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ROCKING further with the question of the supply of power for radio receiving sets of the multi-valve type, one of the most talked about and most interesting questions automatically comes up for review. That is the question of the elimination of all batteries and the provision of apparatus capable of supplying the radio set direct from the power mains.

To the lay mind it undoubtedly seems an extraordinary state of affairs that, with power to burn (in every sense of the word) in a house, the householder has to invest a comparatively large sum of money in purchasing batteries for providing more power to run his radio set. The bold statement that the house supply mains do not supply the correct kind of current is an unsatisfactory statement to many of an inquiring turn of mind, and a salesman is frequently called upon by prospective purchasers to justify his statements concerning his inability to supply moderately priced equipment to plug straight into the light or power socket.

THE PRODUCTION OF SOUND WAVES.

Briefly, radio signals are made audible by virtue of electrical effects induced in the antenna system being amplified and then "detected," amplified again, and then passed through head telephones or loudspeaker, where they become audible as sound waves. The sound waves are set up in the air by the movement of a metal diaphragm, and this is caused to move by being attracted in a greater or lesser degree towards a magnet, whose strength is varied in proportion to the amount of current arriving from the radio set. It thus follows that the greater the movement the greater the volume of sound. The greater movements of the diaphragm do not depend however, on a large volume of current arriving from the radio set, but depend on greater "variations" of current to cause large variations in the diaphragm. A large volume of current could thus be passed through the sound reproducer without any sound resulting at all, providing the current remained constant in volume or was at a continuous pressure. Immediately the pressure or volume is varied, the diaphragm commences to vary its position and disturb the air, thus affecting the human ear by setting up air waves.

Notes for Beginners:

By M. I. R. E.

Batteries and Power Supply Explained

MAIN CURRENT UNSUITABLE.

While no signals are passing through a radio set, therefore the speaker should be quite silent. This would not happen if power were taken from the light or power mains, because this type of current is not continuous, but is alternating in pressure fifty times every second, and if such power were used it would set up a very loud, low-pitched note having a periodicity of the before mentioned figure. In the city of Auckland, direct or continuous current is used for power supply by this term as applied to its actual continuity is purely a relative one. For power or lighting purposes, it certainly is "continuous" enough, but not for radio, because it is full of irregularities which are quite insufficient to make a lamp flicker, for instance, but are so tangible to the hearing when produced in a loudspeaker that the required signals are entirely blotted out. Equipment has been procurable for some time which will smooth out these irregularities, but great care must be exercised in the purchasing of D.C. (direct current) battery eliminators, or "Socket Powers," and a guarantee should be forthcoming from the dealer who is supplying, that the outfit meets the regulations of the Public Works Department, as well as those drawn up by the Fire Underwriters, because some of them are dangerous. Where the design is an approved one, there is no more to be feared from them than any other domestic appliance.

Where AC (alternating current) is used, the problem becomes a more complex one because this type of current does what its name suggests, and that is, alternates in direction, thus making it definitely discontinuous, because it has to rise to its full pressure from zero in one direction, and then fall to zero before it can reverse to rise to its maximum in the other direction. Consequently two operations have to be performed to make such current supply a radio set. First, the current flowing in the wrong direction must be reversed, and second the gaps existing in the supply filled in.

From the foregoing it will be seen that an outfit capable of delivering current

from the supply mains to the radio set carries out no unimportant or mean performance, and to do it reliably and efficiently, the purchaser must realise that he is in the same position as the prospective purchaser of a receiver, and that is that he must only purchase products turned out by makers who are known to be reliable, and he should only purchase through a dealer who is prepared to guarantee his apparatus against mechanical defect for a reasonable period.

Research is concentrated on this problem of finding an economical method of supplying power supply for radio sets cheaply and reliably, and the problem so far as the "B" battery eliminator is concerned, may be reckoned to have been solved. Up till a year ago the factor of obsolescence had to be considered, but that day has passed, and although many important improvements of methods and design will materialise, the eliminator is here to-day in a form which is thoroughly efficient and well worthy of the attention of the set owner or purchaser who is sick of, or doesn't want to be loaded with, the queer tricks which a radio set gets up to when attached to run-down batteries.

