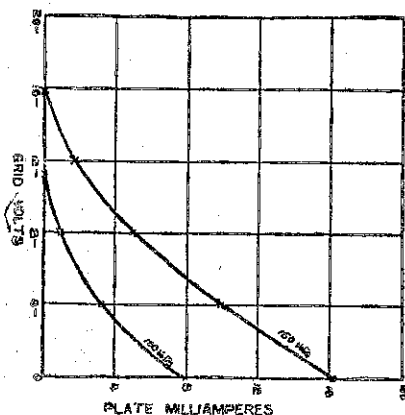


might be mentioned here that in replacing the 201's in an American set it is not a bad plan to use the 221 valves, which take much less current than the 201A. A 201A can always be placed without any other changes in the circuit.

The next consideration is plate voltage, and this again is governed by the B voltage available. Try to get as near as possible to the manufacturers' recommended voltage. Some valves, particularly the battery valves, can be



Characteristic Curve of a Valve.

worked on very low plate voltage. A detector valve will work quite well, and sometimes better on 22½ than on the higher voltages. A power valve and other audio valves will require very much higher voltage, and if you can give them 120 or 185 volts from batteries, so much the better.

It is not a bad plan in a set using screen grid r.f. valves to apply the same voltage to the plate of these as to the plates of the power valves. It is also possible to apply this high voltage to the plate of the first audio valve, providing, of course, that it is suitably biased.

If it is not biased there will be too great a current flowing through the primary of the second audio transformer, and it is likely to burn it out.

Amplification Factor.

Do not imagine because a valve uses a high amplification factor that it can be used with safety in your circuit to give a bigger lift. It must be matched into the following circuit; that means to say, the valve impedance must be at least at half of the impedance of the circuit in which it is being matched. Impedances, however, vary for different frequencies, and it is always a good plan to match at the low frequencies. It is interesting to note here that the average dynamic resistance of a good coil at about 720 kc. is about 50,000 ohms, and the better the coil the higher the impedance. From this it is quite clear that low loss circuits should be used in conjunction with valves such as the screen grid type, which have a very high internal resistance. Increase in gain will also increase the selectivity.

Power Valves.

It is the function of a power valve to convert the audio voltages applied to its grid into variations of plate current of sufficient strength to work satisfactorily the type of speaker connected to it. A power valve rarely gives a high lift, and very often putting a power valve in a circuit will actually lessen the amplification obtained.

The performance of a power valve is indicated by its rating in watts. Two power ratings are applied to a power

valve, the plate input being the produce of the plate voltage, and the plate current in amps and the undistorted output.

The calculation of the first is easy, but that of the second necessitates consulting the characteristics curve of the valve. When tuning a power valve the first thing to consider is the amount of battery power available.

It is useless using a good power valve requiring, say, 200 volts, and expect it to be satisfactory when you only have a small battery delivering, say, 100 or 120. Furthermore, power valves require a heavy plate current, and if you use this in conjunction with a light battery that battery is going to have its life shortened considerably.

Probably the best valves for the small sets to use are 605 type, with about a quarter watt output. These can be worked satisfactorily on 100 volts, and require plate current of about 6 amps.

Characteristics of the New Variable-mu Valves

Heater volts	2.5	..	2.5
Plate volts	180	..	250
Grid volts	1.5	..	3
Screen grid volts	75	..	90
Plate resistance, ohms	350,000		350,000
Mutual conductance (micromhos)	1,100		1,050
Mutual conductance at —40 volts bias	5	..	15
Mutual conductance at —50 volts bias	—		1 or over
Plate current, m/as.	5.8	..	6.5
Screen grid current, m/as.	2.5	..	2.5
Amplification	385	..	370

Furthermore, they have a high amplification factor, which is also of a great advantage when using batteries.

New and Better Valves

The Variable Mu

SINCE the very first days of broadcasting the aim of radio engineers has been toward high amplification before the detector, and when the screen-grid valve was introduced it was hailed with delight for it enabled much greater sensitivity than was hitherto possible. The use of the s.g. valve brought about the improvement in selectivity, improvement in tone, and the use of automatic volume control and these advantages led to the almost universal use of this valve for high-frequency amplification.

In using the screen-grid valve, however, there are certain disadvantages, the most important of these being the cross talk and modulation distortion on powerful signals, resulting from the high amplification provided by the valves. Furthermore, the screen-grid valve can be easily overloaded. It is a valve with high mutual conductance and high amplification. However, it cannot handle a big signal without cross modulation and harmonic distortion. For this reason the control of volume on a powerful local station is somewhat of a difficult problem. Local distance switches and pre-selection circuits are only two of the various methods that have been employed to overcome this.

If power valves could be employed in the first stages of the set we could
(Concluded on page 31.)



Why ?

The Wonderful Popularity of Arcturus Valves This Year

Because

The results obtained by a growing number of satisfied users for the past two years have proved the extraordinary performance and reliability of the

ARCTURUS BLUE VALVE

These satisfied users have spread the news, and owners of radio receivers throughout the Dominion are turning to Arcturus Valves for better performance.

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IMMUNITY TO OVERLOADS—Arcturus Blue Valves resist overload as high as 50%.

LESS HUM—Comparative tests show that Arcturus Valves have 52% less hum than other valves.

LONG LIFE—Arcturus Valves have established an unchallenged world's record for long life.

LIFE-LIKE TONE—Comparison in any receiver shows the improved tone of Arcturus Blue Valves.

BLUE VALVES—This distinctive colour assures you of receiving the genuine Arcturus.

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