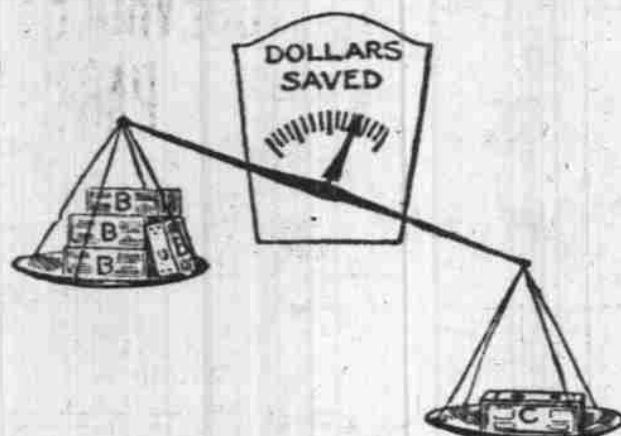


Operating Your Radio At Minimum Cost



Efficiency is the aim of radio designers and constructors—conservation of the feeble impulses set up in the antenna system by the passing ether wave and converting them into sound of the greatest possible volume with the utmost faithfulness of reproduction. But true efficiency is more than this. It is securing the greatest result with the least consumption of energy and at the LOWEST COST. A vacuum tube with a radium electrode would be more efficient than one with a thorium filament, for it would require no filament battery supply. But such a tube would cost an immense fortune and hence it would not fall within our definition of efficiency. There are, however, more practical methods of reducing radio sets operating costs, which in some cases may result in savings amounting to 75 per cent per annum.

Tubes and Batteries Chief Upkeep Cost

Obviously, the two items which contribute most to the upkeep expense of a radio set are the tubes and the batteries. How can we reduce our expenditure on these two items without sacrificing results?

Perhaps you labor under the impression that for a given result, a certain expense must be incurred. However a definite signal strength from a certain distance is not the determining factor in the matter of the tube and battery consumption. Nor is the amount of B battery current used a guide to signal strength. An efficient set drawing 5 milliamperes from the B battery may give a louder signal than an inefficient one drawing 25 milliamperes.

Saving B Batteries

Starting as the saving in tube renewals which may be effected

by judicious adjustment of filament rheostat, it is no less remarkable than the economy in B battery current which is possible—economies which make B battery costs fall from a relatively high figure, to one that is almost negligible.

Economy in B battery current is effected through control of the average grid potential. To one uninitiated in this process, it may appear a difficult operation, but it is, in practice, a very simple matter. Through the use of a "C" battery or by taking advantage of the voltage drop across the filament rheostat, a substantial saving in B battery current may be effected. Let us see what this amounts to.

As we have seen, our receiving system has for its general object, to produce the greatest variations in plate current possible with a given signal. Whether these variations take place about a small or large plate current is immaterial, so long as they are faithful reproductions of the broadcast program.

The immediate cause of variations in the plate current is varying voltages on the grid of the tube. As the grid voltage falls the plate current falls proportionately likewise, when the grid becomes more positive, the plate current increases.

Use Most Economical Size of B Battery

Two factors enter into the cost of B battery manufacture. One is materials; the other is the mechanical work of assembly, which is of course, governed by labor costs. Obviously, the larger the size of B battery, the greater the cost of materials. On the other hand, the number of operations in making the smallest 45 volt B

battery is approximately the same as that encountered in making the largest size of 4 volt B battery. Consequently there is a considerable saving effected in the purchase of a larger size battery, when a smaller one does not give economical service. It is not possible, however, to prescribe batteries of a certain size for sets having a certain number of tubes, because one factor entirely in the control of the user enters into the question. That point is the number of hours per week the set is used.

One important factor in the life of a battery is the current drain to which it is subjected. Radio Cells are designed for small current drains over an extended period. A table given herewith indicates the current drain per tube for the various plate voltages and grid potentials usually employed, as determined by the C battery. Multiply it by the number of tubes in your set and you can readily calculate the B battery drain. This will serve as a rough index to B battery selection.

Tube	Grid Voltage	25% B Battery Voltage	45 B Battery Voltage	67 1/2 B Battery Voltage	90 B Battery Voltage
WD-11-C-11 and WD-12-C-12	+1	.7	1.75		
	0	1.5	2.5	4.5	
	-1/4				3.5
UV-199 and C-300	+1	.8	1.65		
	0	1.4	2.4	4.0	
	-1/4				3.25
UV-200 and C-300	+1	.75			
UV-301-A and C-301-A	+1	.5	2.0		
	0	1.5	3.5	6.0	
	-1/4				2.0

The greatest economy is effected, when service requirements warrant, in the purchase of still larger units, known as "heavy

duty" types which are equipped with "extra large" cells. This is particularly the case with five tube sets or larger.

