

Hand Capacity Troubles

Hints that will Help

OPERATORS are often troubled with hand capacity troubles, and in that respect the following from "Popular Wireless" should be of more than passing interest:—

Hand-capacity trouble, as its name implies, is usually due to the fact that the operators' hands, being really objects at earth potential, produce a slight increase in the capacity of earth when brought near to high potential parts of the receiver such as the "grid" side of the tuning condensers. When the operator's hands are removed this slight additional capacity vanishes, so that tuning is naturally altered. Also bringing the hands near to a coil changes its inductance, very slightly, but sufficient with the capacity change to upset tuning appreciably.

In short-wave receivers this "hand-capacity" produces an even greater change in the tuning. As you are doubtless aware, a very small increase in the capacity of the tuning condenser produces a large change in the tuning on these short waves. If hand-capacity troubles are bad in a short-wave set, reception is quite hopeless, and the receiver has to be re-designed in order to eliminate such trouble.

Depends on Design.

NOW, experienced amateurs, knowing the root-cause of hand-capacity trouble, take precautions when building their receivers to prevent movements of their hands from affecting the receiver. The surest remedy, in almost all cases, is quite simple, and consists of ensuring that there is always an earthed conductor between the operator's hands and the coils and condensers of the receiver. You will immediately think of receivers having all-metal panels, which from experience you know to be free from hand-capacity troubles. The complete freedom here is due to the fact that there is a fixed small capacity between all components inside the cabinet, and the metal panel. Since this is earthed, anything also at earth potential on the dial side of the panel cannot make any difference at all to these capacities of component to earth, so that "hand-capacity" no longer affects the tuning of the receiver.

Now some circuits where all panel components are at earth potential lend themselves to the use of a metal panel quite readily, but it would be fatal to use anything but an ebonite panel where the panel components are not all at the same potential. We always try to juggle with the circuit so that all panel components shall be at earth potential; but in some circuits, where no part of the tuning system is at earth potential, this is impossible.

In the old days the keen experimenter would have fitted the two condenser dials with long "extension" handles; but we more fortunate moderns can now purchase special dials which, besides giving a slow-motion adjustment, have a fairly large engraved metal dial which is insulated from both sides of the condenser. This dial can, therefore, be connected to earth, and we then have the equivalent of a metal panel just in front of the condenser itself, with the added advantage of a slow-motion adjustment.

If your receiver is at all prone to "hand-capacity" trouble and has an ebonite panel, fit these dials, when your troubles will in most cases disappear. Take care, however, to choose a reliable make having really good insulation between the shielding dial and the part which grips the condenser spindle.

Short-wave receivers are very much more liable to "hand-capacity" effects than receivers tuning over the broadcast waveband. Unless a few simple precautions are taken in construction you will find that the tuning may change appreciably in spite of earthed-screen dials. Also, signals from distant stations very often weaken and sometimes disappear altogether when the operator moves a short distance away from the receiver. This is due to the capacity coupling via the headphones producing a very slight change in the capacity of the tuned circuits. This effect is only noticeable on short waves.

Arranging the Lay-out.

THE necessary precautions are to see that the tuning coils are placed as far to the rear edge of the baseboard as possible. The coils are then farther away from the influence of the operator's body, and, for this reason, it is advisable to use a wide baseboard when constructing a short-wave set. If the circuit does not permit a metal panel to be used for the reasons mentioned above, it is a safe plan to mount the tuning and reaction condensers well back on the baseboard, say, 6in. from the back of the panel, and link them to the dials with lengths of ¼in. ebonite rod.

Obviously the best precaution of all is to use a circuit which permits of a metal panel being employed and then to construct a cabinet out of sheet aluminium or copper, when the receiver will be completely screened from outside interference. Take care, of course, that the metal does not come very near the coils anywhere.

"Body-capacity" via the 'phones to earth can also be very troublesome in a short-wave receiver, and the only cure is to reduce to the lowest limits the back-coupling to the tuned circuits. Mere screening is useless in these cases and may even make matters worse. The more valves there are between the detector stage and the 'phone terminals, the less trouble there will be from body capacity. On some short-wave transmissions two L.F. stages following the detector will often provide sufficient volume to work on a loudspeaker so that no trouble occurs, as the 'phones are not then worn.

The Choke Cure.

