Useful Wave Trap to Cut Out Local Stations

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PEOPLE living very near to a powerful broadcasting station may find that this station comes in loudly enough to interfere with reception of other stations, even when the receiving set is most carefully tuned to the station that they want to hear. Particularly is this the case in large cities like New York (which city has no fewer than twenty-two broadcasting stations, operating on powers up to 5000 watts, and in general with many hundreds of thousands of people living within a few miles of each of these stations). With a receiver having poor selectivity, it may be that the nearest or most powerful station will be heard no matter how the set is tuned, but with a receiver of very great selectivity, only perhaps two or three stations of very nearly the same wave-length as the local station will be interfered with. Thus the seriousness of the interference depends upon the selectivity of the receiver, the distance from the interfering station, and the power of the latter. In the following the methods of eliminating or greatly reducing such interference at minimum expense and trouble are given.

Successful Elimination.

"In the great majority of cases the interference can be eliminated by the use of what is called a series wave trap

"The series wave trap has two binding posts, one of which is connected to the antenna post of the receiver, and the other is connected with the antenna. (The antenna is thus disconnected from the set and the signals have to go through the trap to reach the set. This is why it is called a 'series trap.') In addition to the wave trap a .0005 microfarad fixed condenser should be connected across the antenna and ground binding posts of the receiving set.

"The series trap offers a very great obstruction to the interfering signal, and thus reduces the amount that gets through the set, but offers comparatively little obstruction to the desired signals.

Construction of a Series Wave Trap.

"A satisfactory series trap can be made of the following parts:—One .0005 microfad variable condenser, one cylindrical cardboard cover off an old dry cell (about 2½ inches in diameter), a spool of No. 24 double cotton-covered wire, a small board to mount the parts on, two binding posts of Fahnestock clips for connection to antenna and to receiving set. (See Figure 2.) Wind a coil with the wire on the cardboard tube, with the turns close together, about sixty turns. Twist a few loops in the wire for connections at several points, say, turns number 5, 10, 18, and 30, and also at the last turn.

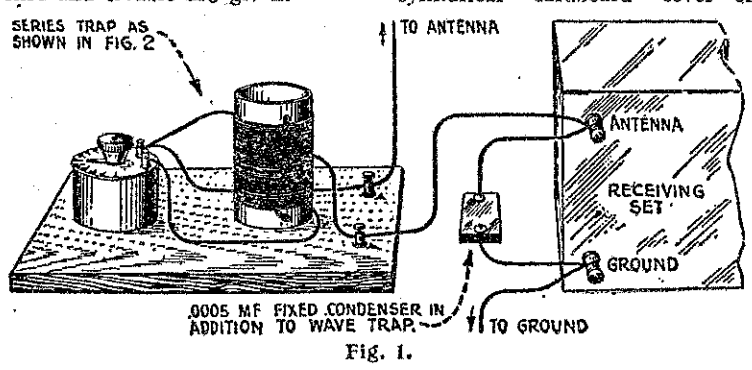


Fig. 1.

"Remove the cotton covering from the wire on the coil at these points, so that connection can be made to any one of them by means of the flexible piece of wire marked 'A.' Such places, where connection may be made to certain turns on the coil, are called 'taps.'

"Mount the variable condenser and coil on a wooden board, provided with two binding posts, as shown in Figure 2. Connect the first and last turns of the coil to the variable condenser, as shown in the figure. Then connect one of the binding posts on the board to one of the binding posts on the variable condenser, as shown in the figure. To the other binding post connect a piece of flexible wire (the No. 24 cotton-covered wire can be used, but a piece of stranded flexible insulated wire would be better), and remove the insulation from the free end, so that it may be connected to one of the 'taps' which were made on the coil, as will be described in the second paragraph below.

Operation.

"Remove the antenna wire from the 'antenna' binding post on your receiving set, and connect it to the right-hand binding post on the wave trap, and connect the left-hand binding post on the wave trap to the binding post on your receiver, to which the antenna wire previously went (see the figure). Next, connect the .0005 microfarad fixed condenser between the antenna and ground binding posts of the receiving set.

"Now twist the 'flexible' wire connection on the wave trap around the 'tap' at the thirtieth turn, being sure to make a good connection. Then start up the receiving set, set the wave trap condenser pointer at zero, and tune for some desired station. This may come in at a different place on the receiver dials from those found previously. If the interfering station is now heard along with the desired one, turn the knob of the wave trap condenser very slowly until the interference disappears.

"If the desired station goes out along with the interfering one, change the flexible connection on the wave trap to the eighteenth turn, and repeat the operation. If the same thing still occurs, try ten turns and five turns in succession In each case, before changing the tap connection, try retuning or readjusting your receiver, to see whether or not the desired station can be brought in, and also readjusting the wave trap slightly to keep out the interfering signal. A certain amount of back and forth adjustment between the receiver and wave trap may be necessary.

"If with the tap connection on the thirtieth turn the interfering signal can still be heard under the desired one, when the wave trap is tuned to give its maximum reduction of interference, change the tap connection to the sixtieth turn, and repeat the operation described above.