SPECIALY-DESIGNED RECEIVERS

Owners of multivalve sets (meaning from 3 valves upwards) are strongly recommended to discuss the question of quitting their batteries with a radio dealer, and adopt the eliminator or socket power. Specially-designed receivers definitely modelled for use with A.C. mains supply are being talked about, and are certainly due for production. In fact, there are one or two types already available on the market. It may be safely said that the orthodox style of receiver with standard designs of socket powers show all the features necessary to convince those interested that this new design exhibits nothing in the way of an improvement. It certainly demonstrates another way of arriving at the same result, but incidentally does it without any lessening of apparatus or cost. Un-

questionably interesting developments will take place along these lines in years to come, but revolutionary improvements will have to show up to warrant a swing-over from existing ideas.

The real problem in the supply of power for radio sets is the question of A supply for the filaments. For technical reasons it is impossible to apply the same principles of obtaining "B" power. The method of smoothing and filling-in the irregularities of the current will not work in this case owing to the low pressure and large volume required demanding a design of smoothing apparatus which would be of such mechanical proportions as to be impracticable of adoption.

THE "TRICKLE-CHARGER."

The popular method of solving this problem to date has been the adoption of a combination of what has become generally known as a "trickle-charger" and an accumulator battery. The term "trickle" is descriptive enough to convey a meaning of its method of performance without further detail. When the receiver is in action, the battery is supplying power, but when the receiver is switched off the battery is taking a very small charge continuously from the mains, and the rate of charge is designed to replace in the battery what the receiver absorbs with average usage. To all intents and purposes this is a complete solution of the problem because except for a periodical examination of the battery, the owner can forget his battery troubles and sympathise with his less fortunate neighbour, who may be seen making heavy weather once a fortnight towards the nearest charging station, and alternately getting a heavy list to port or starboard, according to his changing over his accumulator from his left to right hand as his arm tires.

From the point of view of economy of initial outlay, the trickle-charger and battery combination is going to be the most popular design for many a long day to come. The same com-

bination in its more flexible design, as described before, in the shape of a straight-out accumulator of standard design, with a charger capable of putting a charge of considerable, but regulable, size into the battery, is undoubtedly the best from point of view of ultimate life of battery. This is unquestionably the opinion of those who understand battery maintenance, but the results are dependent on the user keeping the battery in a charged condition, and not permitting it to be run right down. With the trickle-charger the capacity of the battery is usually low, and if unusual demands are made on the receiver by leaving it inadvertently switched on, or by continuous running for any legitimate reason, then the output may exceed the input, and the receiver will just simply go out of commission pending a supply slowly building up again in the battery. Good types of trickle-chargers have means for adjusting the charging rate, and under such circumstances the battery should stand up to its overload.

It will be appreciated that, from the point of view of minimum amount of worry, the A eliminator, or socket power, of the trickle-charge design is certainly the best offering at present.

THE PROBLEM OF "A" POWER.

It was mentioned previously that developments were in train which were designed to produce a special type of receiver, adaptable to consumption of energy from A.C. power mains. As was also stated before, no very marked improvement was likely to result from such developments unless revolutionary discoveries were made. The same may be said to apply to a similar application of principles to the furnishing of A power. In order to apply these principles at all, the orthodox method of assembling the filament supply circuits has had to be altered, thus rendering this class of supply apparatus useless for standard machines. Furthermore, special valves have to be used.

These remarks should not be interpreted as in any way condemnatory. The new system will find its own place. If it is not a success, then the place it will find will be the same as many anti-static inventions of the past, and that is oblivion. The systems in general vogue to-day are tried and true, and guarantees of success and service may, therefore, be made and received with mutual good-will.

Mainly About Construction

(Continued from Previous Page.)

more plate current at a given voltage than will a 201A. The difference is as follows, correct grid bias being shown in parentheses:—At a high-tension voltage of 135 (9) the plate current of 201A is 2.5 milliamperes, and at 90 (4½) 2 milliamperes. With a voltage of 135 (9) the UX112 takes 6 milliamperes, and at 90 (6) the plate current is 2.5 milliamperes. It is thus seen that if the high-tension voltage is kept down the difference is not great, but it would not be worth while to run a power valve at less than 90 volts, because it would not be running under advantageous conditions. It would pay you to discard dry B batteries, as you could either charge an accumulator or run an eliminator from the mains. Then you may put 150 volts on the plate of UX112, with a grid bias of 10 volts.

Crystal Queries.

J.B. (Kilbirnie).—The "Record" crystal set is described in the issue of August 19.

W.H.P.—It is not feasible to use more than two carborundum detectors in one set, and then only by a special dual arrangement.

