wire windings having succumbed to the ravages of time.

The trick was to strip off the old winding and rewind the bobbins with much heavier gauge wire (such as 20 or 22 SWG), then feed them via a typical loudspeaker transformer; eg, 5000:8 ohms or even 5000:2.3 ohms.

Some trial and error was needed but, by all accounts, the idea could be made to work very well. And an un-



**This photo shows the typical construction technique used for early headphones. The two pole pieces were mounted on a permanent magnet and activated a soft iron diaphragm. While not hifi, they were very sensitive and evolved from telephone practice.**

planned advantage was that the original aspect of the units was retained).

## Raiding the supermarket

For some time now, a supermarket bag stuffed full of old headphones has been stored amongst the cobwebs in my junk shed. This bag contained headphones of various makes and models, with all their moth-eaten cords entangled into one great big knot. For some strange and unknown reason, I suddenly decided to investigate these headphones to see if any could be restored. The end result was that quite a few sets were reclaimed but it was a time-consuming task.

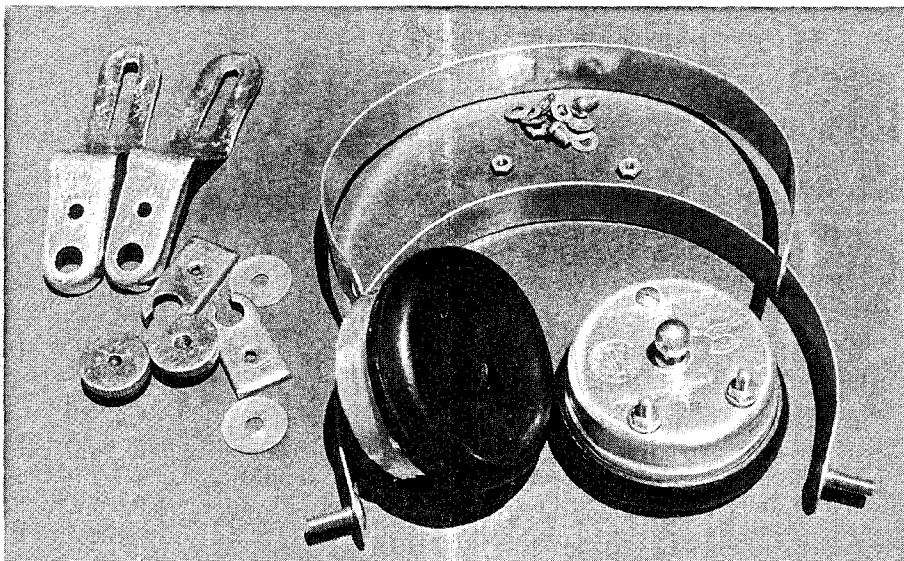
The job involved quite a bit of swapping around of headgear, earphones and cords to make up the working units. At the end of the day (two days actually), I had eight pairs of working headphones and a pile of leftover bits and pieces. These can be used for spare parts, although pole pieces with open windings aren't much good unless rewound.

Some of the brandnames may strike a chord with older readers. Included were Ediswan, Brandes, Siemens, Federal and Brunete models, as well as the more common types made by Brown and STC.

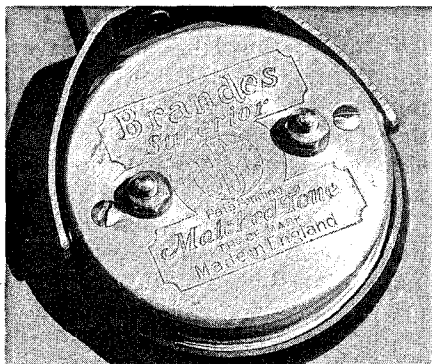
## Performance

The restoration of these old headphones was interesting in that it disproved a few well accepted theories. The general impression amongst collectors is that early headphones from the 1920s era aren't very satisfactory listening devices. This is due to their supposedly poor frequency response and a possible loss of magnetism in their ageing permanent magnets.

To test this theory, I decided to do a



These Ediswan phones have been completely stripped and cleaned and are ready for reassembly. This is the only way to clean things properly.



These Brandes Superior headphones boasted the BBC official stamp of approval, as did many other items of British radio equipment from the 1920s era.