One enthusiastic listener—enthusiastic when not purchasing new B batteries—found it necessary to buy three sets of a small type of vertical battery per year costing \$1.75 each. His plate voltage being 90, he was spending \$25 a year. By substituting two large batteries costing \$7.50, indications at the end of the ninth month are that they will last fully 1 or 12 months. This simple step made him permanently enthusiastic about radio.

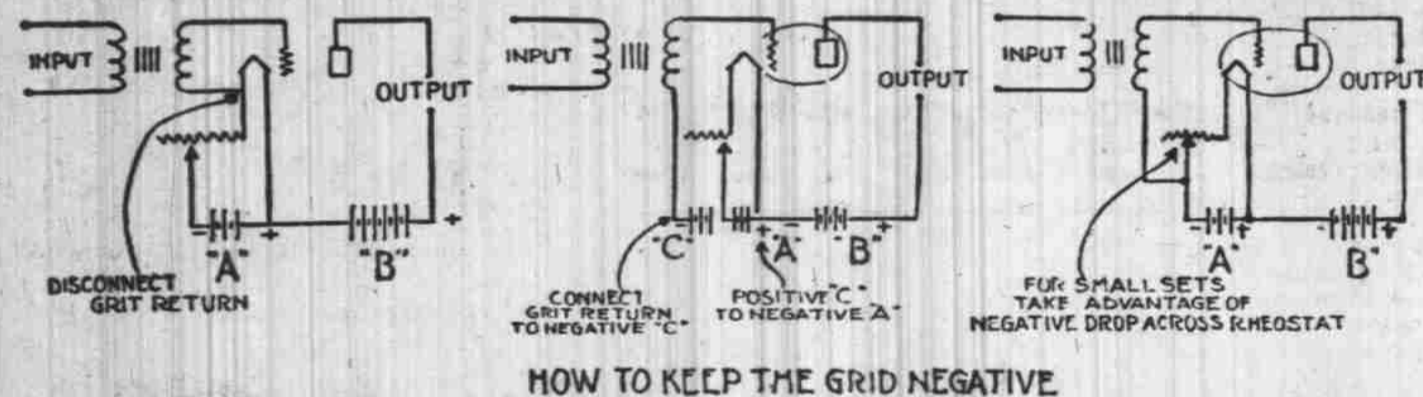
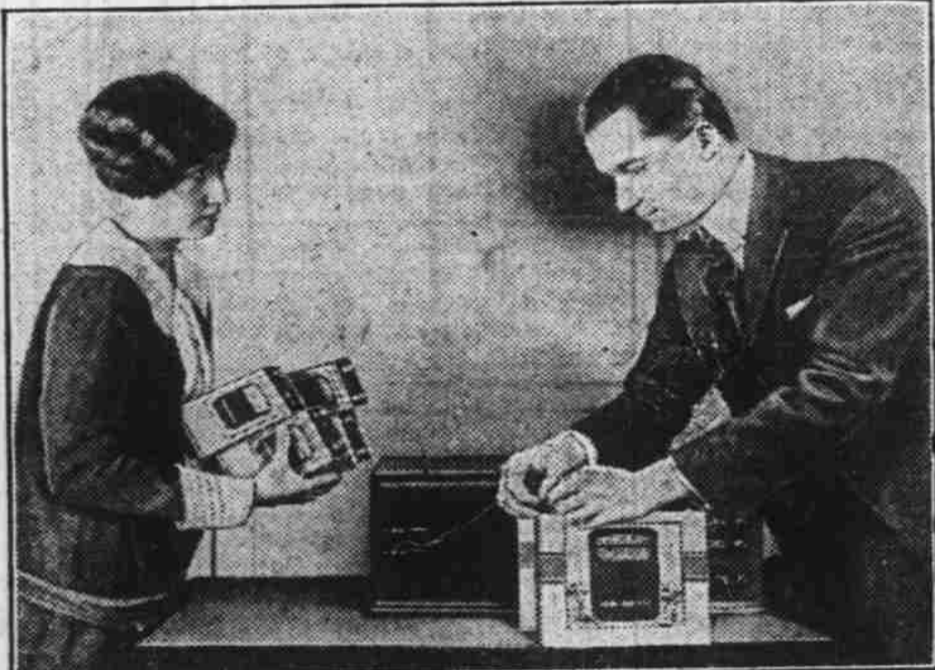
What One User Saved
Some time ago, a case of wasteful upkeep came to my attention, which is well worth citing. Radio had proved so troublesome that the owner of this set had about decided to give up radio. Hardly a week passed that he did not need a new tube or new B batteries, or to recharge his A battery. When I told him that I used a six tube set at least two hours daily and that B batteries lasted at least six months and tubes a year, he was astounded.

