

The Choice of Power Valves

Meaning of Undistorted Power



THE advent of the all-electric set has to a very great extent solved the problem of power valves. Prior to this, the last valve in a multi-valve set had to be more or less economical in both "A" and "B" current, with the result that certain compromises had to be made. This usually amounted to a reduction of the "A" current and "B" voltage; but the all-electric set has rendered economy in these directions unnecessary.

The primary function of a power amplifier is to supply undistorted power to a loudspeaker, in amounts sufficient so that the speaker can give undistorted reproduction with the amount of volume desired by the listener. Power valves and power amplifiers are essential for satisfactory reproduction because of the low efficiency of loudspeakers. This lack of efficiency necessitates that the speaker be supplied with perhaps fifty times as much power as it will finally radiate as sound. If the power valve has not sufficient capacity to supply the required amount of

undistorted power, the speaker has either to be operated at a volume level lower than desired (so that less power is drawn from the valve), or the power valve has to be overloaded. Under these conditions serious distortion is produced.

Distortion makes itself evident by a very large number of symptoms, and all but the most untrained ear can perceive this condition. With the magnetic cones and horns a rattle indicates that the speaker is being overloaded, but with the dynamic cone speaker, overloading is almost impossible under normal household conditions. Overloading of the power valve shows itself generally in harshness, lack of clearness, confusion of both lower and upper notes, and a tendency to blast.

Types of Power Valves.

THERE are now available the following types of power valves: 112A, 171A, the 245, 210, and the 250. All of these can be used singly or in push-pull, and there are consequently ten

possible combinations. The problem arises in determining which combination will be chosen by constructor or purchaser. It will be noticed that several types of valves have been given. These names apply to Radiotron valves, but almost every manufacturer makes the equivalent, and the onus is on each

In Table I has been listed these types of valves and their combinations indicating the power output at various voltages. The table has been arranged in order of power output. In all cases it has been assumed that the power output to be obtained from two valves in push-pull is equal to three times that obtainable from a single valve operated at the same plate voltage.

To bear this out we see that the out-

Table No. 1.

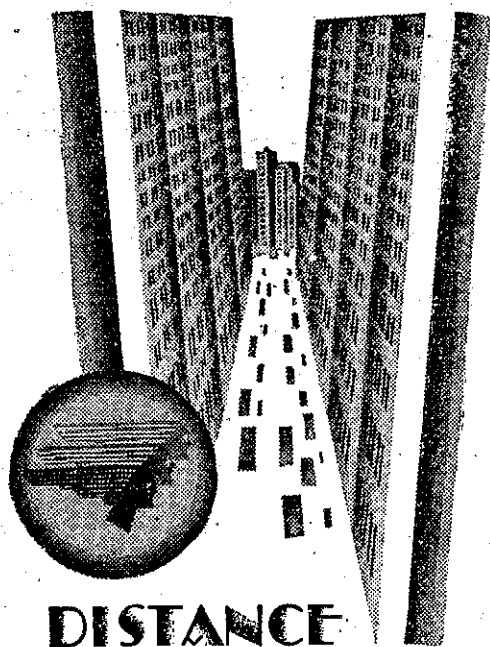
Arrangement No.	Power Output in Watts.	Type of Valve.	Single or Push-Pull.	Plate Voltage Required.
1	.120	112A	Single	135
2	.195	112A	Single	157
3	.330	171A	Single	135
4	.360	112A	Push-Pull	135
5	.600	112A	Push-Pull	157
6	.600	210	Single	300
7	.700	171A	Single	180
8	.750	245	Single	180
9	1.0	171A	Push-Pull	135
10	1.5	210	Single	425
11	1.5	250	Single	300
12	1.6	245	Single	250
13	2.1	171A	Push-Pull	180
14	2.25	245	Push-Pull	180
15	3.2	250	Single	400
16	4.5	210	Push-Pull	425
17	4.5	250	Push-Pull	300
18	4.6	250	Single	450
19	4.8	245	Push-Pull	250
20	9.6	250	Push-Pull	400
21	13.8	250	Push-Pull	450

constructor to find out the designation of these valves in the make he prefers. Table 3 shows a few of the better-known examples.

In deciding which power valve or combination of power valves to use, the first point to be determined is how they compare with regard to power output.

put of a single 171A operated at 135 volts is .33 watts, while two 171A's in push-pull give an output of 1 watt. The wattage is computed by multiplying the voltage applied to the valve by the milliamperes emission, and then dividing the equation by 1000.

An example will serve to make per-



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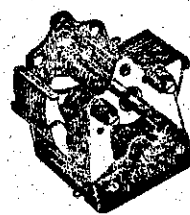
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