DIRECTIONS

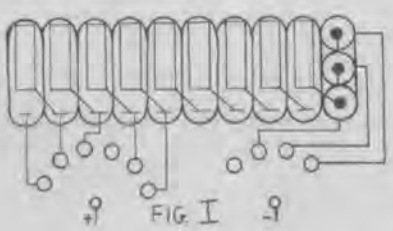
FOR USING AND CONNECTING UP THE

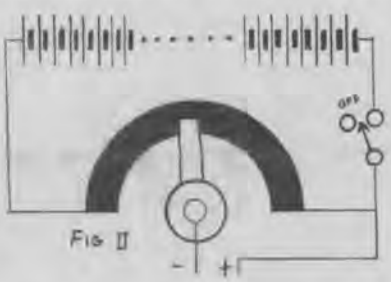
Electron Audio Detector Amplifier and Oscillator

The Electron Bulb is similar to the Audion in that it requires two batteries for its operation. Its fundamental mode of operation, however, is vastly different from the Audion. In the Eleectron Audio Detector a pure discharge of negative corpuscles of electricity known as electrons are shot off from the filament. These negative electrons serve to conduct the current from the "B" battery across the filament plate space. Every attempt is made in our bulb to carry the exhaustion to the absolute commercial limit. At the final pressure obtained there is practically no gas remaining im the bulb. In the gas bulb of the Audion type, the active carriers are not electrons but negative and positive gas ions. A critical pressure is necessary in these bulbs iu order that the maximum amount of current may flow across the filament wing space. Any increase in the vacuum rebuces the sensitiveness. In our Electron Bulb, the higher the degree of exhaustion the more sensitive the bulb.

A six volt battery for lighting the filament is connected in series with an adjustable battery rheostat, and a high voltage battery variable either by taps from the separate cells, or by means of a high resistance potentiometer, is used to maintain a positive potential on the plate at all times in order that it may be an actual absorber of the negative electrons emitted from the filament.

The tapping of the individual cells is preferable to the potentiometer control in that the battery will last materially longer. It is essential that the tapping scheme is arranged so that one cell variation of the "B" battery is provided. Ten three-cell flashlight batteries making thirty cells in all, form an ideal high voltage battery. Figure I. shows a method of connecting the battery, using the tap scheme of variation. Figure II. shows the potentiometer method.





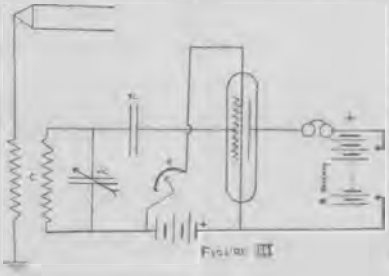
The filament battery is preferably a six volt 40 or 60 ampere hour storage battery. Dry cells can be used in emergency, but owing to their short life are rather expensive. A low voltage transformer cannot be used.

Ten three-cell coat-pocket size flashlight batteries are connected in series by bridging the carbons and the zincs in the regular manner. Taps are brought from the first six carbons as shown to a six point battery switch. (In the Eveready Batteries the zinc terminal is connected to the long bent over brass strip and the carbon pole is the short uprsght brass strip.) The wax in the opposite end cells should be removed and three taps should be taken from the zinc pole as shown to a three point battery switch. After soldering on the the three leads the wax may be remelted and poured over the connections. It will now be seen that by means of these two switches any number of cells from twelve to thirty by single cell variations can be connected in circuit.

By crossing over the leads on the one cell taps as shown in the drawing, an increase in voltage on both switches is obtained in the same direction of volation.

Figure II. shows the alternate potentiometer method of varying the "B" battery. In this scheme no taps are necessary from the battery, and it has the advantage that the variations are umform over the entire battery voltage. Leads are taken from the extreme end of the battery to the potentiometer as shown in the drawing.

Figure III. show the connection of the Electron bulb when used as a detector of damped waves, namely spark stations. C represents the loose coupler with the variable condenser VC shunted across the secondary. FC is a small fixed condenser of the usual telephone blocking type. This condenser may



preferably be a variable condenser having a maximum capacity of .001 mf. The phones should have a resistance of from 2000 to 3000 ohms. The variable "B" battery has already been described in detail. It is essential that the carbon or positive pole of the "B" battery be connected to the phones. The negative

or zinc terminal of the "B" battery is connected to the positive of the filament battery. The rheostat R is used to vary the filament brightness and can be a usual porcelain base battery rheostat of 10 ohms resistance.

