

CARE OF BATTERIES

SOME VALUABLE HINTS

The following valuable hints on batteries were recently given by Mr. Preston Billing from 2YA:—

If really satisfactory results are to be obtained with distant stations the following points must be carefully attended to. Commencing with what is termed the A battery (in case there are some listeners who are not certain which is the A battery, it is the battery which furnishes the power for lighting your valves), this is usually a wet or accumulator one of 6 volts pressure. This battery should be kept fully charged; also it is advisable to purchase one of a reasonable capacity in amp-hours, as the discharge will be more uniform and will last longer with a given charge. The condition of charge or otherwise of this battery may be best ascertained by means of the hydrometer. This device measures the density of the acid in the cells and therefore gives a reliable indication of the state of charge, as the density of the sulphuric acid is proportional to the amount of charge in it. Most of these hydrometers have a range of readings from 1150 spg. (specific gravity) to 1800 spg. Of course, all batteries are not filled to the same density—you can ascertain from the label on your battery the particular acid density at which it should be filled.

For the sake of demonstration, supposing the battery was filled with an acid with 1750 spg., then when this particular battery is fully charged the hydrometer will read 1750 spg. or thereabouts. It should not be discharged below 1175 spg. If the battery should be left in this condition for any length of time the plates will become sulphated. Should this occur it will be found difficult to eliminate the condition. It will also be found the battery has lost a considerable amount of its former capacity on account of the sulphate deposit.

Battery capacities are rated in what are known as amp-hours, and I will endeavour to explain what is meant by this term. If your set is a 5-valve one and uses valves of the 201A type the approximate current consumption would be 14 amperes. If your set is in use for, say, three hours an evening, this would give us a total of 3 multiplied by 14, which gives us 33 amp-hours' consumption for the evening.

Many listeners have their own battery chargers, and in order to give them some idea of the time required to replace the charge back into the

NOTE BY "MEGOHM"

The following paragraph was omitted from the Browning-Drake article last week.—It should be noted that the lower the H.T. voltage intended to be used, the more turns will be required on the tickler in order to obtain oscillation at the higher wave-lengths. Turns on the tickler coil must be close together, not spaced as for "low-loss" winding.

The filament consumption of the P.M. 3A valve was given as 1 amp., the decimal point having been omitted. The actual current required is .1 amp. at 4 volts.

Battery the following information will be found very helpful. If your set is in use for 16 hours per week and consumes current at the rate of our previous example the total amp-hour consumption for the week will be 20 amp-hours. To replace the charge in the battery, add one-third of the total amp-hours consumed over the discharge period. In this instance we will call it 7, which, added to our previous 20, gives us a total of 27 amp-hours. If your charger operates at, say, a 2 ampere charging rate, it will take 27 divided by 2, leaving 13½ hours of time to replace the current used.

Always keep your battery terminals clean, likewise the top of the battery. Unsatisfactory results are often caused through neglect in this respect, especially when clips are used to connect with the battery. These clips should be cleaned frequently and wiped with vaseline to keep the acid from corroding them. Do not forget to add distilled water, as evaporation takes place, and the tops of the plates should not be allowed to show. Sulphuric acid should not be added under any circumstances unless acid is actually split or else only on the advice of a battery expert.

With reference to the B batteries, these are of two types: (a) the dry, (b) the wet or accumulator. The majority of sets seem to be equipped with the (a) type. They have the advantage of requiring little attention excepting renewals, which take place at intervals depending on the B battery consumption in milli-amperes of the particular set in use. The use of a C battery is an absolute necessity, especially as the B battery voltage increases. This battery has the effect of reducing the drain on the B batteries and results in purer reproduction. You can test your own B batteries if you have at hand a voltmeter of suitable range. A new 45 volt block will, of course, show a 45 volt reading or perhaps slightly more. The battery should be discarded when the pressure drops to 37 volts.

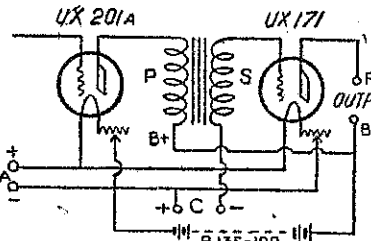
Another method of testing is to employ a low reading ammeter of, say, 0.3 amperes scale reading, and of what is known as the moving iron type. Each block should be momentarily shorted with the ammeter, and should they be in good condition the instrument will be deflected smartly across the entire scale. This method must not be practised too often, or else the batteries will suffer. Also, this latter test must not be applied under any circumstances to accumulator or

AUDIO-FREQUENCY AMPLIFICATION

COMPARISON OF THREE METHODS

In continuation of Mr. Preston, B. Billing's weekly talks on radio matters from 2YA, the following was delivered at Wellington on Monday, September 19:—

