

THE POWER VALVE

A DESIRABLE ADDITION.

Although many different kinds of power amplifier valves have been on the market for some years, it is surprising how little these valves are used by broadcast listeners. It may be that this is because the cost and the current consumption of power amplifier valves are higher than those of the average general purpose valve, but nobody who has used a power amplifier will question that the extra first cost and operating cost of the power amplifier is justified by results. Power amplifiers are intended for use in the final socket of a receiver designed for loudspeaker operation. They are designed to handle a greater undistorted output than an ordinary valve, and they should always be used when fairly loud signals are required. In many sets, from which signals are not very loud and from which loud signals are not desired, the power valve will not make any great increase in the volume of sound when it is used, but it will nearly always effect a marked improvement in the purity of the music from the receiver. The extra cost of the power valve is largely offset by the fact that its life is longer than that of an ordinary valve. It is desirable to use a separate B battery plus connection to the power valve, so that a much greater voltage can be applied to it than that used on the first audio valve. A "C" battery connection is also necessary.

LONG LOUSPEAKER CORDS

TO OVERCOME DIFFICULTIES.

The simplest method for wiring a loudspeaker to a distant set is merely to connect a length of electric light flexible cable between the set and loudspeaker. This method works fairly well if the leads are not too long. If they are of too great length the upper musical notes will be weakened, owing to their being shunted away by the capacity formed across the loudspeaker terminals, between the two long twisted wires. A considerable length can be used, however, without noticeable loss if ordinary flexible cable is used. If twin bell-wire is used the higher tones are so reduced that very disagreeable distortion is introduced, and a muffled sound is given to speech.

The reason is that the capacity of this type of wire is high. Apart from this, it is not desirable to run wires all over the house that carry a high direct current potential (with respect to the earth), as there is risk of fire if a short-circuit occurs, due to some mechanical scraping-away of the insulation. This can easily be guarded against by the use of a choke-filter output circuit (a siftron), or a transformer; and for various other electrical reasons, such as the question of magnetic saturation of the iron cores of loudspeakers, a device of this kind should always be employed whenever a power tube is used in the output stage of the receiver. The use of flexible cable will successfully overcome the capacity difficulty.

CAUSES WEAK RECEPTION.

As long as the activating substance remains in the outer layers of the dull-emitter filament, the valve will work normally, but, with constant use, the substance tends to burn out of the filament, and the filament thus becomes exhausted and fails to carry a current across the interior space of the valve in the ordinary manner. The result, of course, is a steady reduction of signal strength. In most cases, when a filament has become exhausted in this way, it can be restored for several hundred hours' additional use by lighting the filament to full brilliancy and burning it for an hour or two with the high-tension battery detached from the set. This process has the effect of driving portions of the activating substance from near the centre of the filament, where it is useless, to the surface layers.

METHOD OF REVIVING.

The best way for the inexperienced listener to test a valve for filament exhaustion is always to have handy a new spare valve. If it is thought that one of the valves in the set is exhausted in this way, it can quickly be tested by substituting the new valve. An improvement in the working of the set indicates that the valve was at fault. The process of filament exhaustion is not rapid, and after a valve has been in continuous use for some months signal strength has fallen considerably, without the owner of the set realising it. A surprising improvement in the behaviour of a receiver can, therefore, often be brought about simply by replacing the valves, or by lighting them up for a while with the high-tension (or "B") battery disconnected from the receiver.

Our Mail Bag

A Query Answered.

R. S. Crawshaw (New Plymouth).—The short-wave station broadcasting a football match, which a correspondent picked up on Sunday morning, November 27, was 2XAD, New York, relaying station WGY of that city, on short waves. The football match was the annual Army v. Navy match. The transmission was very clear, and I could work the speaker with it at times. The announcer apologised for the noise of transmission from the football stadium, which he said was due to the noise of the great crowd and the roar of aeroplane engines. The cheering of the great crowd was very plain, and the West Point Band could be heard at the

