# AX 1 Full-wave gas-filled rectifying valve

The AX 1 is a full-wave gas-filled rectifying valve for use in the smaller class of amplifiers.

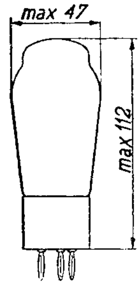


Fig. 1.
Dimensions in mm.

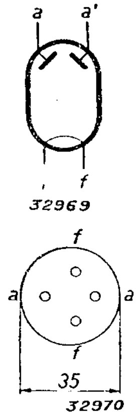


Fig. 2
Arrangement of electrodes and base connections

## FILAMENT RATINGS

Heating: direct, by A.C.
Filament voltage. . . . . . . . . . . . . . . . $V_f = 4.0$ V
Filament current. . . . . . . . . . . . . . . . $I_f = 2.4$ A

## MAXIMUM RATINGS

| | | |
|---|---|---|
| Secondary (A.C.) voltage of the power transformer on no load . . . . . . | $V_{tr}$ | = max. 2×500 $V_{eff}$ |
| D.C. output . . . . . . . . . . . . | $I_o$ | = max. 125 mA |
| Voltage drop in the valve . . . . . | $V_{arc}$ | = max. 15 V |
| Capacitance of the capacitor across the input of the smoothing circuit . . | $C$ | = max. 64 $\mu$F |

When a capacitor is connected across the input of the smoothing circuit:

| | | |
|---|---|---|
| The ohmic resistance in the D.C. circuit, with $C = 64\ \mu$F . . . . . | $R_t$ | = min. 200 ohms |
| The ohmic resistance in the D.C. circuit, with $C = 32\ \mu$F . . . . . | $R_t$ | = min. 150 ohms |
| The ohmic resistance in the D.C. circuit, with $C = 10\ \mu$F . . . . . | $R_t$ | = min. 100 ohms |

## KEY TO SYMBOLS

The ohmic resistance $R_t$ in the D.C. circuit, when the smoothing circuit commences with a capacitor, constitutes the ohmic resistance of the secondary winding of the transformer together with that of the transformer primary, i.e. $R_t = R_s + n^2 R_p$. If the first component of the smoothing circuit is a choke, however, this resistance value must be augmented to the extent of the ohmic resistance of that choke:
$R_t = R_L + R_s + n^2 R_p$. The voltage delivered may be calculated from the expression: $V_o = 0.45\ V_{tr} - I_o R_t - V_{arc}$, in which $V_{tr}$ is the effective alternating voltage of the secondary winding of the transformer, for example $V_{tr} = 2 \times 500$ V. The inductance of the choke should be at least equal to $\frac{R_a}{1{,}000}$ or $\frac{V_o}{V_i}$ ($V_o$ in volts and $I_o$ in mA), where $I_o$ is taken to be the lowest value occurring; in an amplifier having two output valves in a balanced output stage, this will be the current flowing in the amplifier without excitation. From this it will be seen that with a 12-henry choke, the characteristics begin to flatten out only at $I_o = 30$ mA approx. At lower current values the loading curves rise steeply, owing to the effect of the smoothing capacitor. A choke having a higher inductance will produce straight characteristics down to lower current values, for instances 42 henries — 10 mA.
Fig. 4 shows the loading characteristics of the AX 1 used in a circuit in which a capacitor is the first smoothing element, and comparison of these with the corresponding curves for a high vacuum valve such as the AZ 4 shows clearly that the former are

very much flatter with a low value of the internal resistance $R_t$; also that the direct voltage is higher for the same alternating input. The direct voltages obtained from a smoothing circuit in which a capacitor is the first component are, further, higher than those in a circuit containing a choke as the first smoothing element.

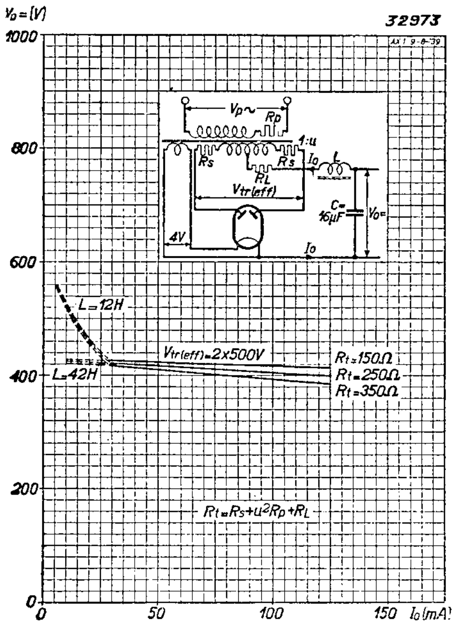


Fig. 3
Loading curves (D.C. voltage as a function of the current delivered) for various values of the resistance $Rt = (R_L + Rs + n^2\ Rp)$, in a smoothing circuit commencing with a choke. The voltages at lower current values wih a choke of 12 or 42 henries are shown by broken lines.

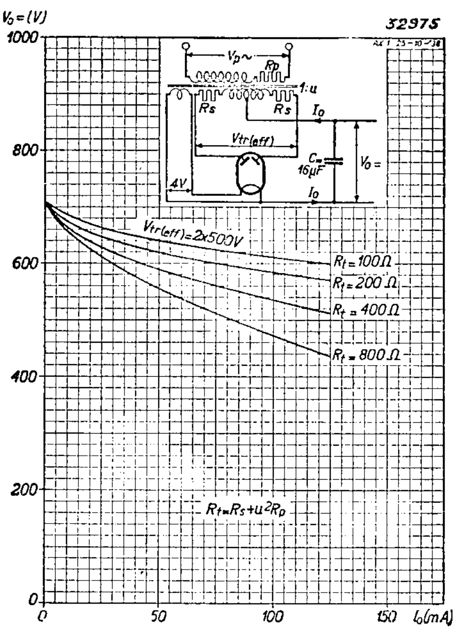


Fig. 4
Loading curves (D.C. voltage as a function of the delivered current) for various values of the total resistance $Rt = (Rs + n^2 Rp)$, in a smoothing circuit commencing with a capacitor.