Normal and X-ray photographs of the EB 41 (approximately actual size).

The EB 41 comprises two separate, indirectly heated diodes screened from each other; only the heaters are interconnected. The advantage of this design is that neither diode in any way affects the other, whilst the low inter-electrode capacitance and low internal resistance render this valve eminently suitable for television and F.M. receivers. For instance, to obtain a television picture with sufficient detail, it is essential that the highest modulation frequencies are not attenuated during detection of the signal; furthermore, to prevent picture distortion, the phase displacement of the detected voltages should be as nearly as possible proportional to the frequency. Both these conditions can be fulfilled if the detector loading resistance is kept low, which means that the internal resistance of the diode must also be low.

The EB 41 is therefore an excellent valve for use in such detector circuits. If one diode of the EB 41 is used as detector in a television receiver, the other is still available for use as a so-called D.C. restorer. If the picture signal is detected and amplified in the normal manner, the brightness of the picture appearing on the C.R. tube is not at the correct brightness level. This can be rectified by means of a D.C. voltage, obtained by using the D.C. restorer diode to detect the I.F. signal.

In addition to these applications of the EB 41, it can be used as signal limiter and detector in F.M. receivers, whilst in ordinary broadcast receivers it will give better results than the conventional diodes.
Heater data

Heating: indirect, A.C. or D.C., series or parallel feed
Heater voltage \( V_f \) = 6.3 V
Heater current \( I_f \) = 0.3 A

Capacitances (cold valve)

Anode - cathode, first diode \( C_{d1} \) = 3.6 pF
Anode - cathode, second diode \( C_{d2} \) = 3.6 pF
Cathode - other electrodes, first diode \( C_{k1} \) = 4.5 pF
Cathode - other electrodes, second diode \( C_{k2} \) = 4.5 pF
Diode anode - diode anode \( C_{d1d2} \) < 0.03 pF

Electrode arrangement, electrode connections and dimensions (in mm) of the EB 41.

Limiting values for use as half-wave rectifier (for each section)

Transformer voltage \( V_{tr} \) = max. 150 V\(_{RMS}\)
Output current \( I_o \) = max. 9 mA
Input capacitance of smoothing filter \( C_{filt} \) = max. 8 \( \mu \)F
Total resistance in anode circuit \( R_t \) = min. 300 \( \Omega \)
Voltage between heater and cathode \( V_{fhp} (k \ pos., \ f \ neg.) \) = max. 330 V

Limiting values (for each system)

Peak inverse voltage at the diode \( V_{d \ inv \ p} \) = max. 420 V
Diode current \( I_d \) = max. 9 mA
Peak diode current \( I_{dp} \) = max. 54 mA

Voltage between heater and
cathode . . . . . . . . $V_{jk}$ = max. 150 V
Voltage between heater and
  cathode (cathode positive
  with respect to heater) . . $V_{jkP}$ (k pos., j neg.) = max. 330 V ¹
External resistance between
  heater and cathode . . . $R_{jk}$ = max. 20 kΩ


Application of the EB 41 in television receivers

In Fig. 3 the diode $D_1$ is shown connected as a detector in a television receiver; the load is provided by the resistor $R_1$ (approx. 4 kΩ), whilst $C_1$ is the detector capacitor (10 - 20 pF). The coil $L_1$, connected in series with $R_1$, works in conjunction with coil $L_2$ to compensate parasitic capacitances, thus making it possible to pass the necessary bandwidth to about 4 Mc/s. The diode $D_2$ functions as a D.C. restorer. Since the object in this case is to obtain a D.C. voltage, a high RC time constant is permissible. The load is formed by a potentiometer comprising resistors $R_2$ in parallel with capacitor $C_2$, and $R_4$ in parallel with $C_3$. The D.C. voltage across $R_3$ is applied through $L_1$, $R_1$ and $L_2$ to the control grid of the next valve and so provides this valve with sufficient bias to ensure correct picture brightness.

In the arrangement shown in Fig. 3 the bias for the next valve is reduced; if a more negative bias is required the anode and cathode connections of the EB 41 must be interchanged.

Fig. 3
The EB 41 used as detector diode and D.C. restorer in a television receiver.
**Fig. 4**  
The current $I_d$ of each system of the EB 41, as a function of the voltage $V_d$.

**Fig. 5**  
The detected D.C. voltage ($V_=$) of each section of the EB 41, as a function of the H.F. input signal ($V_{HF}$) for various values of the load resistance ($R$).

**Fig. 6**  
Diode damping resistance ($R_d$), as a function of the H.F. input signal ($V_{HF}$) for various values of the diode load resistance ($R$).