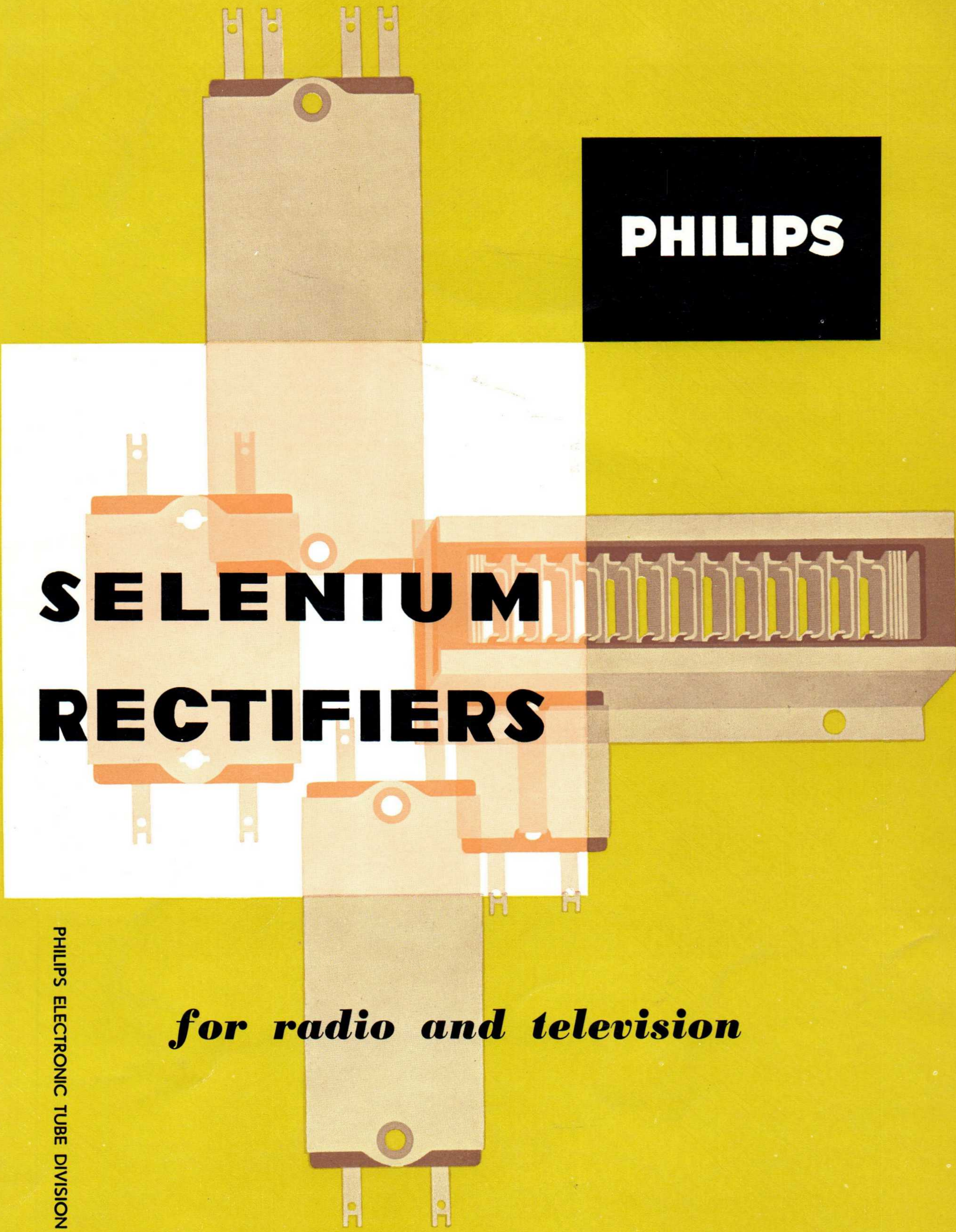
PHILIPS

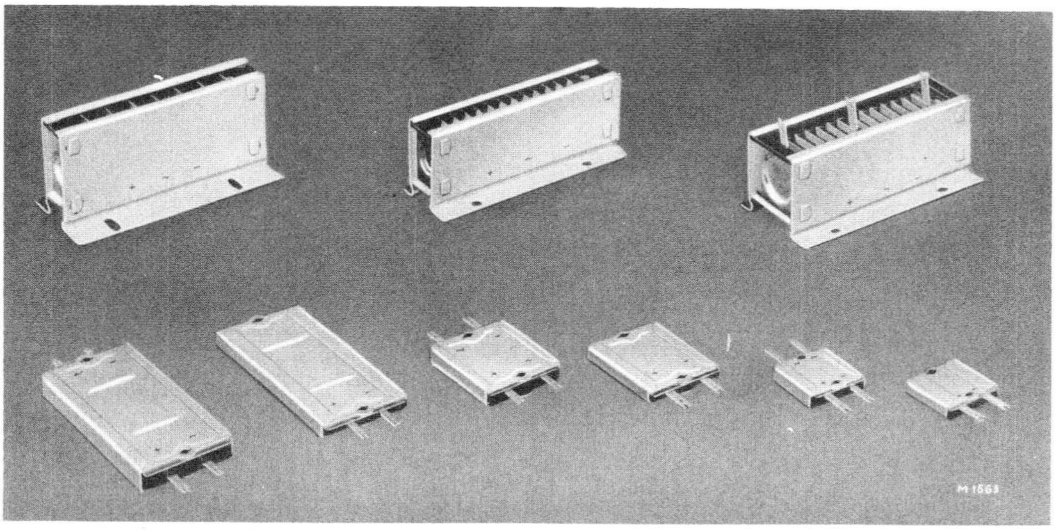


SELENIUM RECTIFIERS

for radio and television

PHILIPS ELECTRONIC TUBE DIVISION

SELENIUM RECTIFIERS
FOR RADIO AND TELEVISION



Selenium flat and radiator type rectifiers have found wide application in radio and television receivers because of their many advantages, which are in brief:

- long life;
- no filament heating;
- small dimensions;
- high overload factor;
- low internal resistance;
- large output voltage;
- simple mounting, no sockets required.

The particularly low forward resistance of the rectifiers results in a high efficiency at small dimensions.

In the Specification Table 2 of the rectifiers and in the Temperature Derating Table 1, two sets of operating values have been indicated. When operated at the nominal supply voltages and the nominal current given in column A and under normal cooling conditions (see under heading "Mounting"), the lifetime expectance is approximately 10 000 hours on the average. When operated at a lower supply voltage and a lower output current, as indicated in column B, the rectifiers will last approximately 50 000 hours on the average.

The selenium rectifiers are suitable for use in the tropics. For temperature derating see Table 1.

The rectifiers are shock-proof and withstand heavy vibrations.