USE GRID-BIAS

BETTER TONE; SAVES BATTERIES

Among home-made wireless receivers no fault is more common than failure to provide effective grid biasing (with a "C" battery or by another method described below) for the valves in the audio frequency amplifier. To operate effectively amplifier valves must be so adjusted that the grid is at a potential lower by several volts than the filament, and the greater the pressure which is applied to the plate of the valve the greater must be this negative bias on the grid for effective operation. Proper grid bias makes three important improvements in the set. It almost invariably increases the purity of reproduction, it increases signal strength, and it makes the high-tension battery last longer by reducing the amount of current the amplifying valves draw from it. Grid bias can be obtained in two ways. The average receiver is operated from an A battery, which gives a higher voltage than that needed by the valves, and the voltage from the battery is "broken down" to the correct value by means of rheostat. For instance, a three-cell lead accumulator, such as is used to operate the average five-volt filament valves, gives a pressure when fully charged of 6.5 volts. This means that a pressure of 1.6 volts must be absorbed in the filament rheostat. This pressure, or, as it is termed, voltage drop, across the rheostat can be used to bias the grid of the valve. Great care to see that connections are correctly made is necessary in employing it.

POSITION OF RHEOSTAT.

The rheostat must be inserted in the terminal from the valve filament, which goes to the negative (marked —) terminal of the A battery. The lead which is taken from the secondary of the inter-valve transformer to the filament circuit of the set is then connected to the terminal of the rheostat, which is connected to the battery. Care must be taken that the connection is made to this terminal of the rheostat, and not the terminal connected to the filament. For pressures of up to 40 volts of high tension battery this bias will be sufficient. If more than a 40-volt B battery is used a special biasing, or C battery, should be included in the set. Small units, giving a total pressure of 4.5 volts, can be purchased as C batteries. To use these batteries the positive terminal (marked X) is connected to the negative terminal of the A battery and the filament return from the transformer is connected to one of the two negative taps on the C battery. One of these taps is at three volts and the other 4½ volts are on the C battery, and the lead should be tried on each in turn to see where best results are obtained.

SUNSPOTS AID RADIO

AMERICAN PHYSICIST'S STORY.

Radio signals almost strong enough to burn up the aerial may be expected during the next few months, if theories of physicists of the Bureau of Standards Radio Laboratory hold true, according to a Washington dispatch to the Chicago "Herald and Examiner."

The theory belongs principally to Ivy Jane Christia Pearl Wymore, assistant physicist in the laboratory of Dr. L. W. Austin, who conducts special observations on the signals of transatlantic stations.

Ivy Jane, of "The Little Sun Spot" of the Radio Laboratory," as she is called, has been working on sun spot data for a long time. Her job is the correlation of sun spot and radio signal strength records.

CAREFUL OBSERVATIONS.

At regular intervals, Ivy Jane is furnished with a fairly complete account of sun spot activities. At the same time, she gets a chart, which shows the rise and fluctuation in the strength of radio signals for the same period. The two are compared, and Ivy Jane is supposed to draw conclusions.

"During the past few months when there has been a steady increase in sun spots," says she, "the outstanding thing has been the remarkable increase in the strength of signals, with an attending decrease in atmospheric interference."

"The period of maximum sun spot activity is just approaching. The spots approach their maximum in eleven-year cycles, and late in 1928 the sun probably will be spotted like a leopard."

"If the strength of radio signals continues to increase with the increase in sun spot activities as it has been doing, it shouldn't be hard this winter to pick up a number of foreign broadcasting stations."

close of the match, which ended in a win for the Army by 15 points to 9. The station closed at 4.40, New York time, which was about 10.20 a.m. our time. I also had this station the two previous Sunday mornings with football broadcasts, Harvard University being one of the teams on one occasion. I did not hear this station last Sunday morning (December 4). The conditions may have been unfavourable or the football season may have ended in America; but this station is well worth listening to on Sunday mornings when it is going.

In conclusion, just a word of appreciation on the Otaki Maori College concert, which was one of the best concerts I have received from your station, both in quality and transmission, which was particularly good till within the last half hour, when fading and mushiness set in. Let's have some more of this popular type of concert instead of the usual preponderance of "high-brow" music, which is far too much a feature of all New Zealand stations.

