

Photo 15. Projection receiver.

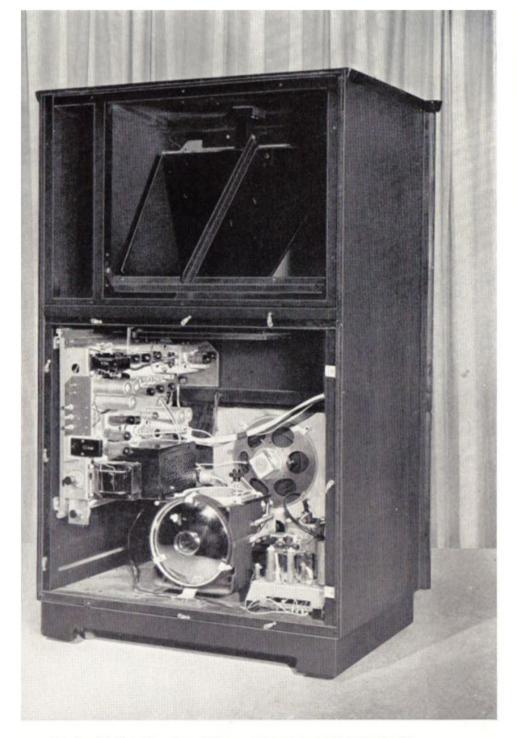


Photo 16. Inside view of the receiver shown in photo 15.

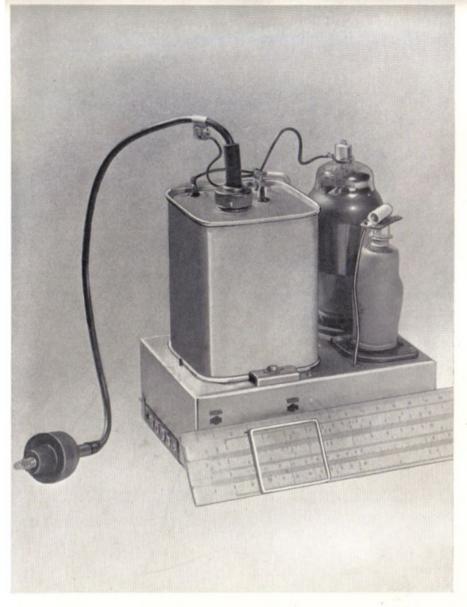
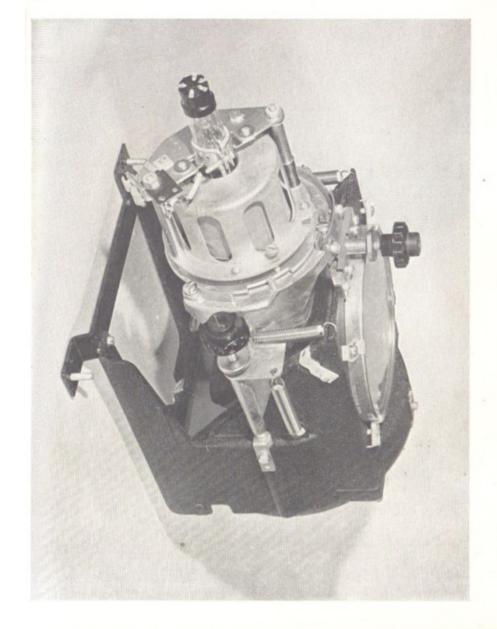


Photo 17. Impulse-driven high-tension generator for 25 kV.

schmidt projector.



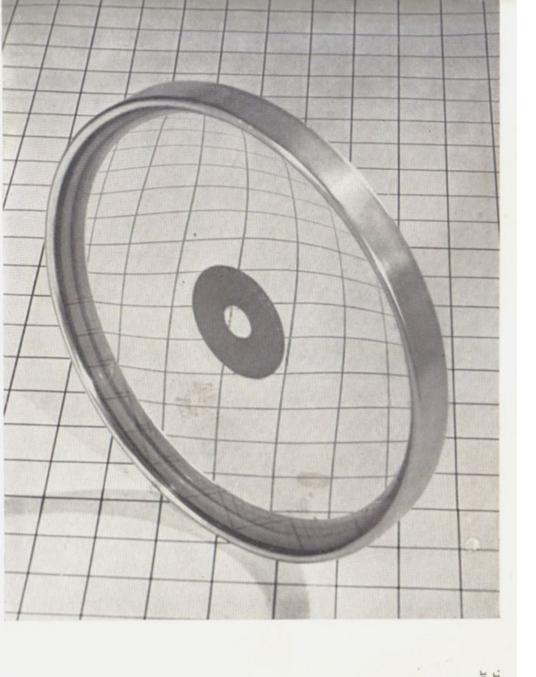


Photo 19 Correcting lens for Schmidt projector.

