

The Two R.F. Shielded Browning-Drake

A High Grade Unit for Home Construction

(By "Megohm.")

THIS is a continuation of the article commenced last week dealing with the construction of three stages of a Browning-Drake receiver with full copper shielding. The three stages consist of two radio-frequency and detector, the output from which can be put through any separate audio amplifying system. Any constructor may, of course, lengthen the panel and baseboard and include the amplifier in the set, and this portion may also be shielded with advantage.

The success of the radio-frequency amplification being kept high is owing to the complete and roomy shielding. The less efficient the shielding of R.F. stages, the less the amplification that can be obtained per stage with stability, which is an indispensable condition. This circuit, with two R.F. stages, could be built without any shielding whatever, but experiment has shown that in such a case in order to secure any semblance of stability the amplification of each stage has to be kept so low that the total amplification of the two stages is less than that of only one stage working at high efficiency. These remarks are made in order to impress upon constructors the necessity for carrying out the shielding exactly as described, and success will be assured provided that ordinary intelligence is brought to bear upon the details of the actual circuit. Let no constructor be tempted into altering the shielding to the type in which a partition is placed between each stage, and the whole is enclosed in a complete shield.

Details of the direction in which coils are wound are given, and should be carefully followed, as if this is done the receiver should work the first time it is connected up—there will be no reversing tickler or primaries, which is an irritating ordeal when all is expected to be o.k. Only the number of tickler turns may need adjustment.

THE TICKLER-ALTERNATIVE CONTROL.

LAST week a method was shown by which the movable tickler could be operated from below so that the condenser dials could all be kept in line for the sake of uniformity and general appearance. If carefully constructed, this method works well, but for those who wish to avoid this, and do not wish to lower the position of the dial, an alternative system of tickler control is here given that has been properly tested and works very satisfactorily.

This idea works upon the absorption principle, and reference to the diagram shows a collar of celluloid an inch or so deep, diameter to just fit inside the celluloid strips projecting about one-eighth inch above the top of secondary coil. Around this collar is one turn of 16's or 18's s.w.g. double cotton-covered wire, carefully curved and bound together with thread at A and held to the collar with celluloid cement in a few places. The two ends of this wire are left of sufficient length to reach to the lower right-hand of the back of panel, where they are connected to a carbon compression type of rheostat with a maximum resistance of about 50 ohms.

One-eighth of an inch above this turn of wire the tickler winding is commenced, and fifteen turns of 30's s.w.g. double cotton-covered wire should be about correct, but leave sufficient end to add a turn or two more if found necessary. Start winding the tickler at plate end, as in diagram, after passing in and out through two holes which are not shown. Finish at the top and connect as shown. The tickler is shown raised above the secondary coil in order to show the direction of the top turn of the latter, but the tickler actually rests inside the upright strips so that the turn of thick wire is one-eighth inch above the top turn of secondary coil.

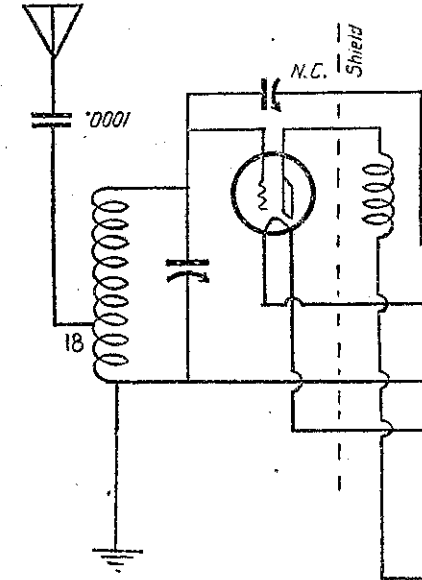
In operation, compressing the carbon is equivalent to turning a rotating tickler down to decrease reaction. The earliest point of maximum compression could be found and a mark made on the knob as a guide to prevent undue compression.

The rheostat is fixed at the right below the condenser dial, and as this condenser is insulated from the panel with a strip of ebonite, this strip can be extended so that the rheostat also is bolted to it so that direct contact with the panel is avoided.

THE ROTATING TICKLER.

IF a rotating tickler is decided upon, its dimensions should be 1½ in. outside diameter and 1½ in. length of cylinder. It may be made of celluloid or thin card, and is mounted upon a spindle of ¼ in. ebonite rod.

For trial, thirty-two turns of 30's d.c.c. should be put on, sixteen each side. Commence winding at A after passing the wire through a hole as shown. Wind in the direction shown by arrow at side, crossing over in the centre and finishing at B, when the end is passed through a hole and then out through a second hole near spindle, round which a couple of turns are taken loosely to avoid any tightening.



of leads when the spindle is turned. The end at A is taken inside and out through a hole near spindle and treated as other end. This end connects loosely to top of by-pass condenser and a thicker wire continues to the amplifier. The other end of this condenser is soldered to the shield tray.