The Children's Corner

By "ARIEL"

A MESSAGE FROM RADIOLAND

Dear Radio Children,

I expect you have all been very busy writing to Father Christmas and lots of nice kind uncles and aunts and other people to thank them for all the lovely presents you were lucky enough to get in your stockings! I wonder if you have ever thought about who first learned to write, or what people did before writing was invented? It's rather a wonderful thing to be able to put on paper the things that you feel inside you, isn't it? Once upon a time nobody could write at all—there was no such thing as writing. Thousands of years ago no one had time to write, they were for too busy hunting for food and fighting wild animals, or making clothes out of skins. When a farmer wanted to count his sheep he couldn't, for there weren't any figures. So he used to make a scratch on a piece of bone or wood for each sheep, and that's how he knew whether any were missing. These scratches were the very first attempts at writing. Then later came word "pictures," just very rough drawings—for instance, if a man wanted to send a message to a friend asking him to come to his farm at midday, he would draw a picture of his house and his sheep and the sun high in the sky and anything else he could think of to make it quite plain. But I expect most of you have read "How the Alphabet was Made" in "Just So Stories." If you haven't, ask Daddy to buy them for you—it's ever so interesting to read how Taffy and her Daddy made lovely pictures which afterwards became the letters of the alphabet we use to-day.

Another way of counting in those "high and far off times" was to tie a knot for every animal in a thin piece of leather like a string; so that now when you tie a knot in your handkerchief to remind you of something you mustn't forget you are doing just what your wild and woolly ancestors did thousands of years ago; and when you draw pictures and things all over the newly-papered walls and nice, clean paint, you are just repeating what they did—only they hadn't anyone to tell them they mustn't! So you see how wonderful it is to be able to write on paper every thought that comes into our heads; and we must never, never forget to write and thank people when they are kind to us.

I hope you are all having the happiest of happy holidays. My love to you.

ARIEL.



BOY SCOUTS WHO CONTRIBUTED TO ONE OF BIG BROTHER'S PROGRAMMES AT 3YA RECENTLY. There are two troops here: No. 4 Linwood, under Scoutmaster Stokes, and No. 5 Edgeware Road, under Scoutmaster Moore. "Big Brother" (Mr. R. J. McEldowney) is secondat the back of the left of the photo. Next to him is Miss Iris Mason (piano solo). Mr. P. Hall ("Peterkin"), a writer of original stories, is holding manuscript. On the right at the back is Major Ashworth.

HOLIDAYS

What crowds of lovely things there are to do in the holidays! Out of doors there are so many interesting things to see, at the beach or in the country, and so the sunshiny days simply fly past. But what about the long days indoors when it rains from morning till night? We generally get a few of these during the holidays, and perhaps we are almost inclined to wish for home and the toy cupboard or some of our favourite looks. But these days can be made to fly just as happily as the fine ones if we settle down to something, instead of wandering to and from the window and grumbling at the weather. We don't carry many playthings with us on a holiday, but pencils and paper can always be found, and a very jolly game is "How Many?"

Each player has a certain word—a long one—written at the top of his paper, and out of the letters contained in this he makes as many other words as he can. "Comfortable" seems a very ordinary word, but you can make more than a hundred others out of it in a very few minutes, easy-to-spell words of two, three, four, and five letters, and it is surprising when the lists are read out how many words one person has got that another has never thought of.

Another good game is "Rhymes." You don't need to be a poet to play this, and you will get such fun out of it. The players decide on a question and two words which they write at the top of their papers. Then each writes a rhyme which must answer the question and mention the two words. Some children were playing this one day, and the question was "Where have you been for your holidays?" The words to be used were "donkey" and "side." Most of the players struggled for a long time, writing lines upon lines of poetry, but one mischievous-looking boy, after scribbling a few words, leaned back in his chair and smiled in a satisfied way. When the papers were read this was his rhyme—

"I've been for a ride
On a donkey's side!"

Then another lovely game for a wet day is shadow plays. It is so easy to make a shadow theatre, for you only need a large dust sheet and a good, strong lamp. Fix up the sheet over a clothes line tied across one end of the room. Behind the sheet is the stage and the other side is for the audience. You don't need any scenery or stage property, but you must be sure to choose fairy stories which have plenty of "action" in them, because it is all "dumb show." The actors must stand as close up to the sheet as possible, and, of course, have the lamp on a box or chair behind them. It is ever so easy, too, to alter your appearance. For instance, if you are acting "Beauty

and the Beast," just tie a fat cushion round your middle and cut out a beast's head in cardboard to hold against your head, and you'll be surprised at the "beastly" effect.