My friend had a self contained receiver of very excellent con-

struction. It employed four UV 201-A tubes, one radio, detector and two audio. At a voltage of 5.0 on the filament, its current drain was 10 milliamperes. Through the addition of a C battery, reduction of filament voltage from 5.0 to 4.0, not only was quality or reception greatly improved, but B battery drain reduced to a mere 2 1/4 milliamperes. This saving of 75 per cent not only effected B battery upkeep cost, but also tube renewals and A battery expense.

Those who find radio expensive should answer these questions:

1. Am I using minimum filament voltage?
 2. Am I taking advantage of the savings possible through the use of a C battery?
 3. Am I using the minimum plate voltage which will give a satisfactory signal?
 4. Am I using the most economical size of B battery?
 5. Am I buying a battery of reputable make?
- If your answer to all of these questions is in the affirmative, you can buy a new receiving set every year out of your savings.



HIGH POWER RADIO PLANNED FOR 1925

Three Methods of "Super-Broadcasting" Will Go Into Effect in Year

What is going to happen in radio in 1925?
Nearly every fan has been asking this question, for he wants to know just what kind of a set to buy or build, what kind of broadcasting will be on the air, and what kind of reception he may expect.
During the last three years, radio development has been largely in the realm of reception, along the lines of improving receiving apparatus, writes Jack Binns, in the January number of Popular Science Monthly. Now every indication points to a reversal of

the order. Instead of more elaborate super-receivers to pick up and magnify weak signals, the trend is toward super-broadcasting with power increased so that distant signals can be brought in by even the simplest receivers.

The development of transmission during the year will be along three well-defined lines, two of which will involve super-power. The third is national broadcasting through the interconnection of broadcasting stations by means of telephone land wires. All three systems will be experimental in character at first, proceeding according to recommendations of the Third National Radio Conference in Washington, D. C. Thus the use of super-power will be subject to immediate cancellation, should the fears of those who say it will tend to create a monopoly of the air materialize.

The first plan under the super-power scheme involves the erection of high-powered broadcasting stations at points removed from any thickly populated area. Such stations will be connected with

studios in the cities by means of land wires.

The second system of super-power broadcasting involves the use of short waves far below the range of the present-day receivers.

The third system is the interconnection of all existing broadcasting stations by means of a network of land telephone wires. Another important development in broadcasting that will affect every radio set during the coming year is the rezoning of the country, which will be divided into six broadcasting zones instead of five. Under this plan the northwestern Atlantic states will have stations operating on the same wave length as stations in Pacific Coast states. This can be done without interference because of the great distance between the stations and also because there is a time difference of three hours between the two coasts.

An increase in the broadcast wave-length band to include waves down to 200 meters and up to 550 meters means that the radio fan who is buying or building a new set should make sure that it will tune.

HISTORIC OXFORD

LONDON, Dec. 20—England's first venture in silver fox farming is to get under way shortly, and already 20 pair of foxes have been brought here from Canada and installed on a plot of ground near Oxford.

The 40 animals, which will be used for breeding purposes, are valued at \$40,000. The promoter of the enterprise, a former Canadian army officer, believes that the climate of England is ideally suited to the rearing of silver foxes, and hopes to expand his farm to include several hundred foxes within the next year or so.

Bars are used to keep burglars out of banks and in jail.—St. Louis Globe-Democrat.

COAST HATCHERY MEN TO ORGANIZE

They Will Meet at Seattle on the 29th, to Make Arrangements for This

For several years the outstanding national organization of poultrymen has been the Baby Chick association. It was through this association that express rates and parcel post shipping of baby chicks were made possible. Each year a few of the coast hatchery men have journeyed to the east or middle west to attend the annual meeting of this national as-

sociation and have returned enthused with the organization's accomplishments. Many have expressed the desire of organizing a coast association that would affiliate with the international. Now the opportunity is here and should be taken advantage of by all who are interested in the baby chick business. Mr. Jay Todd, manager of the Queen Hatchery, Seattle, has, at the request of Mr. H. H. Knapp, president of the International association, called a meeting of the hatchery men in Seattle on the 29th of December for the purpose of forming a coast baby chick association, to affiliate with the international. Mr. Knapp is now on the coast and will attend the meeting to assist with the organization. The meeting is called for 10 o'clock in the assembly room of the Fry hotel, Seattle Washington.