In the case of low frequency transformer coupling there are two windings on an iron core. These two windings are insulated from each other; and they are connected to the vacuum valves as shown. When an electric impulse of a changing nature (which may be designated as a changing voltage) is applied between the grid and filament terminals (these are marked G and F) of the valve, a changing electric current results in the primary winding of the transformer. The passage of a changing current in the primary winding sets up a magnetic field within the iron core, which the primary and secondary windings surround. This changing magnetic field will then, in its turn, induce an increased electric pressure in the secondary winding of the transformer, the increase depending on the turns ratio of the transformer in use. If the transformer were per-



TRANSFORMER COUPLING

fect the voltage would be the image of the voltage applied to G and F of the first valve. In a well-designed transformer it is possible to multiply voltages simply by constructing the device in such a way that there are more turns of wire in the secondary than in the primary winding, in somewhat the same way that a lever may be used to multiply forces. It is this characteristic of a transformer which makes it very suitable as applied to a low frequency amplifier. It is not only possible to obtain the (voltage) amplification of the valve itself in this way, but it is also possible to obtain even more voltage amplification by having a turns ratio on the transformer greater than one. For example: A transformer marked having a turns-ratio of 2 to 1 is one with twice as many turns on the secondary as on the primary. The impedance method for coupling two vacuum valves does not have the same property of multiplying voltages possessed by the transformers. With the same valves it is impossible then to obtain as much amplification per stage by this method in comparison with the transformer coupled combination, and for that matter the resistance coupled combination is in the same position, perhaps worse. Using the so-called high "Mu" tubes, however, this comparison is much more optimistic. Resistance coupled and, in some cases, choke coil amplification, is most effectively accomplished by the use of tubes having a high amplification factor or "Mu." With such tubes the amplification per stage approaches the value obtainable in transformer coupled amplification.

Personally, I would place the relative methods for securing inter-stage low frequency coupling in the following order as regards their all-around qualifications. Transformer coupling first, with this method in use if the transformers are of good design and construction, and the valves are suited to them or to the loads which they are to handle, the B and C battery values being carefully selected, this particular method leaves nothing to be desired from any point of view. The impedance coupled method is next, if the chokes are of good design and the correct value of condenser is inserted between the grid of the next succeeding valve, also a grid leak should be provided for between the grid of the next succeeding valve and filament. This method gives very good reproduction in my opinion equal in quality to the transformer coupled combination, but it is not so powerful, stage for stage, using the same valves and battery voltages. With regard to the resistance coupled method, you will find that this method is considerably weaker than either of the two previous methods, in fact, it will take three very good stages of resistance coupled amplification to even equal two of either the foregoing methods. The tone from the resistance coupling is quite all right, but in my opinion at its best it is not the equal of the transformer operating under the conditions which I have already enumerated.

Even assuming it to be the equal there is still the weakness of its per stage, and in addition this method is rather wasteful, as it requires considerably more B battery pressure to secure the best results from it. Taken all round, then, the transformer method is still equal to any, and a good deal stronger than either of the other two methods, but do not use too high a ratio of turns with the transformer method if the best results are desired. The prime idea should be quality of tone.

wet B batteries. You may test the condition of your wet B battery by means of the hydrometer as advised with the A battery. It is highly important for the B battery connections of either type to be kept clean in order to ensure a steady flow of current.

The Children's Corner

By "ARIEL"

Dear Radio Children,—The result of our last Painting Competition will be announced next week, and it is going to be terribly hard to decide which is really and truly the best. The work sent in so far is much better than any we have had before, so I really think you have been making use of the hints on painting I tried to give you in one of my letters. Anyway, the result does you all credit; my one regret is that the painted pictures cannot be reproduced in our corner. Never mind, we have the satisfaction of seeing our Zoo grow in beauty(?) and splendour, one by one, like the animals walking into the Ark. I rather think Mr. Noah would have been a wee bit staggered if some of our specimens had strolled into his menagerie instead of coming to our zoo!

Are you all very interested in the Carillon that is soon coming to Wellington? Won't it be wonderful to hear it broadcast all over New Zealand? The boys and girls of Canada had a wonderful time on July 1, which, as you may know, was the Diamond Jubilee day of Canadian Federation. A new Carillon has been installed in the Victory Memorial Tower of the House of Parliament at Ottawa, and the very first peal was rung by the King, by means of an electrical signal from London. Isn't that wonderful to think of? The peal was broadcast all over Canada, so that millions had the opportunity of hearing it.