AS many transmissions cannot be received at this strength we must still wear 'phones and overcome our difficulty by inserting H.F. chokes and earth-shunt condensers in the anode circuits in order to keep as much H.F. energy as possible out of the L.F. amplifier. This will often effect a cure, but in obstinate cases where, for example, a good earth connection does not exist, you will find that an H.F. choke in each 'phone lead will assist matters.

Our Crystal Corner

By "Galena"

Full Wave Crystal Set.

I HAVE constructed the full wave crystal set which was described in the "Radio Record," dated December 14, 1928, and I am experiencing a little difficulty in connection with same. I am using carborundum detectors, and find that although I obtain good results (R4 on speaker) with one detector, the volume is considerably reduced when the second detector is inserted. I have tried changing the detectors and have also reversed the ends, but have not been able to make any improvement. The condensers are .0005 semi-circular pattern, and the set can be tuned in with either condenser, the best results being obtained when the moving plates are nearly all out on one condenser, and three-quarters in on the other. I am 2½ miles from 2YA, and have a good aerial and earth, the latter being similar to the Pearce system, but on a smaller scale.

I shall be greatly obliged if you will advise me how I can obtain an increase in volume when using the second detector, also if better results would be obtained if complete carborundum, stabilizing units were used. You may be interested to hear that the "Low-Loss Crystal Set," described in "New Zealand Radio Handbook No. 6," has given me slightly better results than those obtained from the full wave set.—"PUZZLED" (Wellington).

ANSWERS.—Apparently the crystals are not perfect. Test by the phone and battery method described recently in the "Beginner" columns. Test by applying the battery lead to each end alternately. Only in one position should there be a click. If there is a click in both directions the crystal is at fault and defeating the object of the two crystals.

It appears too, that the coils are not matched. Try a few less turns on the coil, the condenser connected with which reads nearly 0.

Stabilising units would be an advantage but would not cure the trouble at present evident.

Full-wave Rectification.

IN our special issue "Pentode" described a full-wave crystal set by employing two crystal circuits. By this arrangement double-strength signals could be obtained. Some correspondents who have made this set seem to have experienced a difficulty. The signals have not been so strong as they had expected, and they have been consequently disappointed.

There is one drawback in this type of circuit, and that lies in the difficulty of getting both crystals to act with equal efficiency as far as rectification is concerned.

If, for example, one crystal is not set at its most sensitive point, this may mean that some of the high-frequency current is getting through from the wrong direction, thereby nullifying a proportioned part of the current that is passing in the correct "conducting"

direction, leaving the 'phones, to respond only to the difference or unbalanced portion of the normal current.

The current, however, that is getting through from the wrong direction is evidently shorting out the second crystal and robbing it of its normal quota of the reversed voltage, so that the signal intensity is much lower than it should be.

It is necessary, then, to get a pair of good crystals, equal in sensitivity, which will pass current in one direction only. A test for this has been described above. Constructors who take this

READERS in difficulty, or

who feel they are not getting the best from their crystal should send in their difficulties.

They will be discussed in the Corner, that is providing they are not too particular to one case, when they will be replied to by post. If an owner has found a circuit he considers superior to the usual, send it in and if worth publishing it will be passed on to others. Remember, address all inquiries "Technical Editor," and mark the letters "Crystal Corner."

caution should experience little difficulty in obtaining loudspeaker reproduction from a nearby local station.

Exceptional Results.

ABOUT a month ago I built a crystal set from which I have had remarkable results, using gauge 28 for aerial wire. The aerial was put up in the room and, using a wire along the floor as an earth, I received 2YA as loud as the set on the outside aerial with a good earth.

In the city I worked it off a frame aerial with fair volume. At Eastbourne I used an aerial 4 feet long with a coil of wire at the end (without insulators) and the guttering of the verandah as an earth. From this I received remarkable results. One Saturday night I used the wire mattress as an aerial and used no earth. The results were fair and I could distinguish every word the announcer said.

The set to me seems to be a "freak." The set consists of two spiderweb coils and the distances between them can be adjusted, a .00025 variable condenser, and a semi-permanent detector. I have also another excellent crystal set, but the new set overshadows it. Hoping you are interested, and wishing you every success with your paper, which I consider the best radio paper for the money in N.Z.—I enjoy every word of it.—G. T. KING (Island Bay),