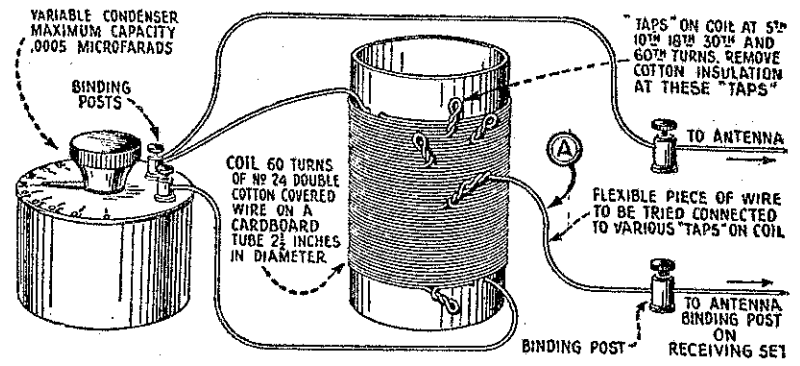


Fig. 2.

"A certain amount of experimenting will be necessary, in order to learn the effect of the wave tap on the receiver adjustments, and in order to learn how to adjust the wave trap as well as what tap on the coil is best for your particular receiving set and antenna.

"If the trap does not work when first made and connected, inspect it carefully to see that it was made in accordance with the foregoing instructions. Traps such as the one described have actually been made, and have been used successfully with many hundreds of receivers, of the widest variety of manufacture.

Loop Sets.

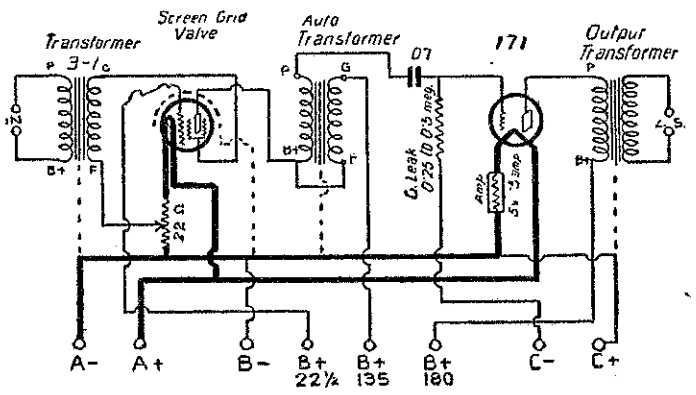
"Less interference will be found usually when using loop sets, because the loop is more selective than an antenna. Also the loop can be turned into a position where the interference is very much reduced. And finally, a wave trap can easily be made that will cause a great decrease in interference, as follows:—

Wind about twenty turns of double-cotton-covered number 24 wire in a bunch around a regular size 45-volt "B" battery (which is about 7 inches by 8 inches). Slip the coil off, and tie or tape it together, to keep from falling apart. Connect it to a variable condenser. Then hold the coil near the loop, and adjust condenser to make the interference as little as possible."

Construction Continued

The New Screen-Grid Valve as Audio Amplifier

THE March number of "Radio News" gives an audio amplifier employing the UX222 valve in the first stage and a 171 type valve in the second, transformer coupling being employed. Quadruple amplification is claimed over results obtained with a 201A in the first stage, or 300 times against 216. The innovation is particularly suited for DX work, of which we get such an amount in New Zealand, but, on the other hand, if properly handled, will give excellent results on strong signals. This latter is effected by the use of a potentiometer to cut down signal strength to an amount that can be carried by the last valve.



The chief difference between this and the usual audio circuit consists in the use of the second transformer as an auto-transformer, by connecting the primary and secondary in series. The only transformer suited to this purpose is the Pacent, which has a high secondary inductance, about 600 henries, with a high value of current through it. No further particulars are given of this transformer. The first transformer is 3 to 1 ratio, and the final output is through an output transformer of the usual 1 to 1 ratio.

Partial shielding of the valve is an absolute necessity to prevent any tendency of the valve to howl, and to present microphonic action from the loud-speaker. The shielding is effected by placing an inverted "beverage shaker," or metal tumbler, over the valve.

Considerable experiment and trial in the laboratory has produced a satisfactory unit, but the descriptive article impresses upon constructors the importance of adhering to specifications as closely as possible.

The schematic diagram is given here as being of particular interest at the present time.

The potentiometer above referred to is made from a 30-ohm rheostat, and in order to cut down the total resistance to 22 ohms, which will give the filament its requisite 3 volts, a section of the resistance (nearly one-third) is shorted by sweating solder across the wires, or by any other convenient method, and both ends of the resistance are brought out to terminal screws. The arm gives a bias of ¾ volt on the screen-grid. Though the filament voltage will be slightly below the rated value, it makes for longer life without decreasing amplifying efficiency.

Little advantage would be gained by using the screen-grip valve unless the last valve was one equal to carrying very large volume, and this the 171 will do.

Browning-Drake Results.

NUMEROUS constructors are reporting success with the Browning-Drake four-valver constructed according to the recently-published specifications. Several who have built it to replace three-coil circuits are pleased with the great improvement in volume, selectivity, and tone.