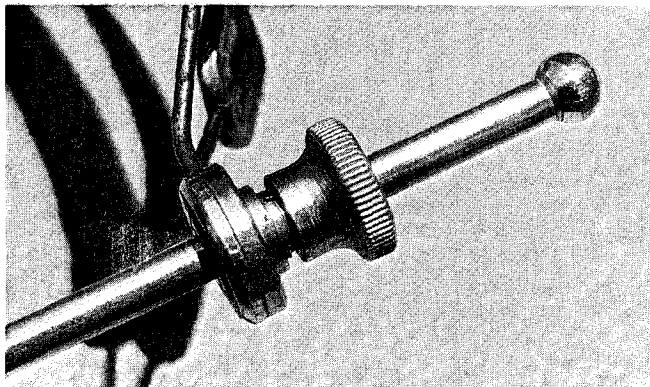
comparison a couple of known good sets of phones. In this instance, the two sets of "control" phones were made by Brown and STC. Both were of postwar manufacture and were as new when acquired a few years ago.

One would presume that the magnets used in these "late model" headphones would be better and stronger than those made in the 1920s and if there was a difference in performance then it would be easily noticed.

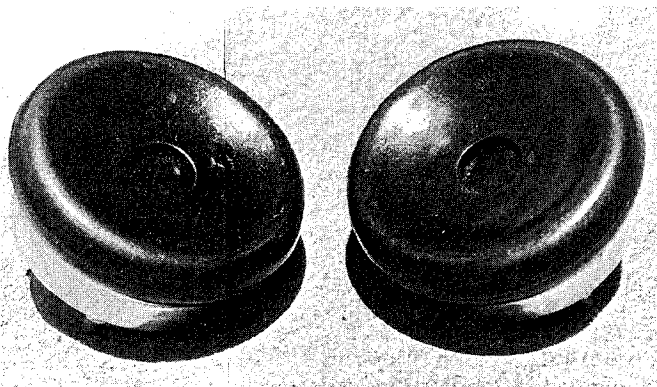
The comparison tests were conducted using a crystal set that was tuned to a distant station. In these circumstances, the signal strength was relatively weak and while speech and music could be clearly heard, it was by no means loud – even when using the good Brown and STC phones.

Trying out the oldies was a pleasant surprise. Most worked very well and their performance was quite comparable to the supposedly good phones. Only the Federal headphones performed poorly and they operated at (subjectively) about half the volume of the others.

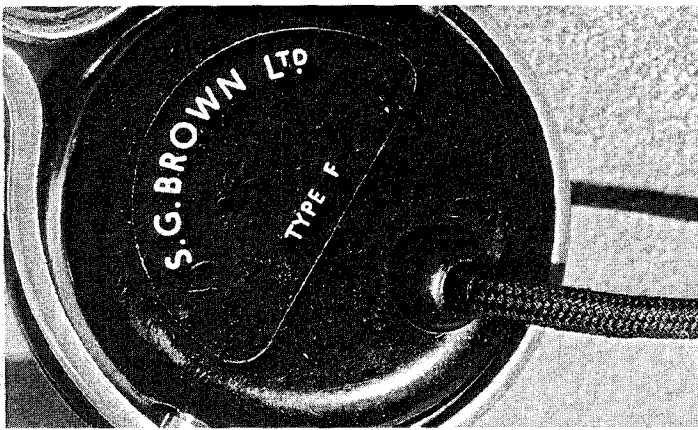
Having said that, the frequency response is fairly restricted with this



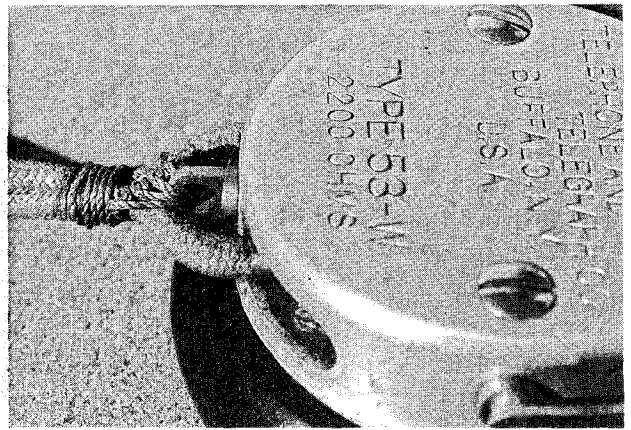
This neat collet type lock on the Brandes headset can be adjusted to hold the central rod with varying degrees of tension.