There are five terminals from the Electron Audio Bulb. The three brown leads are connected to the filaments. The single brown terminal at one end being common to both filaments. The red terminal is connected to the plate, and the green one to the grid. The Electron bulb should be used in a vertical position with the green terminal uppermost. Use only one filament at a time.

CAUTION: IN CONNECTING THE ELECTRON BULB THE UTMOST CARE SHOULD BE USED THAT THE "B" BATTERY LEADS (30 volts) DO NOT COME INTO CONTACT WITH EITHER OF THE BROWN FILAMENT TERMINALS. THIS WOULD BURN OUT THE FILAMENTS AND OUR GUARANTEE CANNOT AND WILL NOT COVER THIS CARELESSNESS.

In operation do not burn a filament at excessive brilliancy. Use as high a B battery voltage as possible to maintain the desired sensitiveness. It will be found that the B battery voltage of the Electron bulb is not critical as it is in the Audion. Maximum sensitiveness will be secured over a six to eight volt variation.

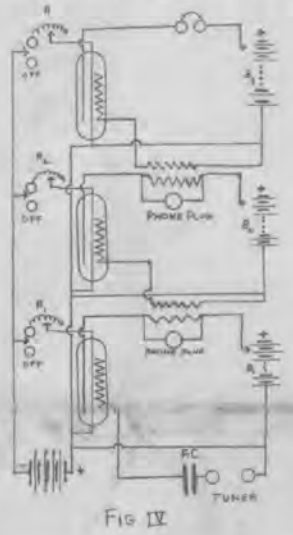


FIG IV

Figure IV shows the method of connecting two or three Electron bulbs to form a two or three step amplifier. Use is made of but a single A battery for lighting all of the filaments. A separate B battery and a separate filament rheostat must be used for each bulb. The coupling transformer may consist of two windings on a quarter inch core three inches long, consisting of a primary of 150 ohms resistance, wound with 32 or 34 silk magnet wire, and 9000 ohms secondary of 38 or 40 silk covered or enamel wire. Secondary is wound on top and insulated from the primary. It will be noticed that the telephones may be connected in parallel with the primary winding of each bulb. This plugging-in arrangement allows a set connected as in the drawing, to be used as a one, two, or three step amplifier at will.

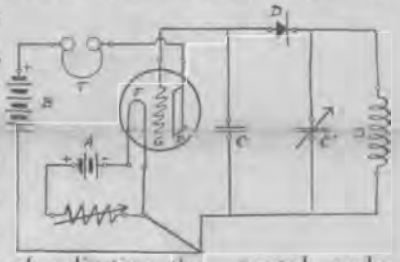


Figure V shows the Electron bulb used as an amplifier of galena or other crystal detectors. Satisfactory results have been obtained by this method of amplification, but the inconvenience of adjusting the crystals make a two step Electron amplifier preferable.

Figures VI, VII and VIII show various hook-ups for undamped wave reception, using the Electron osicillator or combination bulb. These connections are self-explanatory. For detailed information regarding the construction of long wave length loading coils, and other data on undamped wave reception, the reader is referred to the recent wireless magazines, in which a number of excellent articles on this subject have been published.

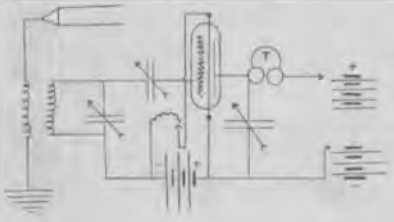


FIG VI

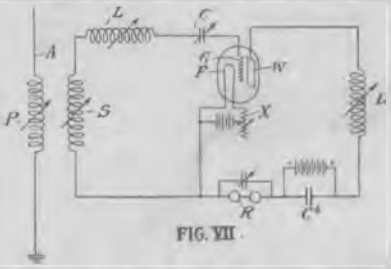


FIG. VII

Every Electron bulb before shipment is tested as to its sensitiveness, audibility and the number of B battery cells required. Any bulb not showing a high degree of sensitiveness and audibility will be exchanged if promptly returned to us. We guarantee safe arrival, and will gladly replace any bulb damaged in shipment.

SUGGESTION.—It may be that in the bulb which you receive the grid has become bent over by rough handling until it is touching the plate. This defect may be easily straightened out by holding the bulb in one hand and jarring the grid into place with the palm of the other hand. There is practically no danger of breaking the filament, so that considerable force can be applied. In the event that you break the filament by attempting to straighten the grid, return same to us, with a statement of the facts, and we will send you a new bulb.