Hand Capacity

How it May be Overcome

ONE of the most annoying things, to anyone who has just built his first shortwave receiver, is hand capacity. This occurs as the result of so many variable factors that it is impossible to lay down any hard and fast rules for means of abolishing it. Nevertheless, it is generally correct to assume that it is caused by the aerial tuning and reaction control condensers. Of course, it is absolutely essential to see that the spindles of these two condensers are earthed. But that alone will not always eliminate the trouble. The older type of condenser had the spindle insulated from the end-plates and, as the spindle and dial had to be earthed, the end-plates were connected to the high-potential end of the circuit and so, bringing the hands near the panel (i.e., one of the end-plates) hand capacity effects were clearly evident.

In the reverse case, if the end-plates were earthed, hand capacity was almost as bad owing to the spindle not being earthed this time. So there was no avoiding the trouble however the condenser was connected. The newer designs of condensers have the spindle and end-plates electrically connected, and the fixed plates are thus inside the two end-plates and effectively shielded. Hand capacity effects, therefore, will be minimised by just making sure that the spindle is earthed.

In many cases a metal shield placed immediately behind the panel will completely abolish these undesirable effects. Any non-magnetic metal can be used, such as aluminium, copper or even zinc. Care must be taken to see that the spindles and end-plates of condensers make contact with this shield and that the high potential plates do not. Here it might be noted that a good aluminium panel generally costs less than an ebonite one of the same size and adds to the neatness of the set by eliminating a certain amount of internal wiring, as well as reducing hand capacity effects. Still, there are many who prefer an ebonite panel, and in such cases a metal shield behind the panel can be used.

When operating a receiver with headphones, hand capacity effects will be noticed if H.F. currents are getting into the output leads. A simple test for this is to tune in some station and then grasp the 'phone leads. If the tuning alters when this is done, it can be assumed that H.F. currents are in the 'phone leads. These can be effectively blocked by using a filter circuit. To each output terminal attach an ordinary H.F. choke and connect the free ends direct to the 'phones. Join two .0005 mfd. condensers in series and take a lead to earth from the join. Connect the free terminal one to each side of the chokes nearest the 'phones.

In certain cases the proper cure is to put the whole receiver in a metal case, but even this will be of no use if a poor earth connection is used. Although a poor earth connection will not make so very much difference to actual signal strength in a short-wave receiver, it will make a great deal of difference to hand capacity effects, and a really good earth connection is essential to the smooth working of the receiver.

Two-valve Amplifier

From "All About All-Electric"

I FIRST constructed "Pentode's" original crystal and one-valve electric set, and obtained excellent results, writes Mr. G. Trevor Hill, of Christchurch. I departed from his specifications only in the turns per volt in the power transformer. He gave 2500 and 2100 for primary and secondary respectively, but I only wound 1380 and 1200. I used cheap 201A type valves for rectifier and amplifier and a crystal set I had in use before. Reception of 3YA was excellent (I am about one mile from the station), but I should have liked more volume. There was absolutely no hum.

When "All About the All-Electric" came out I added 1.50 and 2.50 windings to the original transformer and constructed the two-stage amplifier, following the instructions exactly in every way, except that I continue to use my original crystal set and the 400 — potentiometer I had, and got a 200 — potentiometer for the second valve. I use a 226 valve as first A.F. and a 508X as power. I have not seen this valve advertised and the characteristics do not seem to be published in the maker's literature, but it is identical with 112A type and gives excellent results. These can be bought from a Christchurch firm for 8/6.

I have used a full-sized unit horn speaker all through, and am obliged to detune considerably with the 2-stager, as the volume is far too great for comfort. I get a fairly loud hum which does not affect local reception, but is, I think, excessive. Later I shall try a 227 valve in place of the 226, to try and cut this hum down. In common with a large proportion of listeners, I expect, the financial side of the receiver is the deciding factor in construction. 226 valves can be bought for 10/6 and the 227 cost 15/-, so I use 226 and tolerate the hum. I still use the 201A (R.F.) as rectifier, and it gives 15 m.a. without any apparent overload. These valves can be bought here for 3/6, so if the life of them is not long used in this way it does not matter.