When you are tired of acting, try making a Balkan dwarf. Lots of fun can be had showing him to your friends, and it's ever so easy to do. All you need is a sofa, some cushions, a sheet or a tablecloth, and some burnt cork. The girl or boy who is to be the dwarf lies full length under the sofa with the head only appearing. The table cloth is draped on the sofa, and over the lower part of the face, covering up to the bridge of the nose. A new nose and mouth are drawn on the forehead with burnt cork, so that an upside down face is made. It is a good idea to have for a model a girl, or a boy with fairly long hair, because it makes such a lovely beard. An old coat stuffed with cushions make a body, and an old pair of shoes should poke out at the bottom of the coat. Of course, you can dress the body just how you like, but keep it quite short and dumpy, because, "remember, it's a dwarf."

This is quite good fun to try on people who have never seen a Balkan dwarf.

THE FOX AS SHEPHERD

A NORWEGIAN FOLK-TALE.

Once upon a time there was a woman who went out to hire a shepherd to guard her animals. She went on and on, and while going through a forest she met a bear.

"Where are you going, old woman?" asked the bear.

"Oh, I am just going to get a shepherd to guard my beasts," answered the woman.

"Will you hire me to guard the beasts? I am a fine shepherd!" asked the bear.

"All right," said the woman, "but how will you call the animals together when it is time to get them home?"

"Oh, I shall just cry: 'Oo-oo-oo!'"

At that the old woman got so terrified that she closed her ears with her hands and said, "No, no! That will never do! The beasts won't come together; they will all run away."

And she went farther to look for a shepherd and met a wolf.

"How do you do, old woman? What are you doing here in the wood?" asked the wolf.

"I want to get a shepherd to guard my beasts, but cannot find any," answered the woman.

"Oh, I can be a nice shepherd! Would you not hire me?" said the wolf.

"Certainly," answered the woman, "with pleasure! But how will you call the beasts when it is time to get them home?"

"I shall cry: 'Oo-oo-oo!'"

"Oh, no!" said the woman, "in this way you will never get the beasts together!" And off she went and met a fox.

"Good day, aunty!" said the fox. "What are you looking for?"

"I am looking for a shepherd for my beasts. The bear asked me to hire him, and the wolf asked me to hire him, but both of them scream so fearfully that my beasts will only get frightened!"

"Take me as a shepherd, aunty! I shall call the beasts together as gently as it can be done!"

"And how will you do it?" asked the woman.

"Oh, I shall do it like this: 'Little goats, little sheep, it is time to sleep!'"

"Gili-bome! Gili-bome! Come home! Come home!"

"Oh, how nice!" said the woman. "You are a fine shepherd, indeed!" So the fox came with the old woman to her farm and began to guard her beasts.

He guarded the first day—and ate all the goats and the sheep. The next day he ate all the pigs, young and old. The third day he ate all the cows and oxen and calves.

When the fox came to the farm in the evening the old woman asked him: "Where are my beasts?"

"Their horns are in the brook and their hoofs in the gully!" answered the fox.

"Now, what does that mean?" thought the old woman. "I must go and see where the beasts are."

Just then she was making butter, and as she went away the fox ate all the butter and left only some milk in the churn.

When the old woman came back she saw the fox had eaten up all the butter and was sitting there licking his chops! She seized hold of the milk-tub, the fox ran off, and she ran after it and splashed the milk at the fox, but only wetted its brush.

And that is why ever since foxes' brushes have had white tips!

MANNERS.

There was once a naughty young rabbit who had an extremely bad habit. When he felt in the mood for a mouthful of food he simply proceeded to grabbit.

A very thin boy, Percy Patterson, had a mother who wanted a fatter son. So at meals when he cried, "No more room! Full inside!" she remarked, "Just you clean up that platter son!"

The lion crept out of his den one day, "Hungry," he said, "I am."

He soon trotted back to his den that day.

And gently lay down with the lamb.