DATA

The flat and radiator type rectifiers contain 30 V plates with effective surface areas of 0.6, 0.8, 1.3, 2.7, 3.6 and 5 cm^2.

The rectifiers are designed for mains voltage variations of 10 % and withstand overloads occurring for example during the heating-up time of tubes.

LOAD CAPACITANCE AND TEMPERATURE REQUIREMENTS

The current flow in the forward and inverse directions causes heating-up of the plates. The given nominal values of current and voltage are determined essentially by the heat conductivity of the mounted rectifiers in operation.

The forward resistance of selenium rectifiers increases slightly during life, which results in a higher heat dissipation. However, this aging has already been taken into account in the nominal values of Table 2. The maximum operating temperature of the plates is approximately 75 °C. To prevent this temperature from being exceeded, the surface temperature of the larger flat types (Figs 1 and 2) may not become higher than 65 °C, whereas that of the small flat type (Fig.3) must remain below 60 °C. To safeguard normal lifetime, the given values of Table 2 should not be exceeded.

Since, with flat rectifiers, the cooling of the plates is mainly determined by heat conductance through the mounting plate, the quoted permissible load is based on the highest temperature of the metal rectifier surface. The above-mentioned maximum external (surface) temperatures of 65 °C and 60 °C correspond to the nominal values given in column A of Table 1 at an ambient temperature of 40 °C; an external temperature of approximately 50 °C corresponds to the values in column B for an ambient temperature of 35 °C. At ambient temperatures exceeding 35 °C, the currents must be reduced according to this Table.

Table 1. Temperature derating values.

Ambient temperature in °C	Permissible current in % of the nominal current at the operation values		Permissible voltage in % of the nominal input values
	A. Nominal ratings	B. Reduced ratings	
35	100	100	100
40	100	80	100
45	85	58	100
50	70	37	100
55	57	12	100
60	43	-	100
65	30	-	100
70	10	-	100

D.C. LOAD

The nominal values of Table 2 apply to rectifiers being used with capacitive load. If the rectifiers are connected to a direct voltage only, the max. voltage per plate in the inverse direction must not exceed 15 V.

MOUNTING

In order to quarantee the necessary heat conductance, the flat rectifiers must be attached with their largest surface to the chassis plate. When the rectifiers cannot be mounted with the flat side in contact with the chassis plate, the values must be reduced as follows: by 20% - when mounted vertically

by 50% - when mounted in free air or on an insulator.

Table 2. Technical data of various types of selenium rectifiers.

Type	Circuit	Operating values: A. Nominal ratings — Maximum altern. input voltage (V_{rms})	A. Nominal ratings — Maximum direct current (mA)	B. Reduced ratings — Maximum altern. input voltage (V_{rms})	B. Reduced ratings — Maximum direct current (mA)	Dimensions: Fig.	Dimensions: a	Dimensions: b	Weight in grammes
		Flat metal type rectifiers for radio							
SR 250Y50	half-wave	250	50	200	40	3	8.5	12.5	10
SR 250Y85	half-wave	250	85	200	60	2	6	16.5	17
SR 250Y130	half-wave	250	130	200	90	1	6	14.5	32
SR 250B75	bridge	250	75	200	65	2	8.5	16.5	20
SR 250B100	bridge	250	100	200	85	2	8.5	16.5	20
SR 250B125	bridge	250	125	200	105	2	8.5	14	20
SR 250B150	bridge	250	150	200	130	1	6	14.5	32
SR 125Y80	half-wave	125	80	100	60	3	6	12.5	8
SR 125Y100	half-wave	125	100	100	85	3	8.5	12.5	10
SR 125Y130	half-wave	125	130	100	100	2	6	16.5	17
SR 125Y180	half-wave	125	170	100	140	1	6	14	32
SR 125B85	bridge	125	85	100	70	3	8.5	12.5	10
SR 125B125	bridge	125	125	100	100	2	8.5	16.5	20
SR 125B160	bridge	125	160	100	130	2	8.5	16.5	20
SR 125B300	bridge	125	300	100	240	1	6	14	32
SR 125D50	voltage doubler	125	50	100	40	3	8.5	12.5	10
SR 125D75	voltage doubler	125	75	100	60	2	6	16.5	17
SR 125D90	voltage doubler	125	90	100	70	2	6	16.5	17
SR 125D110	voltage doubler	125	110	100	90	1	6	14	32
		Radiator types for television							
AA 220Y300	half-wave	220	300	175	220	4			140
(AA 110D300)	doubler	110	300	88	220				
AA 220Y350	half-wave	220	350	175	260	5			140
(AA 110D350)	doubler	110	350	88	260				
AA 220Y400	half-wave	220	400			6			140
(AA 110D400)	doubler	110	400						
AA 250Y300	half-wave	250	300			4			140
(AA 125D300)	doubler	125	300						
AA 250Y350	half-wave	250	350			5			140
(AA 125D350)	doubler	125	350						
AA 250Y400	half-wave	250	400			6			140
(AA 125D400)	doubler	125	400						

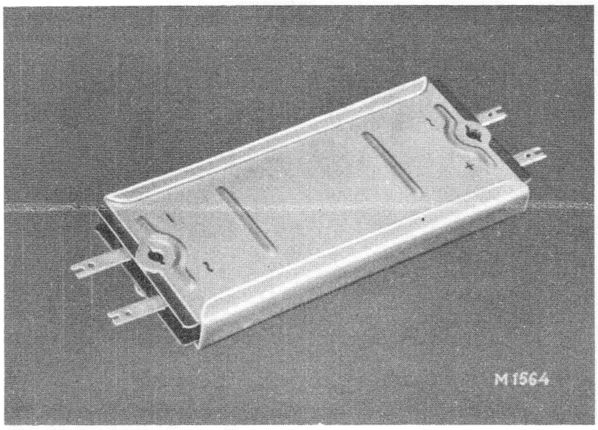
Types for other current and voltage values can be offered on request.

