The Battery Problem

Current Supply to Filaments and Plates

by

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SO many questions continue to arise and repeat themselves concerning what might be termed the life blood of wireless receivers—the various batteries—that a general review of the problem may prove instructive.

When broadcasting first appeared on the horizon the valves then available required as much as 1 ampere at 6 volts for the lighting of the filament, while the high tension current was in the neighbourhood of 2 or 3 milliamperes at a voltage frequently as low as 24 volts.

The real problem in those days was filament current. The transport of the usual 6 volt 40 ampere-hour accumulator to a comparatively distant charging station was always the nightmare of reception. The high tension was considered no difficulty, it being easily supplied by connecting a group of flash lamp batteries, the only cheaply convenient method then available.

The first rumours of dull emitter valves were hailed with great joy and it was considered a wonderful achievement when the filament was reduced to .25 of an ampere even at £2 a time! But real satisfaction was not felt till the arrival of the .06 type, which could be operated with dry cells or primary batteries.

Now the pendulum has swung in the opposite direction. The "A" is thrown at us at every street corner and the "B" has become the real problem. Some may consider that all-electric operation is the ultimate solution to the difficulty, but for the present discussion this can be dismissed. It is a very long way off for the great majority and in many directions it has its own peculiar difficulties, evidenced even in progressively electric America, where battery-driven receivers are still very much to the fore.

Filament lighting is more or less established to well under half an ampere for most of the popular receivers.

Where charging facilities are available an accumulator best meets this requirement, but it is not the only means available. In isolated localities an alternative worth consideration is the large type of Sack Leclanche cell, which is capable of running the filaments of a three-valve receiver for nearly twelve months without any attention.

Accumulators.

ACCUMULATORS frequently prove a source of annoyance to their owners, due to improper usage by them or the charging station. They are best kept in condition by continual movement, electrically speaking, i.e., they should always be charging or being discharged. Any accumulator at rest is nursing trouble to some extent. A wireless receiver calls for intermittent use, which makes it particularly important that the accumulator be charged immediately it approaches a discharged condition. The best plan is to calculate the time it should last with the fullest use, allow a margin, and have it charged regularly at that period whether discharged or not.

Twenty actual ampere hours should be the minimum capacity of cell employed, because many charging stations will not trouble to give the proper charging rate of half an ampere to the small cells, with the result that the positive plates are soon broken up and the old story comes up after a few months, "Your plates are worn out. May we renew them?" whereas they should last for seven years.

The prevalence of improper charging is well illustrated by the following true story. A lady took her accumulator to a charging station in South London which for 30 years has been run by one of the greatest experts on storage cells. When it was handed to her after charging, she coldly asked, "Has this been done?" Much taken aback, the proprietor replied, "Certainly, why do you ask?" "It's quite cold!" exclaimed the lady. Further questioned, she vouchsafed the view that "at all the other places" where it had been charged it was "always nice and warm"! Accumulators should never indicate any very appreciable rise in temperature. It is a sure indication that damage is being done. Always insist that the maker's charging rate and instructions are adhered to.

The "B" Problem.

THE cheap and economical supply of high tension is becoming an increasingly difficult problem. In some quarters it is asserted that "quality" is unattainable with less than 500 volts at 50 milliamps. There are just as many others who can readily demonstrate that 5 milliamps at 100 volts can also do wonders.

Most listeners are bound to their peculiar receiver. As the trend of the popular type is a three-valve instrument utilising a screened grid valve, the requirements are a constant "B" of at least 100 volts and capable of a 10 to 15 milliamp. discharge. With a screened grid valve it is imperative the voltage be maintained, otherwise it may become inoperative. Other valves can still make a show down to 60 volts, but not so the screened grid. This is the modern problem.

The ideal "B" is obtained from accumulators. They give constant voltage with no material internal resistance, and a perfectly silent background. It was a matter of some comment that the B.B.C. used this form of "B" at the Radio Exhibition, but they evidently wished to incur no risks and used the best thing available.

The principal advice one can give with regard to this form of battery is to avoid any temptation to use small cells. Let 5000 milliampere-hours be your standard or leave them alone. The difficulties of smaller cells are too numerous to detail here.

One firm in 1929 made a turnover of £250,000 in dry cells for "B" purposes, and there is no question this is the most widely used form of battery. The fact that a world-wide organisation like Messrs. Siemens have placarded the hoardings of England with their new form of "B" battery is sufficent evidence of its importance. The containing zinc vessel of this new battery consists of a one-piece stamping—a remarkable advance on the old soldered containers, which gave rise to so much local action and reduced the life of the battery.

Dry cell "B" batteries should be of adequate capacity for the work they are called upon to do, otherwise the voltage will fall and the internal resistance rise too quickly. Some measurements made on 60-volt "B" units show an internal resistance of 10 ohms when new, rising to as much as 100 ohms when the voltage has dropped to 45 volts.

The other point is to ascertain if the battery is comparatively new when purchased. Dry cells commence to deteriorate immediately after manufacture. A shop voltmeter test is no guide whatever to the condition of an H.T. battery. It may drop to 20 volts the very next day. If you cannot trust your dealer send direct to the makers for your battery.

A very interesting fact not generally known is that a dry cell battery in use at its normal economical discharge rate will fall comparatively steadily in voltage from week to week. If the same battery is left and not utilised at all the time will come when its voltage also will drop, but it will not do so gradually. The fall takes place with remarkable suddenness.

This fact is of vital importance where grid bias batteries are concerned. The failure of these may ruin both "B" batteries and valve. After six months it is useless to rely on a voltage test for their condition. Change them. If they must be nursed longer, test them on a heavy load, such as a flash lamp bulb, for several seconds. The writer has known a grid bias battery to give a full voltage reading one day and to fail the next day to move the voltmeter needles, despite the fact that no current had been taken from it.

Many alternative sources of "B" have been attempted and actually marketed, but with doubtful success—at least from the point of view of economy and efficiency.

All centre on obtaining the "B" from the "A" battery, which, of course, would be the ideal method. It is rather annoying to know that the actual power required for the "B" is only equivalent to another half-ampere taken from your accumulator.

These other sources of "B" include motor generators run from the "A" accumulator; voltage transformers operated by make-and-break contacts and subsequently rectified by a valve; "B" accumulators with paralleling switch for charging from L.T.

The expense and a certain amount of worry rule these things out for most people, but they are interesting for those with plenty of money and time on their hands.

There is occasional talk of cold valves. They are not urgently required. The infinitely more pressing problem is the abolition of the need for high voltages.—