

"THE DIFFERENTIAL FOUR"

Successful Series Completed

By "CATHODE"

BEFORE going on with the description of the final stage of this receiver, it may be well to touch briefly upon the addition of a volume control which, when the final stage is added, will be found very necessary.

The form of volume control which has been found best for most circumstances consists of a potentiometer shunted across the first audio transformer, the connection from the moving arm of the potentiometer being then taken to the grid of the first audio valve. This is, as a matter of fact, one of the very few forms of volume control which do not have an adverse effect on the frequency response of the audio system. The potentiometer should have a value of one megohm, or thereabouts, and must, of course, be mounted on the panel. A symmetrical appearance will be lent the front of the panel if the volume control is mounted alongside the reaction condenser and on a level with it. It will be noticed that a part of the panel at the extreme right end has been left unoccupied with a view to the addition of this control.

"The Differential Four."

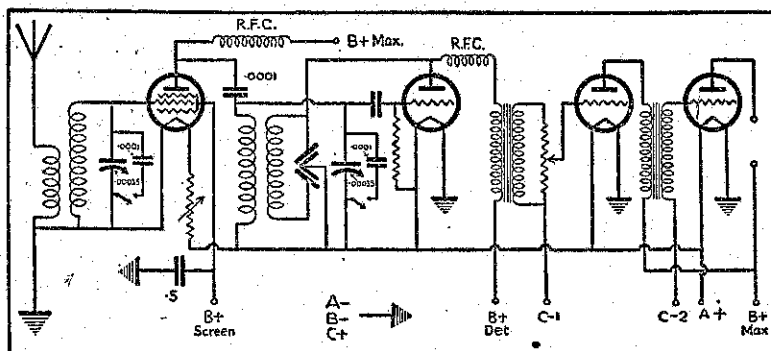
APART from the volume control, all that is required to add a second audio amplifier to the receiver is an audio transformer of good quality and a valve socket. Space will be found for these at the rear of the newly-added volume control, their precise location not being a matter of any great importance.

The lead which runs from the negative speaker terminal to the plate terminal of the first audio valve holder should now be changed over to the plate terminal of the second audio

valve holder (that just added). The now vacant plate terminal of the first audio valve holder should be connected to one end of the primary of the new audio transformer, the other end of the primary being connected to the B+ max. terminal. The secondary of the audio transformer is, of course, connected one end to the grid terminal of

valve will receive its proper filament supply.

A valve having a good power handling capacity should be chosen for the last stage as otherwise strong signals will result in distortion. A valve with an impedance of 2000 to 4000 ohms will be found very suitable, and the recommendations of the valve manufacturer



the second audio valve holder and the other end to the empty C negative terminal on the terminal strip. The wiring is completed by running wires from the filament terminals on the existing first audio valve holder to the new second valve holder, so that the power

as to the grid bias to be used with the particular plate voltage employed should be scrupulously followed. The plate voltage should be raised to as high a figure as the purse will allow, provided that the maximum voltage recommended by the valve maker is not exceeded. A high plate voltage is always of assistance in obtaining the minimum of distortion on powerful signals.

IT will be noticed from the diagram that slight alterations have been made in placing the audio stages of the Diff. Four. These are suggestions to get a more compact layout than is possible in building the set up stage by stage. At a later date a compact four-valve set will be described. It will be noticed, too, that the coil used in the radio stage employs an English base. The five-valve bases are difficult to obtain, and in this circuit are unnecessary. We have resorted to an English base to prevent the valve being placed in the coil socket, or vice-versa. This would have disastrous results both to the valve and the battery. The rheostat has been shown in the detector circuit on the layout diagram and in the radio circuit in the theoretical stage. This has been purposely done to help those who, wishing to use the set primarily for short-wave, wish to control the voltage of the det. valve.

Clearing Away Difficulties.

IT appears as though a slight misapprehension occurred when the radio stage was described. The writer specified a .0005 condenser, thinking that

constructors would build the special coil for that condenser described earlier in the series. Some builders followed the same specifications as those for their .00035 condensers in the detector stage. This has, of course, thrown the dials right out of alignment, and it means that the whole broadcast band cannot be tuned in. To make matters quite clear, a table was published recently in the Questions and Answers columns.

On trying out different types of valves, the writer encountered a difficulty which has been met by many correspondents, that is, with regard to reaction. Unless one happens to be using a valve which is a particularly ready oscillator, it is necessary to increase the number of turns on the reaction coil. The small diameter of the coil and its consequent inefficiency on the broadcast band contributes to this to some extent, but the real reason lies in the smallness of some of the differential condensers on the market.

The insertion of a small fixed condenser across one side of the reaction condenser completely eliminates the difficulty, but renders the condenser less suited for short-wave work. What is really required is a differential condenser having a capacity of about .00025 on either side. Although reaction coils should be kept as small as possible, 60 turns is not an unreasonable size for the broadcast band, everything being considered.

Some difficulty has been encountered on the h.f. side, and this is most likely due to the use of an unsatisfactory type of choke for parallel feed. This is a key component in this type of circuit and a careful choice must be made. The .001 condenser originally specified has been superseded by a .0001, which

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