Coding system:

SR = selenium rectifier - flat type
AA = radiator type
First number = max. alternating input voltage
Y = half-wave circuit
B = bridge circuit
D = doubler circuit
Second number = max. direct output current in milliamps

DIMENSIONAL DIAGRAMS

FLAT TYPES FOR RADIO



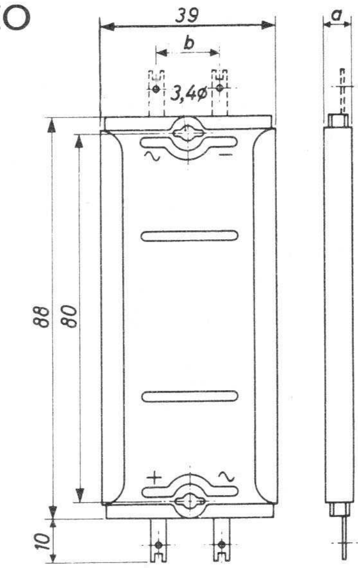
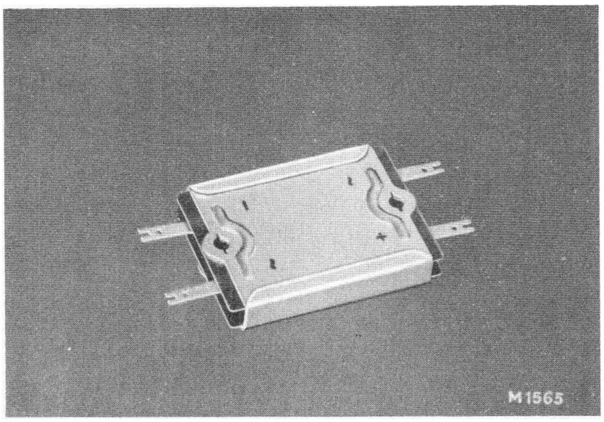


Fig.1.



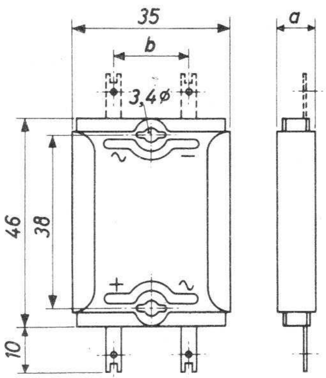
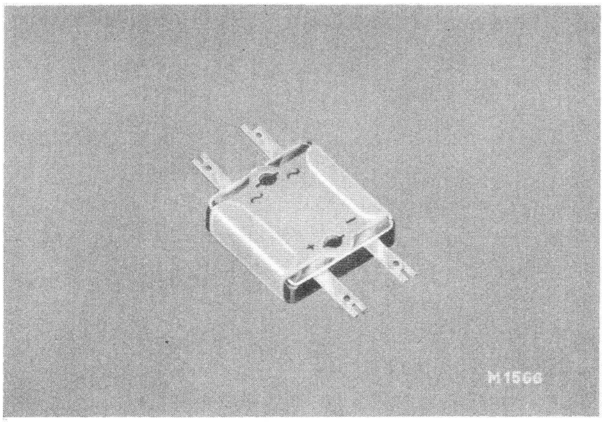


Fig.2.



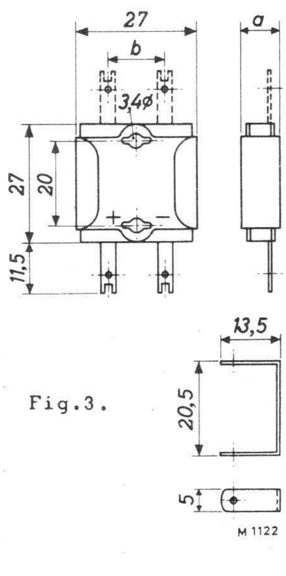
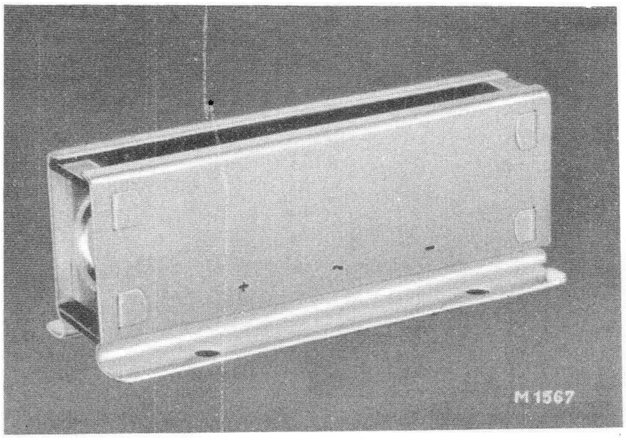


Fig.3.

RADIATOR TYPES FOR TELEVISION



AA 220 Y 300
(AA 110 D 300)
AA 250 Y 300
(AA 125 D 300)

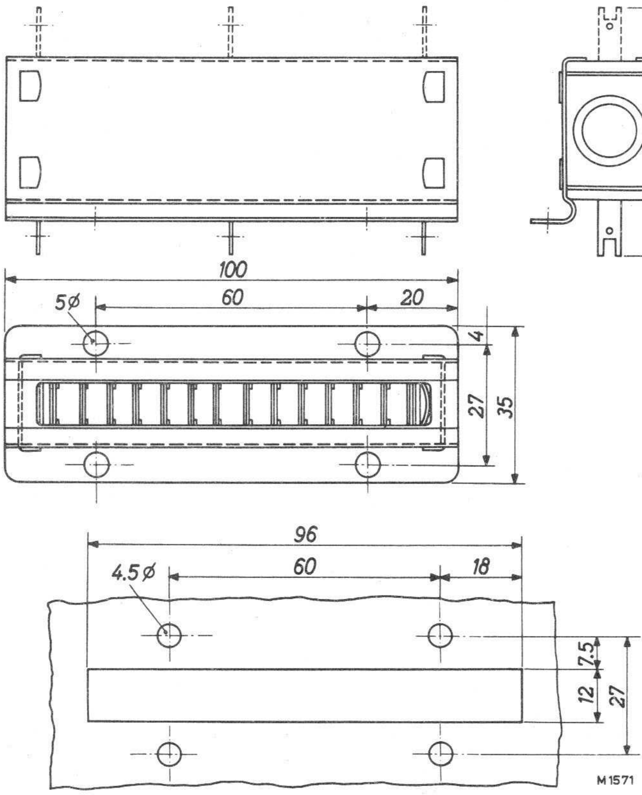


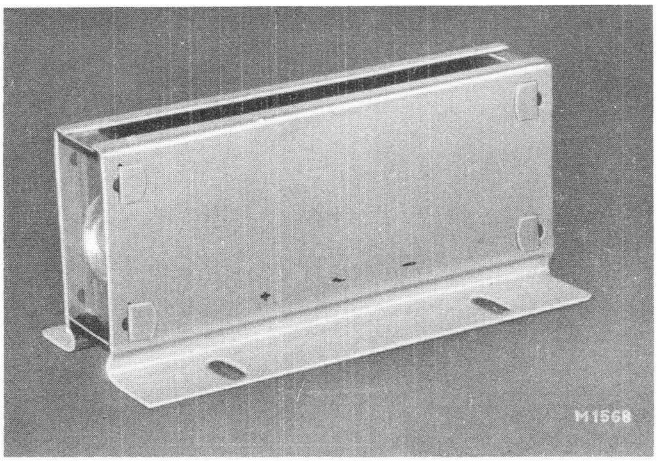
Fig.4.