GRID BIAS

A POINT which is not always realised when considering the setting of grid bias for the various valves within a receiver is that one to three dry cells will provide ample bias for the first audio stage.

Assuming that sufficient demands are being made on the set to warrant biasing the grid of the last valve to 9 volts, the peak value of the A.C. signal voltage swing will be 18 volts.

Since we have a right to expect at least 25 times voltage amplification from any modern stage of audio-frequency amplification, be it resistance coupled or transformer coupled, this 18 volts swing on the grid of the power valve would be produced by 18/25, or, say, 0.7 volt on the grid of the preceding valve.

To accommodate this 0.7 volt swing a bias of only 0.35 volt is necessary, always providing that the particular valve employed does not pass grid current until the grid bias has been raised to a potential positive in respect to the negative end of the filament.

Reversing this argument, the grid bias produced by a single cell, i.e., 1.5 volts, is only fully employed when a voltage swing of 90 is deemed desirable on the grid of the output stage.

The small bias normally required could quite well be obtained in many cases by inserting resistance (fixed or variable) in the negative lead of the valve filament circuit, and connecting the grid to negative L.T.

Whether this method will work depends upon the characteristics of the valve filament. For instance, many filaments rated at 2 volts will function well at 1.6 volts, leaving 0.4 volt available for biasing, resistance drop in battery leads, etc. With four or six-volt a large surplus voltage is available.

When only just sufficient bias is used the maximum performance of the valve will be obtained at an appreciably lower H.T. voltage than would otherwise be necessary, thus economising in batteries.

QUERIES BY CORRESPONDENCE.

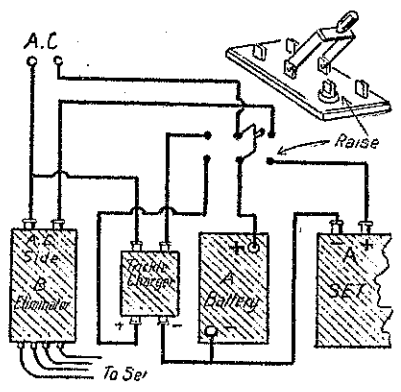
1. Every communication enclosing queries is to be addressed to "Megohm," ½ Box 1032, Wellington, and must be accompanied by a stamped addressed envelope for reply by post.

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.

CONTROLLING "B" ELIMINATOR AND "A" BATTERY TRICKLE-CHARGER

IT is quite easy to control a receiver with B eliminator and A battery trickle-charger with a single double-pole double-throw switch, so that in one position the receiver and eliminator are both cut out from battery and mains, and the trickle-charger is switched on to charge the A battery, and in the other position the trickle-charger is cut out, power connected to the eliminator, and the receiver filaments switched on, provided, of course, that low tension controls on the receiver are left in position for reception.



In order that the valve filaments may switch on before and off after the eliminator, it is only necessary to make the A battery contact on the switch higher than the opposite one of the pair.

IMPEDANCE.

IMPEDANCE is influenced by frequency, as is reactance, and concerns direct as well as alternating currents, as does resistance Like resistance, it is measured in ohms, the number of ohms being the number of volts required per ampere of current.

For example, the resistance of a pair of headphones is very often 4000 ohms. The impedance of such a pair to a current at a frequency of 800 cycles per second may be about 30,000 ohms, whereas to a current at 400 cycles it would be a little more than half that amount. We may summarise these results as follows:

Resistance is the opposition offered flow of a current, and is a property of the circuit or apparatus concerned, being independent of the nature or frequency of the current.

Reactance is the opposition offered by an inductance or capacity to an alternating current. Only alternating or changing currents encounter reactance. the magnitude of which depends upon the frequency of the current.

Impedance is the total opposition offered by a circuit, and is made up of resistance and reactance. Where direct current is concerned, the impedance is the same as the resistance, for there is no reactance.

A New Accumulator.

VERY shortly will be described an easy method of constructing a B accumulator of good capacity, capable of being charged with the A battery charger recently described, thus obviating the necessity for having two chargers. A method has already been described for an easy system of charging B accumulators "in parallel," but the forthcoming idea is much simpler to construct, and will, therefore, appeal to those whose experience has so far been limited, or who cannot spare the time for more elaborate ideas.

Vibrating Chargers.

A FEW old-fashioned listeners are still utilising battery chargers of the vibrating type, and most of them appear to be particular not to work them during broadcast hours. But the valve rectifier is a much superior and more trustworthy instrument, as it will not let the battery down. A vibrator, unless provided with complicated safety gear, will short the whole battery charge if a stoppage of the main's current should happen, if only for a moment. This type of rectifier may cause considerable interference with neighbouring receivers, but this trouble can be reduced, if not cured, by placing a 1 mfd. condenser across the vibrator gap.

New Type of Cone Speaker.

A NEW type of cone speaker has been evolved in which the diaphragms are of linen, stretched on two 2-foot square frames eight inches apart. The centres of the linen squares are drawn together by a bolt which is actuated by the driving unit. Volume with quality and a frequency response from 30 to 8000 cycles are said to be the result.