Let n=3,  $V_{ho}=25$  kV,  $V_b=350$  V and  $\triangle V_a=280$  V, then, according to (7.3-27), for  $R_{io}=5$  M $\Omega$ :

$$W_b = \frac{1}{2} k \frac{V_b}{\Delta V_a} \frac{V_{bo}^2}{R_{ba}} = \frac{1}{2} - \frac{7}{9} - \frac{350 \cdot 25^2 \cdot 10^6}{280 \cdot 5 \cdot 10^6} = 61 \text{ W}.$$

Conversely, for  $W_b=6$  W, a value of about 50 M $\Omega$  is found for  $R_{to}$ . With such a low power, however, it is still possible to get an internal resistance of 5 M $\Omega$  or less with the aid of an automatic control voltage. This control voltage, which depends upon the value of the voltage

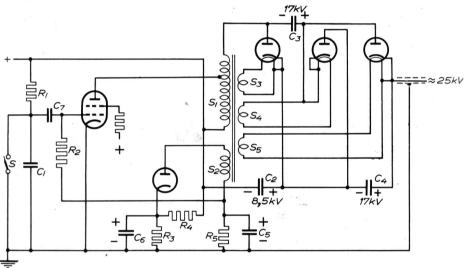


Fig. 7.3–8 Circuit diagram for a  $25~\mathrm{kV}$  pulse E.H.T. generator.

peaks on the L- $C_p$  circuit, is obtained by rectifying the voltage peaks induced in a winding coupled to the coil L. Due to this automatic control, there is only a small drop in the E.H.T. voltage when the current rises from zero to a certain limit. The equation (7.3-27) then applies for loads above that limit and not in the control range. Above that limit the E.H.T. voltage drops quickly. This is a valuable property of the system, because any short-circuiting is less destructive.

To make the control as effective as possible, two measures are taken:

- 1. The winding is connected in such a way that a voltage proportional to the voltage peak  $V_2$  is rectified, since, as already mentioned, this varies more than  $V_1$ , see fig. 7.3-6.
- 2. A constant delay voltage is connected in series with the peak

voltage to be rectified, so that, with varying load, the percentage variation in the resulting control voltage is more than that in the induced peak voltage.

Figure 7.3–8 gives the circuit diagram for a pulse E.H.T. generator for  $25\,\mathrm{kV}$ . For this voltage  $\mathrm{n}=3$  is in every respect a satisfactory compromise for the number of stages in cascade. The peak voltage across  $S_1$  is in this case 8.5 kV. The anode of the power valve is connected to a tap on  $S_1$ , because the permissible anode peak voltage of this valve is about 6 kV. The tapping ratio is 0.7.

The rectifying valves of the Mullard EY 51 type are suitable for an inverse

voltage of 17 kV. The saturation current is about 200 mA, whilst a filament power of 0.5 W is required, this power being taken from the circuit. For this purpose the coils  $S_3$ ,  $S_4$  and  $S_5$ , each consisting of a few turns coupled to  $S_1$ , are provided at the top end of  $S_1$ . In  $S_2$  the peak voltage is induced, which has to produce the control voltage across  $R_5$  and  $C_5$ . This control voltage is applied to the control grid of the power valve via  $R_2$ . The delay voltage across  $R_3$  is intended to make the control voltage more dependent upon the load than the voltage across  $S_2$ .

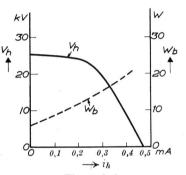


Fig. 7.3–9 Direct voltage output  $V_h$  and input power  $W_b$  as functions of the D.C. output current  $i_h$ .

The adjustment of the power valve is such that at no load the control voltage is so high that the peak current  $i_m$  flowing in the anode circuit is much less than that corresponding to  $V_g=0$ . Under load, however, the voltage across  $R_5$ , and thus also the negative bias on the grid of the output pentode, will be reduced. As a result, there will be an increase in  $i_m$  in the anode circuit and thus also in  $V_m$  across the coil, so that, in spite of the reduction of  $\frac{V_1}{V_m}$  and  $\frac{V_2}{V_m}$ , the peak voltages  $V_1$  and  $V_2$  remain practically constant.

In fig. 7.3–9 the direct voltage  $V_h$  and the input power  $W_h$  are shown as a function of the output current  $i_h$ . It is seen that at first the voltage  $V_h$  drops little with increasing current, but after  $i_h = 250 \,\mu\text{A}$  is reached, there is a sharp drop of the voltage. Both this voltage drop at the end of the control range and the value of  $W_b$  compare very favourably with that found in the case of the high-frequency E.H.T. generator; see fig. 7.2–7.