So many of my boys and girls write and ask if they may "join" our corner, so I have decided to give all of you something very definite to "join." I have been thinking about something you would all love to belong to, for some time now, but it isn't quite ready yet and I'm not going to breathe a word till it is. However, quite, soon now I will tell you about it. Aren't you curious to know what it is? It's a lovely surprise for you, and if you all keep your ears and eyes wide open (do ears open?) you'll know very, very soon. I hope you will read the notice in our Corner about the 3YA Uncles, so that you will know when to listen for them. Thank you all for your letters, My love to you,

—ARIEL.

3YA UNCLES

This week the two uncles at 3YA will change their nights. At Uncle Jack's request, and by arrangement, he will take the children's sessions on Mondays and Thursdays, while Uncle Sam will be on the air on Wednesdays and Saturdays. Uncle Sam also takes the children's service on Sunday evening.

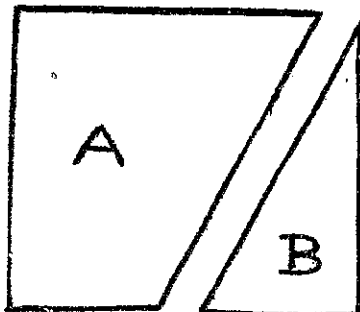
PUZZLES AND TEASERS

SOMETHING TO DO.

1. Cut out five pieces of cardboard of the same size and shape as A in the diagram, and another five pieces the same as B. Then see if you can fit them together to make a perfect square. Every piece must be used, of course.

2. Draw nine dots on a piece of paper just as I have done here. Take your pencil and see if you can cross out all the nine dots with four straight strokes. Each of the four strokes must be a straight line, and you are not allowed to take the pencil off the paper until you have crossed them all out, but you can begin and end wherever you like.

Solutions Next Week.



MORE MISSING E's

There are seventeen missing e's waiting to find their proper places to make a sentence containing good advice about the Ten Commandments. Can you find out where they go?

PRSVRYPRCTMNVKPKTHSPRC
PTSTN.

DOUBLE ACROSTICS

Do you know who made the very first double acrostic puzzle, and how long ago it was made, and why they became so popular? It is said that the first double acrostic was composed by an English clergyman in 1856. Single acrostics, of course, are years and years older than that. Double acrostics became very popular because they were a favourite pastime at the Court of Queen Victoria, and also because she herself was one of the first inventors. She used to write them at Windsor for the Royal children. Here is one of Queen Victoria's double acrostics:—

A city in Italy.
A river in Germany.
A town in the United States.
A town in North America.
A town in Holland.
The Turkish name for Constantinople.
A town in Bothnia.
A city in Greece.
A circle on the globe.

The initials form the name of a town in England, and the initials (reading upwards) tell you what that town is famous for. Who is good at geography? Get out your maps and see how many of you can send me correct solutions. Have you ever wondered why it is called an "acrostic"? The word is of Greek origin, and its meaning is "first letter verse." It's always as well to know how things come by their names, isn't it?

AN ALPHABET PUZZLE

Here is an absorbing puzzle for the bigger Radio children. It requires quite a lot of thinking, so just sit down quietly one wet day when you are badly wanting something to do and try to make a perfect sentence out of the twenty-six letters of the alphabet. It is impossible to use each letter only once; there are not enough vowels, but try to form a sentence with the fewest possible extra letters. Here is an example for you: "Pack my box with five dozen liquor jugs." This sentence has six extra letters—one e, two i's, two o's, and one u. Can you improve on it, and use less repeated letters? Send me your efforts. It will be interesting to see who can make the best complete sentence.



Photo, Webb.

ANNA ROSE HALL, wife of Captain J. S. H. Hall, the newly-appointed principal of the Children's Department of the Radio Broadcasting Company, to whom listeners will look for organisation and improvement in the children's sessions from all centres.

RIDDLES IN RHYME

"Charge, Chester, charge! On Stanley, on!"
Were the last words of Marmion.

If I were put in Stanley's place
When Marmion urged him to the chase,
In me you quickly would descry
What draws a tear from many an eye.

Answer: ON, I, ON.

I plucked them in the forest as they grew;
I held them in my hands and gave to you;
But though you took and cast them on the floor,
They cling unto my hands for evermore.
Oh, could I but behold them, they'd be freed,
And I could give them unto those in need.

Answer: Palms—alms.

BURIED TOWNS

The names of some well-known towns are buried somewhere in these sentences. How many can you find?

1. The river was lovely on summer nights in spite of midges (two towns).
2. Why she should choose such a drab rug, Esther could never discover (one town).
3. He spoke in a whisper that could be heard from end to end of the attic (two towns).
4. Often by leaving off your tunic or knitted sweater you catch cold (two towns).
5. In the acre we planted last November nearly every ear of wheat rotted (three towns).