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STORAGE BATTERIES

DANGER IN FLYING RAPIDLY VANISHING

Army Aviation Chief Says Risks are Fast Being Overcome in Traffic

NEW YORK, Dec. 20.—Major General Mason M. Patrick, chief of the air service of the United States army, believes that air craft transportation systems for passengers, mail and goods can, under proper conditions, compete for safety and reliability with the standards of railway train service or even surpass them. He made that statement this afternoon to the 18th annual convention of the Association of Life Insurance Presidents in urging life insurance companies to give consideration to the granting of insurance at regular premiums on the lives of travelers by air and the operators of aircraft, declaring also that such insurance would greatly aid the development of air transportation. General Patrick, who learned to fly when about 60 years old, often uses the air ship to save time in the transaction of his official duties. "When invited to address this meeting I must confess that I was somewhat cheered and elated by the knowledge that an association of insurance men was at last willing to take some kind of a chance on an aviator. For my part I am going to venture the bold statement that before very long air traffic, air transportation, will be on a par with other transportation insurance risks; otherwise history will have reversed itself.

Speaks on Development.
"I want to touch for just a moment upon the military phase of the development and use of aircraft. The experience of the World War has convinced all who have studied the matter that in future wars aircraft will play an important or possibly a decisive part; that the only adequate and effective defense against an air attack is an air force of your own; and hence such an air force properly equipped, highly trained, must be part of our military establishment. So far as our national safety is concerned, it is my firm opinion that an adequate air force is the best peace insurance policy that this country can obtain.

Aircraft as weapons of warfare yearly become more swift, more powerful, more destructive; but it is in aircraft as agents of commerce, carrying the world's goods and transporting the peoples of one community to another, that the deeper significance lies.

Lower Premiums
"Inevitably the time will come when the life insurance companies will be willing to grant insurance at regular premiums on the lives of travelers by air and the operators of aircraft. This would greatly aid the development of air transportation and I hope that this association will give careful consideration to such an important matter. It is a fact that much has been done during the past few years to

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Sonora Radio Tubes, each \$3.50

GOODE ELECTRIC COMPANY

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1136 Jefferson St., Salem, Oregon

make flying less hazardous. This involved the consideration of many factors, among them the improvement of the equipment, laying out and marking air routes and the creation of proper facilities along them. With landing fields at proper intervals, many of the risks of flying would be eliminated.

"That there are comparatively few casualties suffered by the air mail is marked evidence of the safety with which a well designated air route, one along which there are enough landing fields, may be traversed. These air mail pilots flew over 2,000,000 miles without a single fatality. On the British and Dutch air lines during the past three years the average number of passenger air miles to reach passenger fatality was 2,662,000. Prior to 1913 for a number of years there was an average of one passenger casualty on our railroads for about every 2,000,000 passenger miles. "In fact it is believed conclusive evidence already exists that air travel under proper conditions can be conducted with a degree of regularity, safety and dispatch sufficient to establish it as a significant additional channel of commerce in the transportation resources of a nation."

SUPPOSE THEY HAD TO PAY FOR IT

Missouri newspaper men have appointed a committee to devise ways of combating the efforts of politicians to get free newspaper space. In view of the tendency to combat evils by statute, we suggest that it be made corrupt practice for any candidate to get more than \$10,000 worth of newspaper mention, measured at minimum space rate.—National Advertising.

Denmark is the greatest bicycling country in the world today, but Mr. Ford has started in, with his new branch factory in Copenhagen, to make them ride on four wheels instead of two.—The Pathfinder.

Woe to the man with a weak heart! "Yellow aircahs" are weak in Chicago. Watching the antics of a taxi fare-meter on terra firma is a big enough jolt for

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Brondes Head Phones, 2000 Ohms, head set, standard type, regular price \$6—ours \$4.75. Brondes 2000 Ohms, head phones, \$8 value—our price \$6.25. The fan steel Bakelite Battery charger—none better—regular price \$20—ours \$18.75. Bradley grid leak, with condenser, regular price \$3.20—ours \$1.85. Radios—Neutrodyne, 5 tube kit, regular price \$72—our price \$62.50. The Rico kit, Boys Friend, regular price \$15—ours \$13.75. We build both the Neutrodyne and Super Heterodyne in our shop. Get our prices.

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