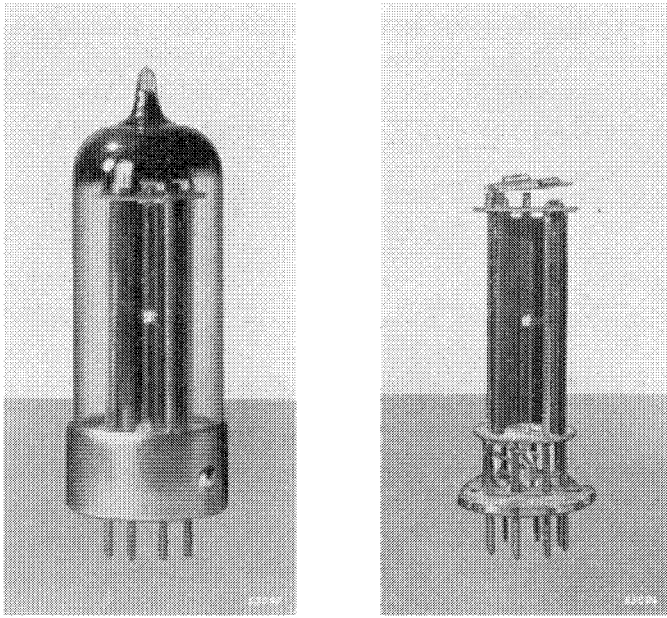# UY 41   Half-wave rectifying valve

Fig. 1
The UY 41, showing the electrode system (approximately actual size).

The UY 41 is a high-vacuum, indirectly heated half-wave rectifying valve capable of delivering a maximum of 100 mA direct current. A simple receiver employing the UCH 42, $2 \times$ UAF 42 and the UL 41 for 220 V mains operation would require a total current of roughly 80 mA, so that a single UY 41 will provide enough reserve current for an R.F. valve and a tuning indicator (UM 4).

At a low mains voltage (127 V) the anode current of a receiver of this type would be about 50 mA, and in this case the reserve of current of the UY 41 admits of the design of high-performance receivers with a push-pull output stage, of which the total anode current would be about 80 mA.

A suitable circuit for the UY 41 is shown in Fig. 2: here the smoothing filter consists of the electrolytic capacitors C_1 and C_2 with a 1200 ohm resistor. The anode voltage of the output valve is derived from C_1, the other anode and screen grid voltages from C_2. As a rule, a filter of this kind provides ample smoothing in a small receiver fitted with a loudspeaker giving moderate bass response, but in sets of higher quality it is advisable to incorporate a hum-bucking coil in the output transformer.

If a choke is used in place of the resistor in the smoothing filter, it must

be remembered that the voltage drop across this choke will be roughly 10 V for a total anode current of 80 mA and a D.C. resistance of 125 ohms, assuming that the anode voltage of the output valve is taken from C_2.

If the receiver is operated on 220 V mains, the voltage across C_1 is about 198 V, and that across C_2 188 V; with the smoothing resistor shown in Fig. 2 these values will be 198 V and 166 V respectively. As the maximum permissible anode dissipation of the valves is not to be exceeded, this increase in voltage must be taken into account when a choke is used, e.g. by adding a resistor in series, or by increasing the value of the limiting resistor in the anode circuit of the UY 41. On 200 to 220 V mains, a 160 ohm resistor would be needed for this purpose (see Fig. 2); on mains of less than 130 V the limiting resistor can be omitted, whilst for intermediate voltages the correct resistance value can be computed by linear interpolation. It should be noted that these are minimum resistance values (this is important when resistors with large tolerances are used).

In determining the wattage of the limiting resistor it is essential to take into account the ripple component of the current flowing through this resistor. Generally, the resultant wattage is about three times as high as that computed only from the D.C. component.

On mains of more than 220 V, or when a choke is used for the smoothing filter, the maximum permissible anode dissipation of the output valve is usually exceeded unless special measures are taken to prevent this. This can be suitably effected by increasing the limiting resistor.

Any parasitic R.F. currents flowing through the valve UY 41 may undergo modulation by the mains frequency, resulting in audible hum in the speaker, but a capacitor of 0.022 μF in parallel with the valve (see Fig. 2) will prevent this.
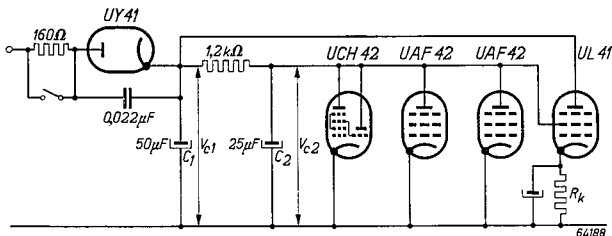

Fig. 2
Rectifier section of an A.C./D.C. receiver employing the UY 41 with a smoothing resistor. For details see text.