A BED-TIME STORY

MOUSEY BIRD.

There once was a mouse who lived at his ease in the wainscot of a small house, where there were no cats. He really ought to have been very happy, because he knew how to get bread-crumbs and sugar, and all sorts of nice things from the larder, without being noticed. Every morning, as he started out to forage, his neat little wife would kiss him good-bye at the door hole, and warn him against traps; and every time he came back she would smooth his coat and make sure that his paws were quite dry. But one day, in the meadow, he saw a whole flock of swallows flying a-s-l-uming above the grass. So graceful and beautiful they looked that Mousey could think of nothing else. "I must fly; I must be a bird!" was all he could say, and he wandered about repeating this over and over again. "I must fly—" "Certainly," said a piping voice so close beside him that Mousey jumped. It was a gnome who lived in a tree at the foot of the hill and did all sorts of magic. "Certainly," he said. "I can easily fit you with a pair of wings."

Mousey was so delighted he could hardly squeak. "Oh, he cried, at last, 'I shall be a prince of birds.'" The gnome took his magic wand and moiled and toiled, and toiled and moiled, for quite three minutes.

"There," said the gnome, proudly. Mousey sprang up, and, wild with excitement, flew off to the swallows. He had got wings, after all, but he didn't know he was only going to be a bat!

"Who are you?" asked the swallows. "I am a swallow," said Mousey. "I am prince of swallows."

The real swallows began to laugh. "Ha-ha-ha! You are only an ugly Mousey-Bird! You had better hide during the daytime, or you will have every bird in the sky laughing at you. Ha-ha-ha!"

"Oh, dear," sighed Mousey. "If they are all going to laugh at me like that, I had better be a nightingale, and come out after dark." He found a corner of a barn to hide in, and when it was quite dark flew to the nightingale wood.

"Who are you?" said the nightingales. "I am a nightingale," said Mousey. "I am a prince of nightingales." The real nightingales were not quite sure. "In that case," they chorused, "you must have a better voice than any of us. Let us hear it at once!"

Mousey opened his mouth, but the squeak that came out of it was so thin and high that if it had not been a sound you would have said that "was an invisible squeak." The nightingales gurgled and nearly burst with laughter.

"Ha, ha, ha," they twittered, "you are only a ragged Mousey bird, without any ear for music. You had better not come out at night, or every nightingale and owl will make fun of you. Ha, ha, ha!"

"Oh, dear, oh dear me—" sighed Mousey, more deeply than before. I may not come out by day, and I may not come out by night, and everybody's laughing. I had better be a mouse again."

He flew back quickly to his mouse-hole and peeped through the door. "Who's there?" said the shrill voice of his neglected wife. "It's your long-lost Mousey," squeaked the tramp. "and—and I am the prince of mice," he added, very weakly indeed.

"Prince, did you dare to say? Come inside at once!"

Mousey scrambled and scratched, but in vain. His wings were too big—they wouldn't go through the door-hole. His wife came scurrying up. "Who's this?" she cried, and then burst into tears. "Oh, oh," she cried. "You are not my husband at all. My Mousey kin had such a fine tail and whiskers, and you have none at all; he had not nearly such big ears, and instead of those clumsy wings, my Mousey-Pousey had neat little paws for me to dry. I must have some paw to dry. Oh, oh, I must get another husband."

Poor Mousey did not know what to say. "Won't I do?" he waited, quite humbly.

"No, indeed," decided his wife severely, looking at him with a needle eye. "I would much rather have a good mouse than a bad bird, and you—well, you're just a Mousey-Bird." Mousey flapped sadly away. "I'm just a Mousey-Bird," he said, and then, quite by force of habit, "I am a prince of Mousey-Birds!"

Mousey wondered why on earth he hadn't thought of that before. He forgot about the birds and the mice, and by day, by night, hung head down-wards in a corner of his dusty barn in the very best Mousey-Bird manner. Ah, but at dusk how he danced and ducked and twirled in the funny velvety light! He snapped at gnats and flies, and squeaked with delight so finely that no one could hear him. It certainly was an invisible squeak, and he certainly was a prince of Mousey-Birds!

And in the circumstances I think it was the very best thing he could be—don't you?

MISSING WORDS

In the verse below fill in the four missing words. Each of these words is made up of the same four letters arranged in a different way in each case:

A old woman on bent,
Put on her and away she went;
"Ah," said she, as she walked away,
"How shall I manage to to-day?"

Answer Next Week.

There was an old person of Hurst,
Who drank when he was not thirsty.
When they said, "You'll grow fatter,"
He answered, "What matter?"

Sent in by George Best.