REMARKS

The maximum output current of the selenium radiator type rectifiers AA 220Y300 / AA 110D300 and AA 250Y300 / AA 125D300 is 300 mA. In half-wave circuits for 220/250 volt alternating input voltage the lugs with the indication + and - must be used. For voltage doubler circuits for 110/125 volt mains the alternating input voltage must be applied to the lug marked - and the centre lug, and the direct output current must be taken from the lugs marked - and +.

NOTE

Normal execution AA, with connection lugs at the bottom.



AA 220 Y 350
(AA 110 D 350)
AA 250 Y 350
(AA 125 D 350)

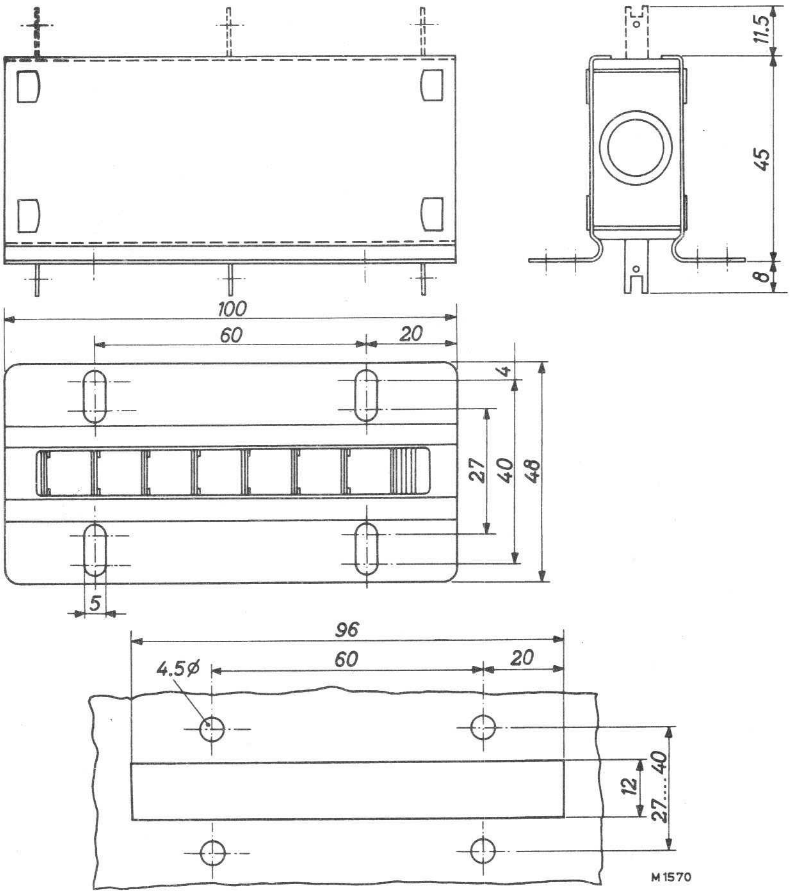


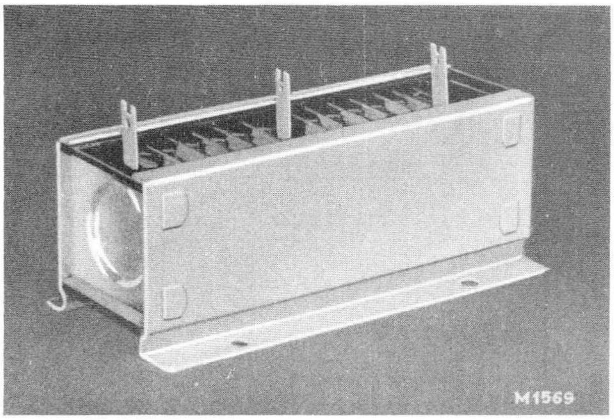
Fig.5.

REMARKS

The maximum output current of the selenium radiator type rectifiers AA 220Y350 / AA 110D350 and AA 250Y350 / AA 125D350 is 350 mA. In half-wave circuits for 220/250 volt alternating input voltage the lugs with the indication + and - must be used. For voltage doubler circuits for 110/125 volt mains the alternating input voltage must be applied to the lug marked - and the centre lug, and the direct output current must be taken from the lugs marked - and +.

NOTES

Normal execution AA, with connection lugs at the bottom. The execution indicated above represents a temporary type. For new designs the smaller dimensions can be considered, viz. 27 mm distance between the holes and 35 mm width of the flanges instead of 48 mm.



AA 220 Y 400
(AA 110 D 400)
AA 250 Y 400
(AA 125 D 400)

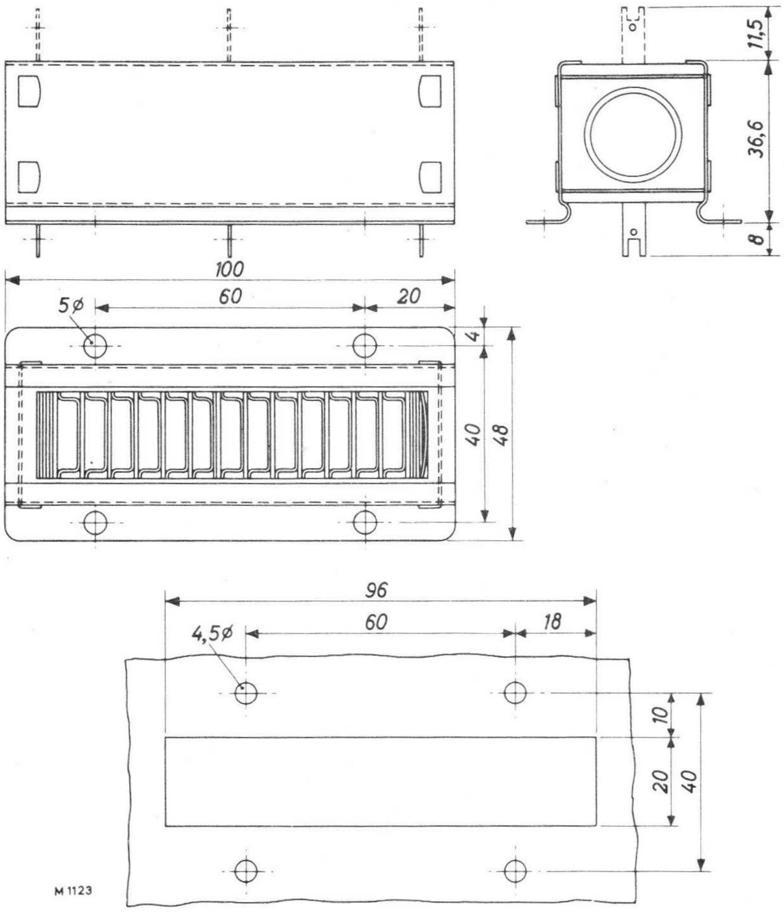


Fig.6.