I have no means of measuring my rectified plate voltage, but have measured the current and find the 226 is drawing nearly 6 m.a. and the 112A 9 to 10 m.a., so the voltage must be very close to 160. I use 1500 ohm. resistance for the 226 bias, and about 1200 for the 112. My smoothing choke is constructed according to "Listeners' Guide" specifications—1¼ lb. 30 S.W.G. wire on 1¼in. x 1in. core, with two gaps. I don't think it's possible to obtain 1¼in. stalloy in Christchurch, but 1in. can be had, and I accordingly used that, making the piles 1¼in. high, instead of using 1¼in. to 1in. high. This would help anyone who cannot obtain the 1¼in., and save them paying postage through having to send to Auckland or Wellington for it. Two other tips that may prove useful to other constructors:

1. I made a strap out of 20 g. brass sheet to join the plate and grid terminals on the rectifying valve holder, simplifying the wiring of the set.

2. Instead of putting the terminal strips on the power transformer across the tops of the wooden clamps, I made an ebonite panel 6in. x 3in., and screwed it vertically to the clamps at one end, keeping it out from the clamps with a distance piece on each of the four screws. I arranged the terminals as on the commercial transformers, 11 of them; two 160 v., two 2.5 v., two 1.5 v., two 5 v., and three for the centre tapped rectifier filament winding. It was then a simple matter to make a neat wooden case, open at the bottom and one end, that slides down over the whole thing when it is screwed down to the baseboard. This gives a finish to the component, keeps the dust out, and deadens any buzzing of the laminations. I have had the set running for ten hours without switching off, and the wooden case has just got perceptibly warm to the touch. If shielding is required it would be easy to cover the box with thin sheet iron. Made out of ¼in. mahogany and polished, the transformer in it's case looks like a factory job. The 230 v. lead can be taken through the baseboard inside the case, and I considered it a good plan to keep it off the panel. I have engraved the value of each pair of terminals on the panel, and there is no fear of connecting the wrong filament voltage to either valve.

In addition to 3YA, I get 3ZC at very satisfactory strength on the speaker, and when both 3YA and 3ZC are off the air I can get Wellington on the speaker, but very faint (I can distinguish the announcements and understand what is being said.) The hum spoils this reception, though.

[The hum can be lessened by the use of a half-wave rectifier in place of the 201A.—Tec. Ed.]

DO not use thin wire as used for coils for your accumulator leads, as this is not only inefficient but dangerous if the positive and negative leads come into contact.

DON'T forget when soldering fine wires or small tags that these, owing to their small size, heat much more readily than larger objects.

Tips and Jottings

A Simple Storage System.

WHILE many experimenters use classified boxes and sets of drawers to store their nuts, screws, and terminals, comparatively few have any convenient system of storage for large parts. Every experimenter sooner or later accumulates quite a collection of such objects as filament resistances, fixed resisters, valve sockets, plug-in coils, and the like, which are generally pushed into a large drawer and jumbled about indiscriminately. A much better plan is to obtain a number of cardboard boxes measuring about 12in. long (open boot boxes serve excellently), and to lay them side by side under the largest table in the room. One box can be kept for filament resistances, another for valve sockets, the third for coil sockets, a fourth (the largest box available) for plug-in coils, and so on. More delicate components, such as variable condensers (the plates of which are very easily bent), are better kept on shelves side by side. Valves are best kept in eggstands, into which they fit excellently. If a nest of small drawers is available (excellent little sets can be obtained at any toolship) it is best used for fixed condensers, grid leaks, and small components which are frequently needed for interchange purposes.

Re-Sensitising Crystals.

CRYSTALS may usually be re-sensitised by giving them a bath in a saturated solution of alum. The crystal should be placed in this solution and left for from 10 to 20 minutes. Now lift out with a pair of tweezers (on no account using your fingers) and put to dry in some cool, dry position. When completely dry the crystal will have turned dull where previously it was bright. This is no deterrent, as it is only a thin layer of alum which has now covered the crystal surface. The crystal can now be used and will be found to be re-sensitised.

NEW ELECTRIC SETS

Plug in and Save Money!

6 and 7 Valves, All-Electric £35. Wonderful Value

F. J. W. FEAR & CO.

63 Willis Street, Wellington. Phone 41-446