VALVE-HOLDERS.

THE sprung Benjamin or similar socket for the detector valve is mounted on a 2 x 2 x 1 block of wood, shellacked and secured to the base by a central screw.

The two other holders are similarly mounted on blocks an inch high. The position of these is not exactly critical, and can be ascertained from the plan and accompanying scale.

GRID LEAK AND CONDENSER.

GOOD makes of these must be procured. The condenser is held in an upright position by the grid leak soldered to its lower end. The top end connects to top of secondary coil and fixed plates of tuning condenser.

THE WIRING PLAN.

THE wiring is fairly clear on this drawing, but a brief survey will help what may be doubtful points to some. It will be noticed that the pair of filament leads from each valve goes under the base through a hole drilled near each valve. In all three stages the lead running from grid of valve to condenser stator is also connected to top of secondary coil.

It should be noted that all wires terminating with an X are soldered to the shield.

Wires shown slightly broken pass below the unbroken ones. The B battery lead of each primary passes down through a hole in base. The other end of primaries connects to plate of preceding valve. Other points are dealt with elsewhere.

A rough sketch is given of the first R.F. stage showing the general appearance and wiring, aerial and earth terminals, and brass strut holding panel. The .0001 is held by a bent strip of brass bolted to back of aerial terminal. This condenser is about 1½ plates in the home-built variety, or two pieces of tinfoil ½ the full width. (Article Dec. 9th.)

CABLED WIRING UNDER BASE.

THIS is one of the features of the receiver that make for quality and tone. The scheme is to consolidate all battery leads into one cable as much as possible, thus making them function as an efficient by-pass condenser which gets rid of all radio frequencies where they are unwanted, and prevents them getting into the audio system where they are detrimental. This set of leads should be made up quite away from the board, upon which they

its presence in the cable is an advantage to assist the by-passing. The central batten is not shown under the board, but it and the base may be cut out to allow the cable to pass between in the same way as is shown at the output end. No detector B voltage is provided for, as it connects to the input terminal of amplifier not connected to plate of detector through the tickler.

R.R. FILAMENT CUT-OUT.

THIS small panel placed at the right measures 1½ by 1.5 in., and its purpose is to provide a convenient means of cutting off this filament supply to either R.F. valve when neutralising. The panel, of ebonite, is screwed to the side of baseboard and behind it the tuned-up edge of the tray is cut away equal to the width. Two sockets, flush pattern if possible, are inserted as shown, and these are both connected together by the end of A positive lead from the battery, and either from here or from another point the A positive may continue to the detector filament.

The positive leads from the two R.F. filaments terminate at the top of the panel in a short piece of flexible wire and a pin to fit the sockets. These

obtaining complete neutralisation that will effectively prevent radiation. Those who have been used to the four-valver will find the process exactly the same with the five, each valve being dealt with quite separately.

The R.F. valves are neutralised as follows:—Tune in a loud station near centre of the broadcast band, 1YA or 3YA, maximum volume being carefully obtained without oscillation, reaction being kept well down. Next turn out the filament of the R.F. valve being treated by withdrawing the corresponding pin from small side panel. Now with the neutralising stick inserted through hole in top of shield, turn neutralising condenser until signals are inaudible or at minimum strength, then turn on filament again and the station should come through well. Now see that the variable condensers are all at maximum tuning; if not, they must be altered to get the best tuning, and the process of neutralising is gone through again. The second attempt is practically certain to be correct. If neutralisation cannot be obtained it may be for several reasons. R.F. primary connections reversed, or neutralising condenser too large or too small capacity. Everything is well standardised in the construction of this receiver, so there should be little chance of trouble of this kind if sizes and valves are adhered to.

VALVES TO USE.

IT is important that only valves of medium impedance be used in the first two stages, and by that is meant

QUERIES BY CORRESPONDENCE.

1. Every communication enclosing queries is to be addressed to "Megohm," Box 1032, Wellington, and must be accompanied by a stamped addressed envelope for reply by post.
2. Questions must be written so that a space is left in which the reply may be added.
3. No charge is made for replies.

valves having an impedance ranging between 11,000 and 20,000 ohms. Those used by the writer have an impedance not very far below 20,000, and the result is very satisfactory. On very low wave-lengths around 200 metres it will sometimes be found an advantage to slightly reduce the R.F. filament supply.

In the "Listeners' Guide," to be published shortly, there is a useful table showing valves obtainable in New Zealand listed according to the positions in the set for which they are best suited, and also giving impedance, grid-bias, etc., so by consulting this table, a listener may quickly find a suitable valve for any purpose.

For the detector stage, whether followed by transformer, impedance, or resistance coupling, the writer has found a high impedance valve to give the best results, both for tone and volume. High impedance in this case is taken to mean not less than 60,000 ohms.

It is necessary to adjust the number of turns on the R.F. transformers to suit the impedance of the preceding valve. The impedance is stated on printed matter enclosed with the valve.