H.M.J. (Main Trunk).—The grid and plate of each PM4 are connected together for rectifying purposes in the B eliminator.

CRYSTAL JOTTINGS

The microphone bar amplifier is not used as much as it might be, but in many cases it will give good amplification and better tone than a low-priced two-valve amplifier when added to a crystal. The first cost of the bar amplifier is low compared with a two-valve amplifier, and the running cost is very much less.

In crystal rectification the current passes from the cat's-whisker to the crystal. The principle of rectification allows very little current to pass in the opposite direction. It is always worth while to try reversing your crystal connections so that current flows in the opposite direction, as it is frequently found that results are better with the current passing through the circuit in one direction than in the other.

Zincite crystals are both natural and artificial. For some time they have been manufactured as "synthetic" zincite, and give results equal to the natural variety. The synthetic crystals are hard, and not brittle, and may be used as oscillating or amplifying crystals. They are made by heating in a furnace ordinary "zinc white,"

such as is used in paint, with or without a trace of manganese dioxide. A cherry-red heat produces a yellow-looking, glassy mass, and when this is carefully broken and tested much of it will be found to be very sensitive to radio signals.

Carborundum is carbide of silicon, and is manufactured by fusing a mixture of fine sand and coke in an electric furnace. This crystal is not attacked by acids of any kind. If purchased unmounted, the light steel-blue variety is best for wireless reception.

Where selectivity is required in a crystal set, loose-coupled tuning should be adopted, as a slight variation in the coupling will often cut out interference, and bring in the broadcast just the same.

In Britain, where two stations are frequently simultaneously broadcasting the same programme on different wave-lengths, crystal sets are often used constructed with two separately-tuned circuits, one receiving each station, and these two series of signals, passing through the same 'phone, result in much increased volume. The volume is not usually doubled, because, as a rule, one station will be situated at a greater distance than the other.

A POCKET CRYSTAL SET.

Next week there will be a special article describing the making of a handy pocket crystal set, easily made, cost very small, yet quite good for permanent use near a broadcast centre. Cyclists out for the day will be able to try this out at various distances. A length of thin wire hitched to a tree makes a good temporary aerial, and the end of a wire run into a creek makes a good earth, whilst 'phones occupy little space with the headbands temporarily removed.

For crystal amplifiers employing an ordinary valve in the first stage, a grid bias of 1½ volts will often be all that is necessary to improve the tone. This means that one dry cell which may be flashlight size is all that is required. To install this, find the secondary terminal of audio transformer connected to negative A and disconnect this wire, connecting it instead to the positive of the 1½-volt cell. The negative side of the cell is then connected to the transformer terminal. It must be clearly understood that this connection is not to be made on the side of the transformer secondary that is connected directly to the grid of the valve. The higher the impedance of a valve, the lower the grid bias required.

(End of Construction Section.)

RADIO LITERATURE

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MARCONI INTERVIEWED

FAITH IN BEAM SERVICE.

During his recent visit to New York and Washington, Marconi granted many interviews to newspaper reporters.

Commenting on his latest discovery, the beam wireless, Signor Marconi prophesied that it would soon supplant the ordinary commercial wireless services. The beam service has already been inaugurated between England and its colonies and the Anglo-American circuit will shortly be opened.

In most fields the beam wireless will supplant the cable, the inventor believes, although the cable route may still be preserved for secret messages. In the air there is always the danger of interference or the possibility that an unauthorised station may pick up the message. The danger is, however, more theoretical than practical, Signor Marconi feels, for with the beam system several hundred words a minute will be sent, requiring complicated and expensive receiving sets, and he felt it was not within human power to transcribe otherwise messages coming in at that rate.

The immediate future of fac-simile transmission by wireless, Signor Mar-

coni believes, will see whole pages of newspapers transmitted by the square inch instead of by the word, from one end of the world to the other. Reporters' notes put in the air in London will, in a few minutes or seconds, be visually before an editor in New York.

The success of wireless enterprise in America, which has so signally developed since the inventor's visit five years ago, he attributed to this country's vast financial resources and to the enthusiasm of America's youth.

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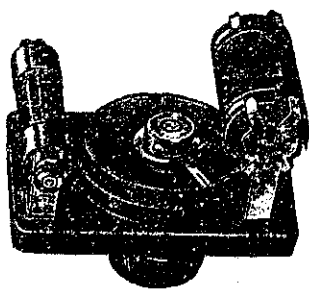
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