

Now turn the attention to the effect this has upon the grid current. According to the graph, this will also vary, corresponding to the movement of the operating point. Owing to the shape of this curve more grid current will flow when the point goes over to the positive side of the half cycle, than will be the case when the working point moves to the negative side of the completing half-cycle or wave.

Let us run over it once more. The incoming high-frequency wave shown on the left of the graph is directly impressed on the grid. Each half of this wave is equal and the voltage mounts up to a maximum on one side and repeats itself on the other side of the zero-line.

These variations of potential, however, produce variations of grid current, shown as the wave form on the bottom right side of the graph. But, owing to the peculiar shape of the characteristic grid curve, these current waves are not equal on each side of the zero-point shown by the dotted line. More current flows during one-half cycle than does in the other, and this current is said to be partly rectified.

Having obtained these minute impulses of direct current it would be thought that the process of detection was complete. One or two more steps are necessary before the audio-frequency signals find their way into the plate circuit.

The small amount of direct current produced on the grid has only one escape, and that is through the grid leak. It was mentioned before that when a current passes through a resistance a voltage drop occurs across the resistance. One of the factors governing this drop is the amount of current flowing. The more current the greater the voltage drop. The direct current flowing through the grid leak varies according to the amount of rectified current produced so it can now be seen that these direct current impulses, flowing through the resistance of the grid leak, produce variations in the voltage drop across the grid leak.

As one end of the leak is connected directly to the grid these voltage

variations produce an effect upon the anode current, and the action of the valve as a detector is complete.

Summarised, the process is as follows: High-frequency voltages are first rectified by making use of the grid volt-grid current characteristic. The rectified current's vibrations flow through the grid leak causing varying potentials in voltage to be again applied to the grid. The valve now works as an ordinary amplifier, and current variations appear in the plate circuit.

Anode Bend Detection.

THE explanation that has been given of grid-leak detection differs considerably from the familiar one in which the function of the grid leak is to let the grid condenser charge leak off and return to the filament.

The explanation of the type known as the "anode bend" detector will be almost self-evident. The curve given (Fig. 2) represents a characteristic curve of a typical high impedance valve. This class of valve is the most efficient when used as detector. No grid leak and condenser are used, and rectification is obtained by making use of the sudden curve at the lower end of the straight portion. The operating point in this case is obtained by using a negative grid bias of four volts, shown by point marked X. The high-frequency wave is impressed upon the grid, but owing to the shape of the curve the anode current wave form appears as represented by the wave on the bottom right-hand side of the graph. More current flows during one-half of the cycle than during the opposite half, and this extra current is the rectified current used to operate the phones or speaker in the anode circuit of the valve.

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Unique Radio Feat

Dual Rebroadcast

SOMETHING unique in the history of radio broadcasting was accomplished Sunday afternoon and evening by the General Electric and Engineering Company of America and Amalgamated Wireless (Australasia) Ltd., Sydney. Station KDKA (Pittsburg) broadcasts specially for Commander Byrd and his party at "Little America" at the Antarctica, on alternate Sundays a musical programme, and immediately this is finished special and personal messages from friends and relatives are broadcast to Commander Byrd and his men at the frozen south, a reply message in morse being eagerly awaited by the operators at KDKA.

Yesterday Commander Byrd's reply was rebroadcast by KDKA and also rebroadcast again by 2ME (Sydney). In other words, the American rebroadcast was again rebroadcast by Sydney. The actual distance between Sydney and the Antarctic was stated as being over 22,000 miles, via Pittsburg. Similarly, Pittsburg rebroadcast the transmission from 2ME (Sydney, so that actually a dual rebroadcast was going on all the time; the event, stated the 2ME officials at Sydney, was an innovation. A detailed note of the exchanges between the two stations was kept by Mr. R. Leslie Jones, of Lyall Bay.

The duplex telephony broadcasts were a great success, states Mr. Jones. Quite a surprise was sprung on everyone by the General Electric Company, who asked Commander Byrd and men to stand by for a pleasant surprise; and indeed listeners throughout the world who were fortunate to be listening-in on short-wave receivers got a great surprise. One message from "Little America" addressed to Horace Watson at KDKA said: "Thanks, old chap, enjoyed your programme fine; best thanks and kindest regards to all."

Station 2ME shortly after 6 p.m. stated that the speed of telephony between Sydney and Pittsburg and back to Sydney was between one-ninth and one-eighth of a second.

By special request of KDKA (Pittsburg), 2ME (Sydney) broadcast some music reproduced from records, and Mrs.

McDonald, speaking from Sydney (styled "Mrs. Sydney"), had a few words to say to Commander Byrd and party. Considerable amusement was caused, owing to the fact that those at the American end thought Mrs. McDonald and Mrs. Sydney were two distinct ladies; and the roars of laughter could be heard quite distinctly in Wellington.

KDKA linked up with the "New York Times" over a long line, and Mrs. McDonald's remarks and a full report of the extensive tests is to be the subject of special articles in the American Press, copies of which were requested should be forwarded to Sydney after publication.

Such selections as "In a Monastery Garden" and "Liebestraum" were greatly enjoyed. In fact, reports were hastily received by KDKA from various American States saying that reception was very good indeed. Away as far as the Grand Rapids in Michigan, the Sydney programme was beautifully clear. An announcement from Pittsburg stated the time was "Ten minutes to three, daylight-saving time, which is ten to two eastern standard time," and the speaker reminded listeners that it was "Mother's Day." A contrast in the programme of events was the announcing of weather reports both in America and Australia.

At 6.40 p.m., Wellington time, the two countries were still carrying on the tests, and a request was made to Sydney that members of KDKA staff wanted to speak to Mr. Farmer. At 6.55 p.m. 2ME told the American officials that they ought to be in bed. "I suppose you are going to bed; are you going home to bed now? Too interested, aye?" "It's getting near teatime here," said Sydney. It was remarked that 2ME being right in the path of the Sydney beam station, a certain amount of trouble was to be expected.

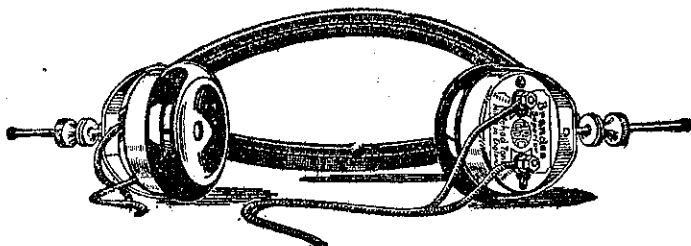
The wavelength of WSXK, the experimental call sign of KDKA, was given as 25.4 metres. The last statement was: "It is nearly 4 o'clock and we bid you all good-morning."

Reception, both through KDKA and 2ME, was obtained by Mr. Jones on a loudspeaker.

2ME works on a power of 50 kilowatts and was using two power amplifier tubes of 20 kilowatts each. KDKA uses push pull crystal control, and was working on four 20 kilowatts tubes. The broadcast was a remarkable event, and would not have been believed possible a year ago.

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