(Continued on Page 13.)

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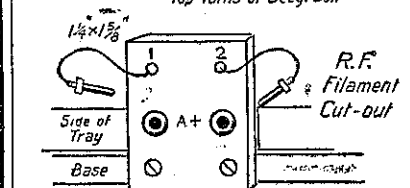
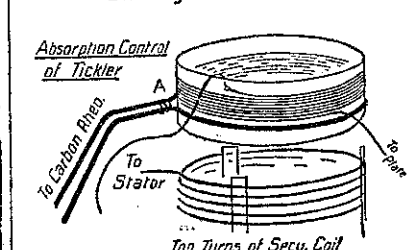
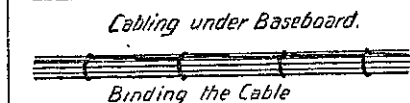
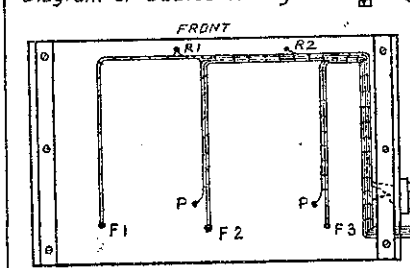
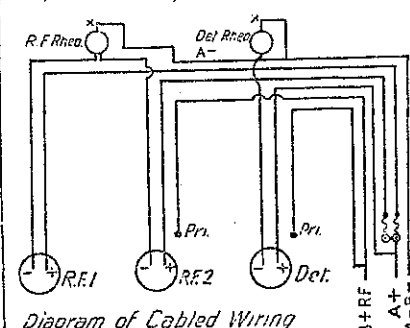
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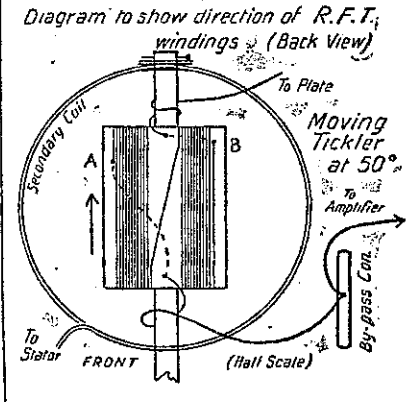
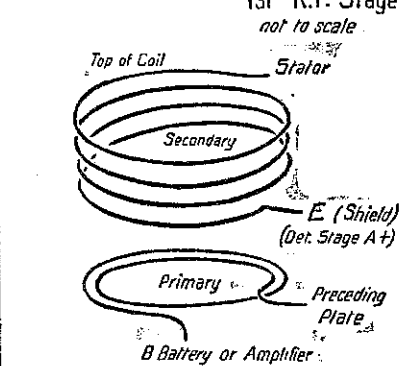
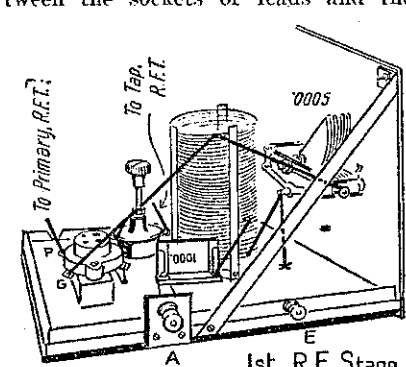
are placed when bound together. The connecting wire to be used for this purpose must naturally be well insulated, and rubber-covered is splendid for the purpose. The writer has used good quality bell-wire, 20's s.w.g., tinned, rubberised, thick double cotton,

are only shown diagrammatically. As they are not used often it would serve to bring out the actual leads and attach the pins. It must be remembered that the shield is negative A, so there must be no chance of connection between the sockets or leads and the



and waxed. A diagram of the actual leads is shown. These are to be cut suitable lengths, bent as required, and bound together with thin twine, a "hitch" being taken about every inch. Care must be taken to provide for ends at rheostats and to connect to the small filament cut-out panel at right. The two R.F. and three positive A leads are to run separately as shown, joining where they leave the baseboard. All ends should be left sufficiently long to reach the batteries without joining. Where the A and B leads must separate, bind them separately; up to this point they are all cabled together.

The negative ends of the rheostats are shown wired to the shield, and in the under base cable diagram a negative A wire is shown running to these points. This wire may optionally be run to either one of these points or to both, and as it is at earth potential



shield, so a good plan would be to protect the back of sockets, with insulation or a small protective block of wood hollowed out and screwed into place to prevent any chance of the cover touching the sockets. The cover is cut away to clear the panel. When the back is fixed a scrap of copper could be used to make a small protective shield with turned edges, which could be soldered to tray.

NEUTRALISING.

WHEN the joyful day arrives upon which constructional work is completed, the unit may be hitched up to the amplifier and batteries, and the process of neutralisation carried out. There is nothing very difficult or mysterious in this connection, and if the instructions are carefully carried out, no trouble should be experienced in