TECHNICAL DATA OF THE HALF-WAVE RECTIFIER UY 41

Heater data

Heating : indirect, A.C. or D.C., series feed

Heater current	I_f	$=$	100	mA
Heater voltage	V_f	$=$	31	V

Operating characteristics and limiting values

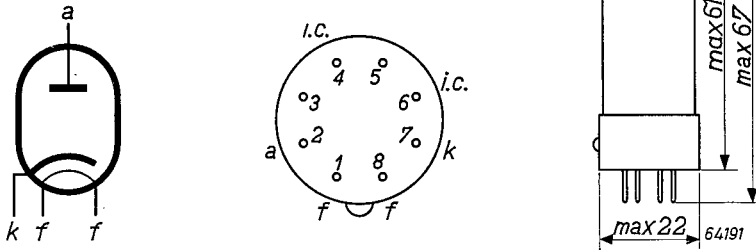|								
Mains voltage	V_i	$=$		127		220 max.	250	V_{RMS}
Rectified current . . .	I_o	$=$ max.	100	max.	100	max.	100	mA
Limiting resistor . . .	R_t	$=$		0 min.	160	min.	210	Ω
Input capacitance, smoothing filter. . .	C_{filt}	$=$ max.	50	max.	50	max.	50	μF
Peak voltage between heater and cathode . .	V_{fk}	$=$ max.	550	max.	550	max.	550	V

Fig. 3
Electrode arrangement, electrode connections and maximum dimensions in mm of the UY 41.
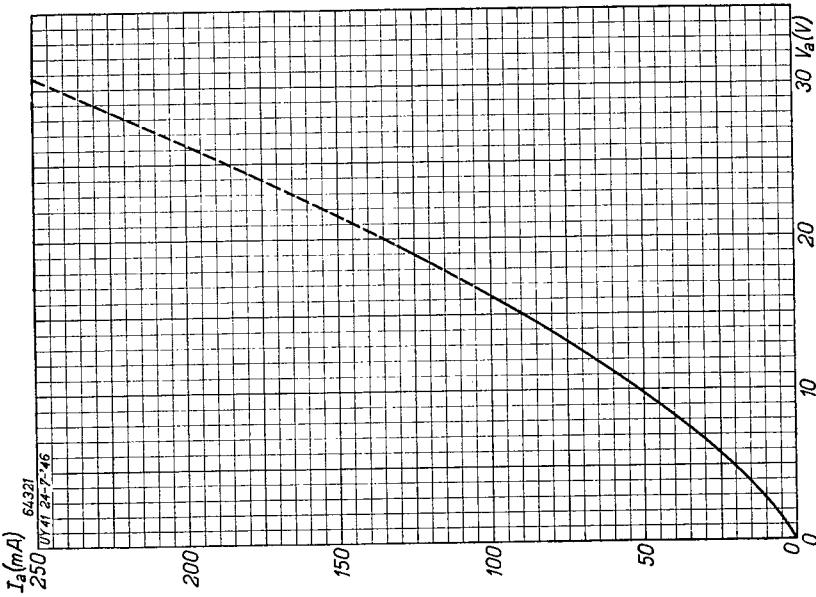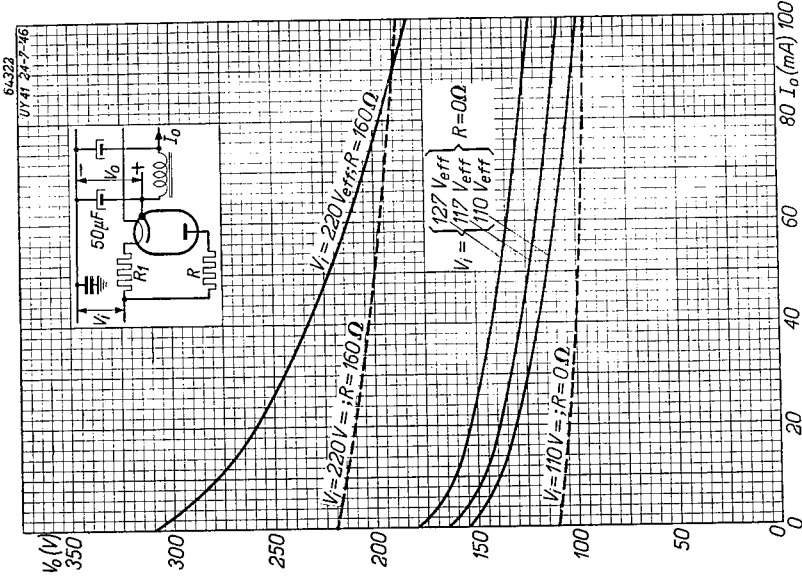
Fig. 5

Regulation of the UY 41 (output voltage V_o as a function of the direct current output I_o). Unbroken lines : valve operating on A.C. mains. Dotted lines : valve operating on D.C. mains.

Fig. 4

Anode current (I_a) of the UY 41 as a function of the applied direct voltage (V_a).