Made in Paris, these Brunete earpieces are in excellent working order but require suitable headgear to complete the outfit.



This cord arrangement is very good in that it is connected and anchored internally. It should give trouble-free service for a long time.



Externally anchored cords are not as neat but anything is better than flexible wires that will eventually become open circuit.

type of earpiece. They all use a soft iron diaphragm and whether they were made in France, England or the USA, the diaphragm thickness is virtually the same on all makes.

It's a fact that this type of headphone was only intended to reproduce speech frequencies and it is unreasonable to expect a wide frequency response from them. Whether by accident or by design, they peaked quite sharply in the middle of the speech range. There is no way that metal diaphragm headphones of this nature

could be referred to as being hifi.

When comparing a number of different makes and models, as was done in the comparison test, there were some distinct tonal differences. In general, the more modern Brown and STC phones were inclined to be harsher than the old timers. This was noticeable only when receiving strong signals.

While discussing the tonal qualities of headphones it is perhaps an appropriate time to mention again the use of  $8\Omega$  stereo headphones and an output transformer. When listening to even a humble crystal set, the stereo phones give an excellent sound reproduction which includes quite good bass. They don't overload to the same extent on strong local stations either. The same is true when using this equipment on a 1 or 2-valve receiver.

If you have never listened to such a setup it's worth a try if you do have a good set of high impedance phones. The comfort of padded earpieces is a

big improvement on hard bakelite.

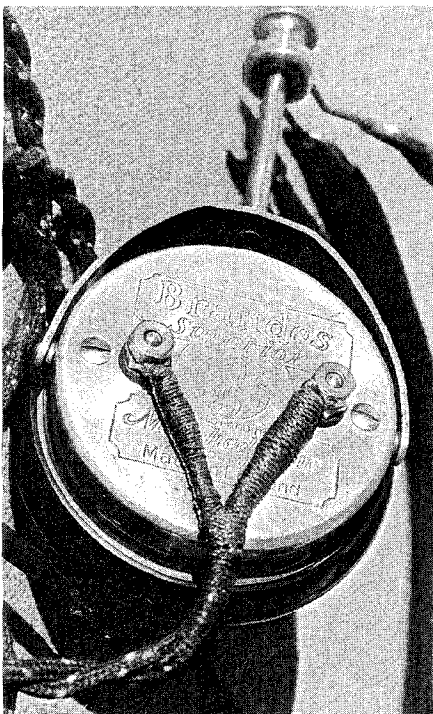
### Restoration problems

There are a number of problems when restoring old headphones. First, it is not uncommon to find the pole-piece windings open circuit and this involves a major repair job unless one is highly skilled in delicate rewinds with hair-thick wire.

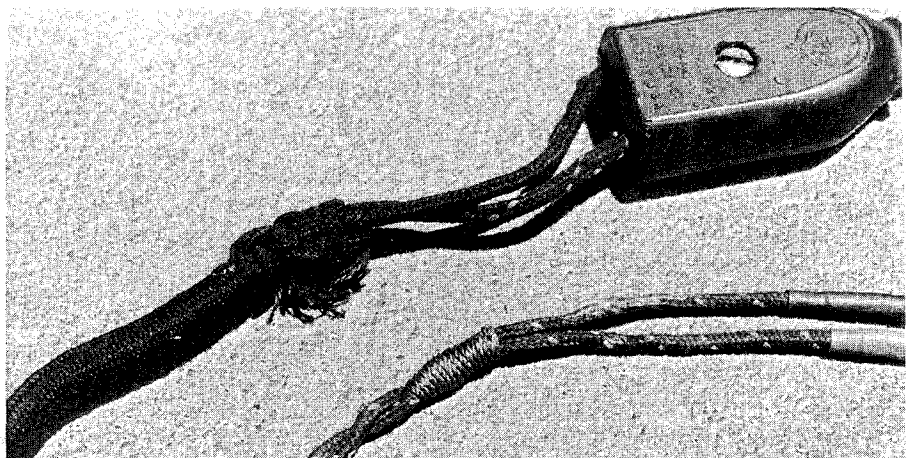
Second, the cords are nearly always in tatters and as most headphone leads are very light and flexible, you cannot expect any old replacement wire to look the part. White figure-8 plastic-covered power cord doesn't have the right appearance somehow!

