

Filament Emission.

"HOW is it possible for a radio valve to light brilliantly and yet to be 'dead' for use in a radio set?"

ANSWER: There are a number of causes for the refusal of a valve to function while its filament still glows with normal brilliancy. One of these is the short-circuiting (or the making contact not called for in the design of the valve) of two internal elements: as between the plate and the grid or the grid and the filament. In the latter case the filament usually is destroyed immediately the current is turned on; in the former the valve will refuse to function, yet the filament will probably last its normal life.

The most prevalent valve ailment, however, sets in after a valve has been in service for some time, usually a year. At this time a marked weakening of signal strength inability to get remote (DX) stations with the same

It is not necessary to open the window to let in radio waves; they pass through stone, brick, wood, and glass. But, on the other hand, metal, such as structural steel, deflects them and often causes freaks of reception, especially in cities.

ease as when the set was new, and perhaps some degree of distortion, may take place. The cause of this is the burning down of the filament to a point where the amount of the "electrons" it gives off, when heated to complete the "plate" or "B" battery circuit, is considerably lessened, with a resultant drop in the efficiency of operation. As the valve depends upon the filament's discharge of electrons for its operation, the manufacturers coat the filaments with an "element" known as thorium, which aids in giving off electrons for the successful operation of the valve.

After the valve's normal service the thorium is fairly burnt off, thus decreasing the number of electrons flowing from the filament to the plate. It

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Questions and Answers

is this weakening of the filament's operating efficiency which causes the unsatisfactory performance of the set. At times this condition will come upon a practically new valve—a fault known as paralysis. To correct this and also weakening in old valves the process known as rejuvenation is employed. This was dealt with recently in these columns.

Range of a Receiver.

"WHAT is the distance range of a four-valve receiver?"

ANSWER: This is a question often addressed to "Observer," so that it will be of general interest to all readers. No one can say just what distance a certain receiver can cover. There are so many controlling factors that enter into the matter that it is practically impossible for any one to state with certainty the normal range of the receiver. Weather conditions have a good deal to do with distant reception; and so have the condition of the batteries, the valves, the sensitivity, and the tuning ability of the receiver, the quality and condition of the antenna structure, and the efficiency and condition of the ground connection. Furthermore, there are certain areas in the country known as "dead spots," in which reception of anything but powerful local stations is extremely difficult even with the most elaborate receivers. Another controlling and very important factor is the operator. He is responsible to a great extent for the results obtained. Keeping the set and the accessories at maximum efficiency, a good knowledge of the tuning temperament of the receiver, and patience must eventually reward the operator with the desired "DX," as reception of the distant stations is called.

What is an A.C. Valve?

"DOES the A.C. valve operate entirely on alternating current?"

ANSWER: No. Alternating current is used only to light the filament, or the heater element which heats the filament, depending on the design of the valve. As the modern A.C. valve requires anywhere from one and a-half to fifteen volts of alternating current to heat the filament, it is necessary to "step down" the usual 220 volts of the house supply by means of a step-down transformer. However, to supply the "plate" voltage or "B" current, direct current obtained from "B" socket power unit or from batteries must be used.

Because receivers to-day use plate voltage ranging as high as 400 volts, it is necessary that the 220 volts obtained from the house be first "stepped-up" to the required voltage by means of a "step-up" transformer. After this the increased voltage must be rectified from the alternating to direct current, as the receiver cannot function with alternating current on the plates of the valves. After rectifying the increased current we find there is still a noticeable hum present in the speaker, due to the characteristics of the alternating current. This hum is "ironed-out" by an apparatus known as a "filter"—a combination of condensers and choke coils. The entire combination of the step-up transformer, rectifier (usually a valve) and filter system

goes to make up the B voltage supply unit, without which no radio receiver can operate. In the case of the modern A.C. set it is really an integral part of the receiver and is usually so considered.

Care of L.T. Battery.

"WHEN I first took up wireless we used to be told that it was absolutely fatal to short a low-tension battery, and great care was taken to prevent this. But recently I have noticed a tendency among my friends to think that accidental shorting of a battery will not do it any harm at all, and I have, indeed, heard this stated as a fact. What really happens when this occurs, and what is the damage done to the battery, if any?"

ANSWER: Sudden over-discharging is likely to lead to a good many accumulator troubles, though certain modern accumulators are far more "hardy" than their predecessors. Amongst other things, shorting often gives rise to the buckling of a plate and to the loosening or shedding of the active material in the plates. (This latter is due to excessive sulphation, which is accompanied by a certain amount of expansion of the active material in the plates, and if this expansion is greater than the containing grid can cope with, when the sulphate is reduced by the next charge on the accumulator a certain unavoidable loosening and shedding takes place. The over-discharge due to a dead short-circuit or to a short through quite a low resistance is likely to give rise to buckling of the plates and frequent over-discharge may quite easily cause a reversal of the polarity of the plates in one or more of the cells, especially if they are partially discharged to begin with.

Many Battery Leads.

"WHAT is the advantage of having a lot of different 'B' plus terminals? In my last set I only had two and it was perfectly satisfactory, but in the new one which I am thinking of building there are no less than four. Are they really necessary?"

ANSWER: The idea of having a large number of B plus tappings on any set enables each particular valve to have exactly that B voltage which it requires. For very selective and high-quality reception it is frequently necessary to adjust the B battery positive and the grid-bias potentials very accurately in order to obtain the maximum results, and it is impossible to do this for separate valves unless each has a separate high-tension supply. It is for this reason that the B is duplicated or triplicated on many sets, and we think that in general you will find that it is a refinement that is well

Concerning the Moving Coil Speaker.

"W.C.W." (Tirau) writes: Having just about completed the moving coil speaker, described in your issues of March 1 and 8, I would like you to advise me on the following points. Where can I obtain 5-1 output transformer?

A.: Ferranti manufactures one and this may be obtained from their agents or direct from the master agents, A. D. Riley, Ltd., Wiggins Buildings, Wellington.

(2) How is this transformer connected, and what size wire is the best to run from the set to the transformer and the transformer to the moving coil?

A.: The feeds from the set are connected to the two input terminals of the transformer, and the output terminals are connected to the moving coil. Wire ranging from 30 to 18 swg. is quite suitable.

(3) Can this speaker be run from an accumulator simultaneously with the set?

A.: Yes, but the total draw (approximately 1.6 amperes) would be rather heavy, so that if possible a charger should be connected to the battery while it is in operation, i.e., an accumulator should be floated between the charger and the speaker.

(4) Are Philips 609 and 605 valves in the two last stages satisfactory?

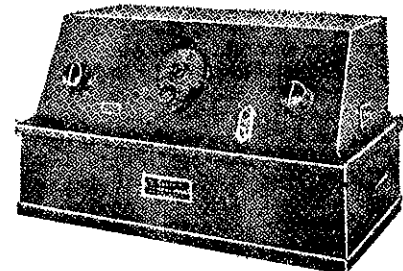
A.: No, at least use 603 in the last stage, 609 or 605 would, however, be quite in order if placed in the second last audio stage.

(5) Will it be satisfactory made up in a cabinet 12in. square?

A.: Yes, if the back of the cabinet is left open or covered with a gauze. A larger baffle board would be preferable as some of the lower notes will be lost when the baffle is restricted in size.

Don't plug an A.C. radio device into a D.C. socket—that is, unless you want to buy a new one.

Following are a few additional notes on this speaker. The speaker coil is designed for the 210 type of valve, which has an impedance of 5000 ohms, and an amplification factor of 8. Where a valve of lower impedance is used, e.g., 603 (1650 ohms), fewer turns will be required on the moving coil. In this latter



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