REMARKS

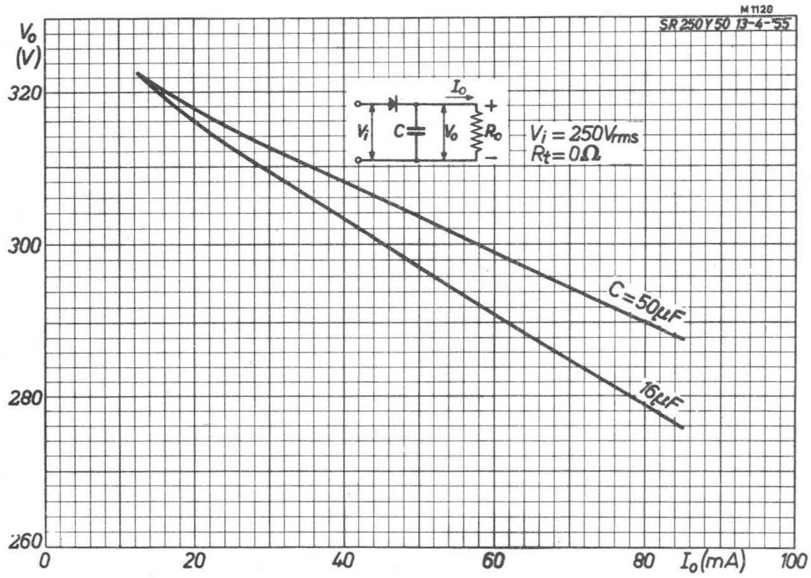
The maximum output current of the selenium radiator type rectifiers AA 220Y400 / AA 110D400 and AA 250Y400 / AA 125D400 is 400 mA. In half-wave circuits for 220/250 volt alternating input voltage the lugs with the indication + and - must be used. For voltage doubler circuits for 110/125 volt mains the alternating input voltage must be applied to the lug marked - and the centre lug, and the direct output current must be taken from the lugs marked - and +.

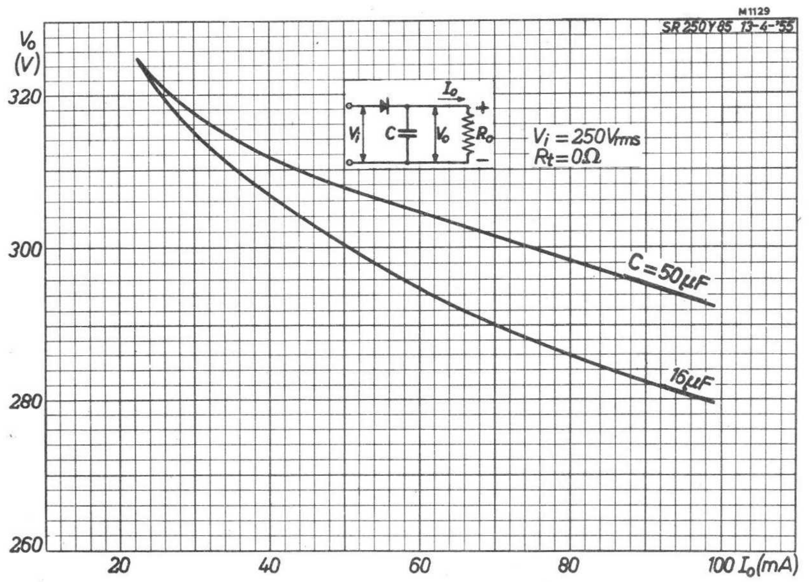
NOTE

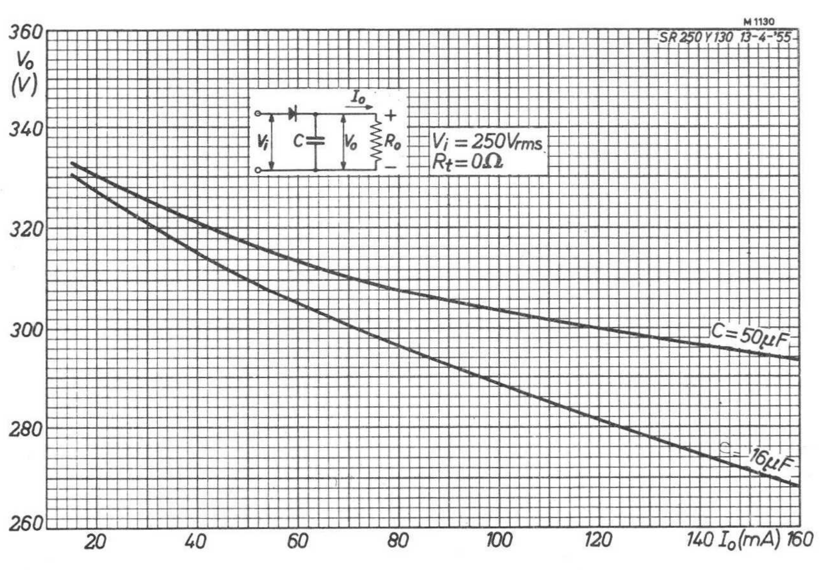
Normal execution AA, with connection lugs at the bottom.