Third, although not generally my experience, there is little doubt that weak magnets could be a problem with some old headphones. The previously mentioned Federal phones may be suffering from this complaint.

While working on a number of different makes and models it soon became apparent that the way in which



Flexible headphone cords can be reinforced by binding the leads and applying a suitable glue to stiffen them. External connections invite trouble, however.



Headphone cords can often be tidied by binding them with a suitable thread.

the phone cord is attached to the earpiece is an important factor in the life span of the cord. Some cords are attached to the earpiece by external connections and while this is OK electrically, the constant movement of the cord can soon fatigue the wire where it flexes close to the connection. If the earpiece is free to rotate, this also aggravates the situation.

In better designs, there is some provision to anchor the cord and restrict the movement of the earpiece in order to prevent the cord from flexing and pulling at this vulnerable point. This is a good aspect to look for when purchasing a set of old headphones.

The most secure method is where both the connections and cord anchor are internal, with the cord exiting the earpiece through a grommetted hole. This system is perhaps the best way to tackle the problem as both the connections and the cord securing device are well protected. Headphones with wagging external connections will eventually give trouble.

At the other end of the cord, there were two methods used to connect the phones to the receiver: (1) via a standard 1/4-inch headphone plug; or (2) via individual metal tips that were held by terminals or binding posts. Fitting lead tips to old headphone cords is not an easy job, by the way.

When rewiring headphone cords, one must pay strict attention to earpiece connection polarity. Where DC flows through the windings, incorrectly wired headphones can cause demagnetisation of the permanent magnets. Leads marked red or with a red trace indicate the positive side of the connections.

The impedance of old headphones varies considerably. Amongst those mentioned in this story, the high-impedance types ranged from  $1\text{k}\Omega$  to  $2.2\text{k}\Omega$  per earpiece, with most being the more common  $2\text{k}\Omega$  variety. The crystal set comparison test using a distant station showed no discernible difference in performance between these values. It made no difference whether the impedance was  $1\text{k}\Omega$  or  $2\text{k}\Omega$  – the performance was identical!

Even a  $120\Omega$  set of STC phones performed fairly well on the crystal set, so high-impedance is not always a critical factor by any means. The  $8\Omega$  stereo headphones do work but nowhere near as well as when coupled via an output transformer.



**A modern pair of 8-ohm stereo headphones and a matching transformer can be substituted for high-impedance headphones. The M1100 transformer is a particularly handy unit as it has 2, 4, 8 and 16 $\Omega$  secondary tapings. The latter matches perfectly with two  $8\Omega$  earpieces connected in series. The  $5\text{k}\Omega$  primary is compatible with crystal sets and one and 2-valve regenerative receivers.**

Incidentally, some impedance ratings can be rather confusing. Because the earpieces on old headphones are connected in series, two  $2\text{k}\Omega$  earpieces give an impedance reading of  $4\text{k}\Omega$  at the lead tips. Some manufacturers referred to such units as  $2\text{k}\Omega$  headphones while others called them  $4\text{k}\Omega$  headphones.

When using two sets of headphones on a crystal set it will be noted that the volume decreases if the phones are connected in parallel. If they are connected in series however, two pairs of phones will produce about the same volume as one. One of my boyhood crystal sets had three terminals for the headphones with the centre terminal connected to nothing. Its purpose was to join two pair of phones in series so that my brother could listen in as well.

Many radio collectors are always scrounging around, looking for other things to collect apart from radio receivers. In fact, any item associated with radio is generally considered collectable.

If it is good enough to collect and display a range of vintage loudspeakers, then a selection of vintage headphones should be equally valid. If they are in working order and still retain their original cords, then so much the better. Old headphones are also necessary when displaying items such as genuine early crystal sets and small regenerative receivers.

So if you have a few pairs of old

headphones in your collection, you may find repairing them an interesting challenge. It certainly makes an interesting change from the more conventional restoration jobs. **SC**