

## Systematic Trouble Tracking.

IT very often happens that the set, without any warning, either stops working or the signals fade off, till hardly audible, and all the coaxing will not induce the set to resume its normal functioning. It is then considered a matter for the service man, yet it may be only a very small fault, and one that may be corrected in half an hour or so (perhaps even less), and be such that the average radio listener can adjust without any difficulty.

Following is a list of faults in the order they should be tested for when the set refuses to function in its usual manner.

1. Defective batteries.
2. Defective valves.
3. Broken wiring (open circuits).
4. Defective aeriels.
5. Defective grounds.
6. Defective parts.
7. The use of harmful components.
8. Wrong connections.
9. Short circuits.
10. Defective arresters.

## Batteries.

THIS very common cause of trouble is one for which no radio listener has any excuse. A voltmeter suitable for intermittent testing can be obtained for a few shillings, and every owner whose set is battery operated should provide himself with one. If the voltmeter is to remain in the circuit permanently it should be of the best quality, and one that consumes but little current; this type usually costs about £2, but the cheaper variety are equally suitable when not to be permanently installed in the circuit.

When the battery falls lower than 40 per cent. it should be discarded if the set is to perform at its best. However, when the local station only is to be brought in the battery can be allowed to fall lower, but if the quality is to

be maintained a high voltage must be maintained. This is particularly true when it comes to the reproduction of the bass notes which need a high voltage to drive them. This explains why a high voltage on the final valve is necessary if the quality is to be reproduced.

The A battery, of course, should not be allowed to fall below 60 per cent., and even this is rather low if the accumulator is to be made to last.

The batteries should be regularly tested, as a multitude of troubles can arise through defective batteries.

## Defective Valves.

FROM time to time tests for valves have been given through the columns of the "Radio Record," but the following method is one of the surest to detect an offending valve. A milliammeter is necessary, and those who can spare a few shillings will find that its use will enable the set owner to trace many and varied troubles. A milliammeter which ranges from 0 to 50 should be placed in series with the minus B lead. First take the total reading, then remove the valves one at a time and note the current drop at each removal. The valve, not counting the detector, whose removal gives the smallest drop

in current is the weak valve, assuming, of course, that all the valves are supplied with the same B and C voltage.

As most valves are supplied with different tapings, it is easy to attach all the leads to the same tap for the test. A check can be made in replacing the valves, noting the gain per valve.

## Broken Wirings.

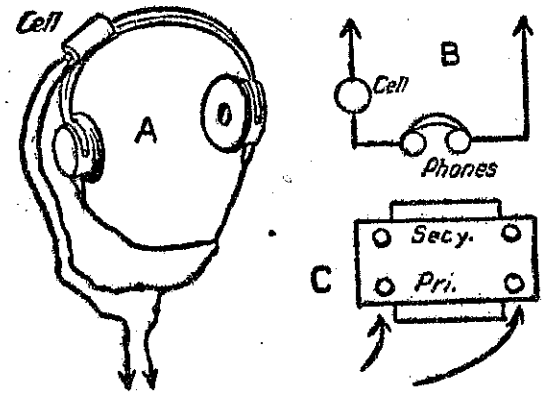
THERE are numerous ways of hunting for these troubles, and following are a few methods which can be applied without the necessity of constructing or purchasing checking devices.

The usual symptoms of an open circuit is a loss of volume or a total loss of signal. In most instances of sets having three dials, the trouble, if it is in the radio stages, will isolate itself by the fact that one of the dials will have little or no effect in the tuning. Again, it may show itself by a zero reading of the voltmeter connected between the plate terminal of the valve socket and the B minus, which means that there is a break in the primary in a radio frequency coil. A simple test in such a case is to place the fingers on a 2 megohm gridleak across the primary terminals of the suspected transformer or coil.

If the set is inoperative because of an open circuit, the fingers of the gridleak will cause the set to function, though not up to its usual standard. The fingers may also be used to determine whether or not the break is in the audio side by touching the grid lead to the detector valve. If the audio amplifier is O.K., a howl will be produced in the speaker. Don't be too anxious to make the tests with phones.

## A Simple Tester.

WITH the aid of a pair of phones and a small battery, a small testing apparatus can be improvised which will reveal a broken circuit very easily. Below is a diagram of how this is constructed, the small diagram B clearing up any doubtful point. In A, a torch or other small battery is used, but the writer has found that the use of a larger voltage, say, 22½ volts, gives a surer indication. Take two pieces of wire and attach them to the positive and negative of the battery. Fasten one of these to one of the tips of the phone cord, leaving the other phone tip and the other lead from the battery free. These



are represented by the arrow heads in diagram B. The tester is now ready for operation.

The use of this little instrument in testing transformers has often been described, but for any who are still in doubt the following remarks will probably be of use. Place the arrow heads on the terminals of the suspected transformer, after having removed the connections and disconnected the batteries.

Test the primary first, that is, across the terminals marked OP IP, or HT (B) and P. When the tops of the wires touch a decided click should be heard in the phones. Try touching the wires together and the resulting click should be the same, or nearly so. This indicates that the winding is intact. If on the other hand there is a series of weak clicks or an absence of them, the winding is broken and no doubt the cause of the trouble. Likewise test the secondary, and the result should be almost the same, though the resulting click is usually weaker.

By this means the wiring of the set can be tested, and the position of the break located. Soldered and non-soldered joints, if they exist, should likewise be tested.

This piece of apparatus can be used for a multiplicity of operations that will be described in future numbers in the series of trouble tracking paragraphs under the scheme indicated at the beginning of this series.

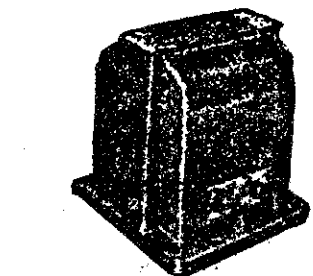
A 2-volt accumulator should never be allowed to run down below 1.8 volts per cell. A 4-volter below 3.6, and a 6-volter below 5.4 volts.

If you cannot afford a voltmeter for testing your accumulator ask your dealer about a hydrometer, which is much cheaper and very useful.

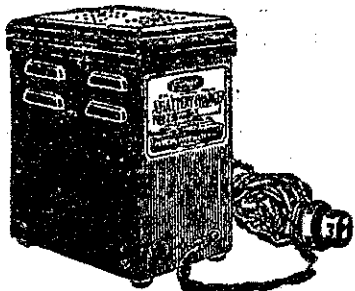
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By Observer

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