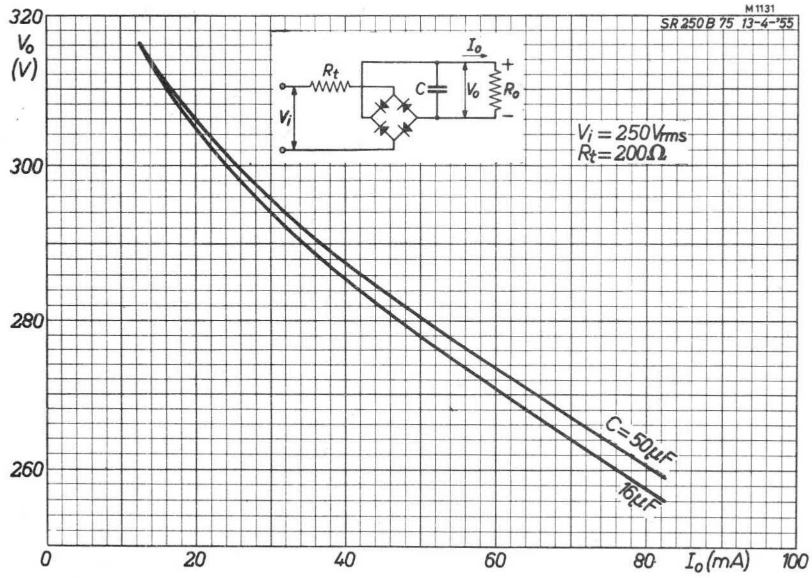
TYPICAL CHARACTERISTICS

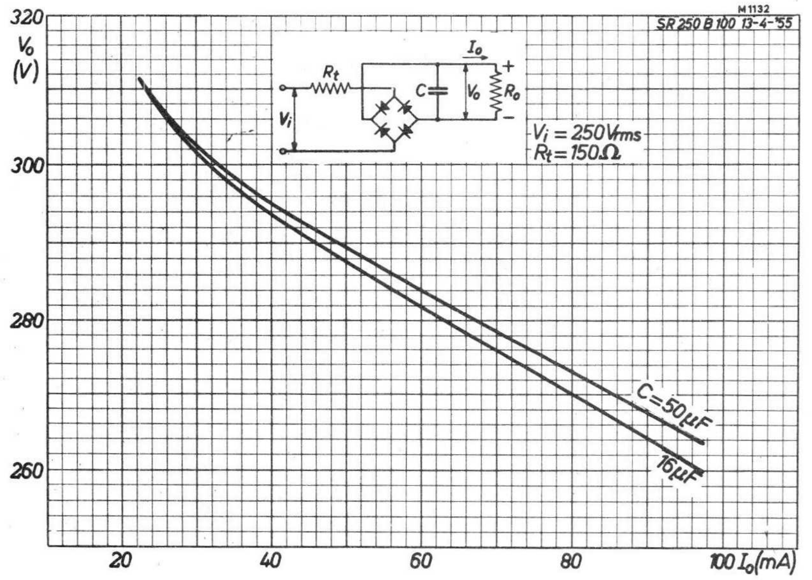
Voltage V_o across the load capacitor as a function of the direct output current I_o with the load capacitance C as parameter:

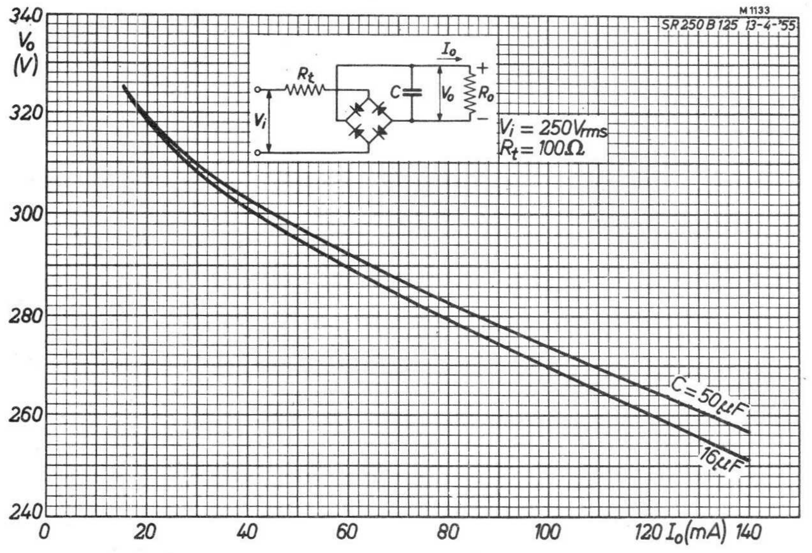






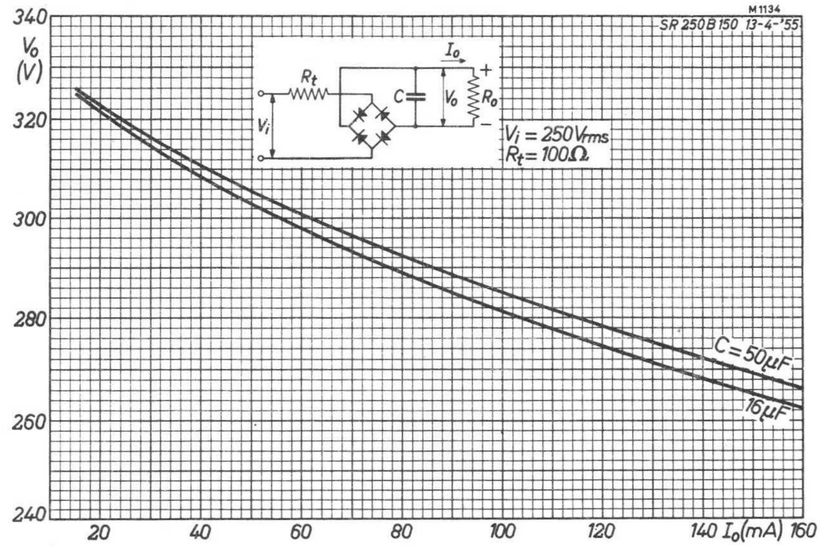


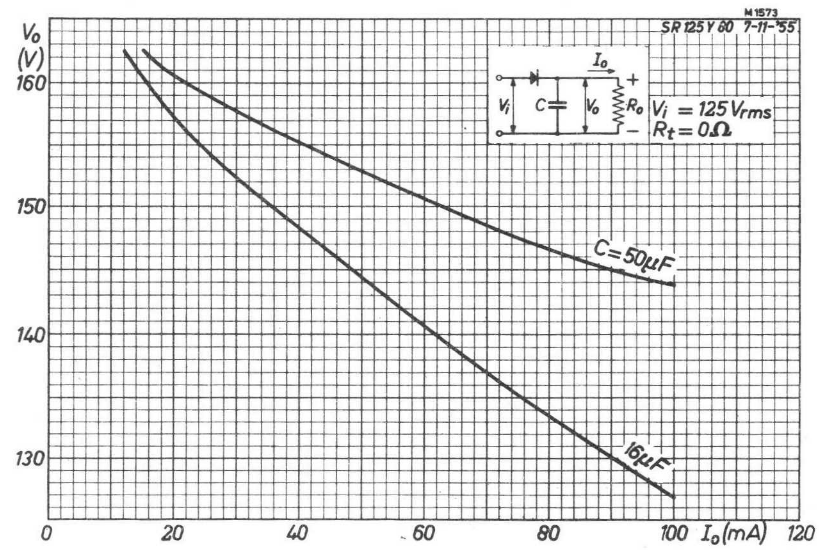


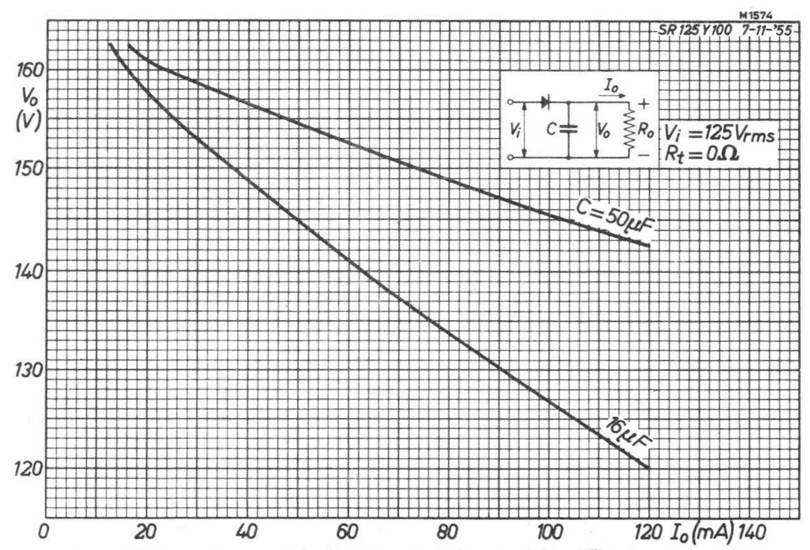


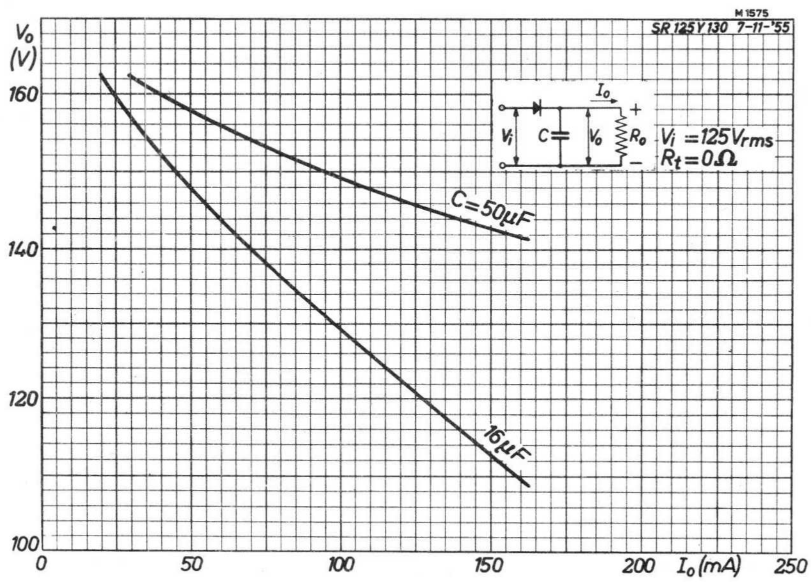
V_i = r.m.s. alternating supply voltage
V_o = direct output voltage
I_o = direct output current
R_t = protecting resistance

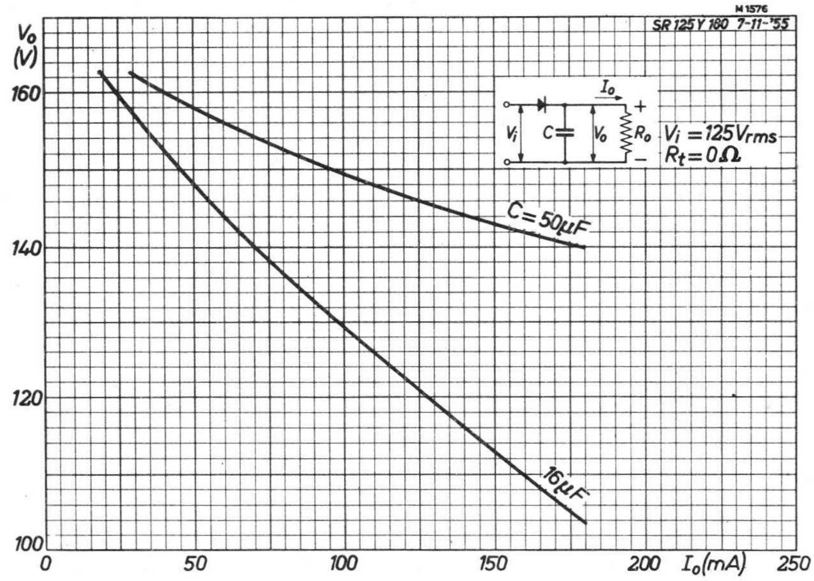
Voltage V_o across the load capacitor as a function of the direct output current I_o with the load capacitance C as parameter:

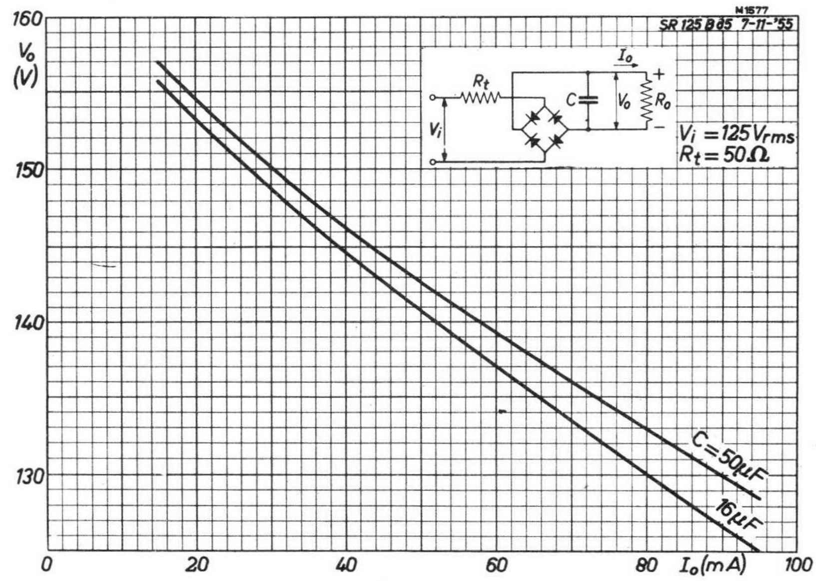






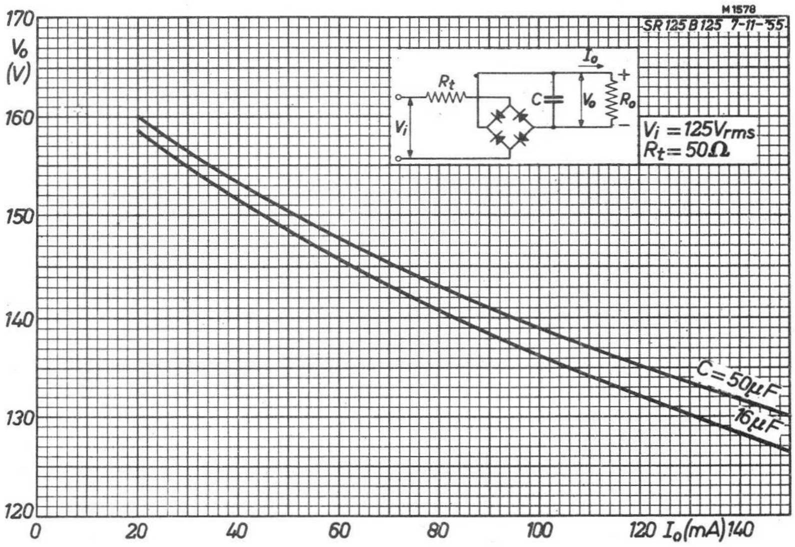


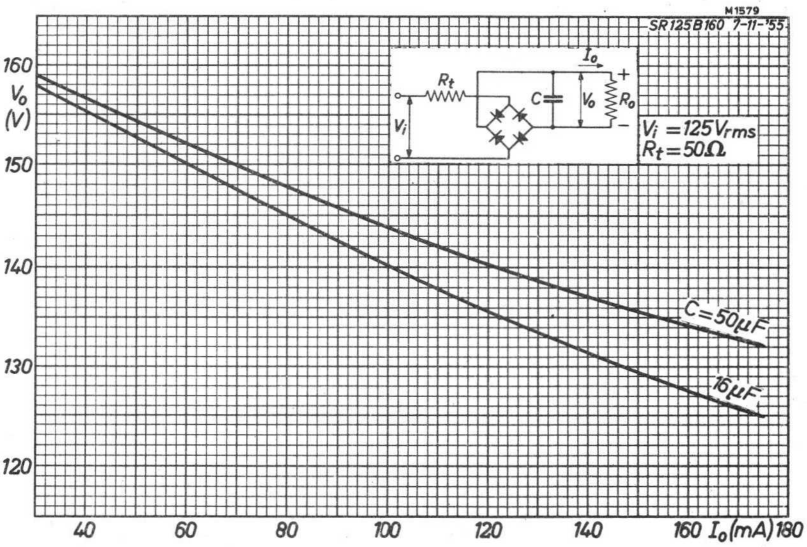


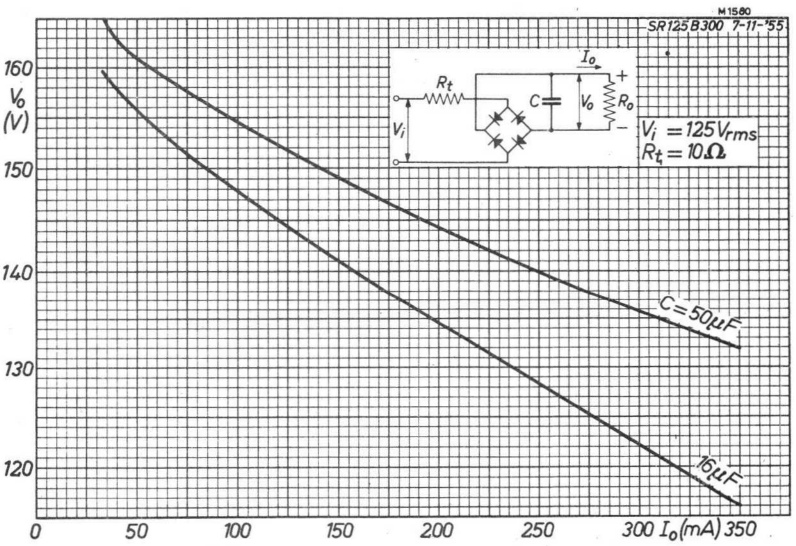


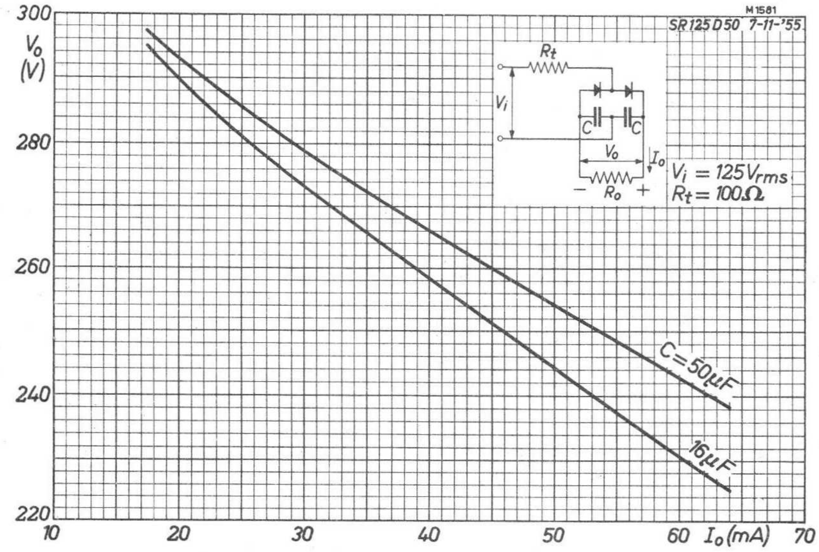
V_i = r.m.s. alternating supply voltage
V_o = direct output voltage
I_o = direct output current
R_t = protecting resistance

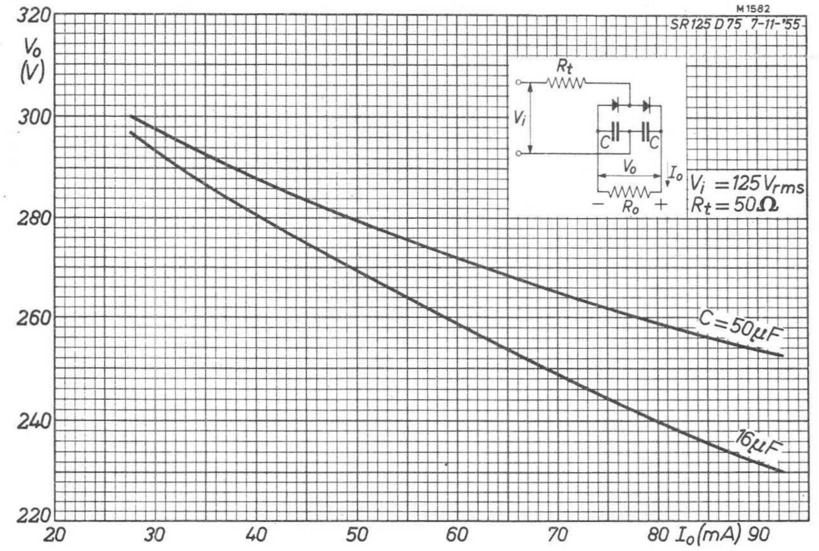
Voltage V_o across the load capacitor as a function of the direct output current I_o with the load capacitance C as parameter:

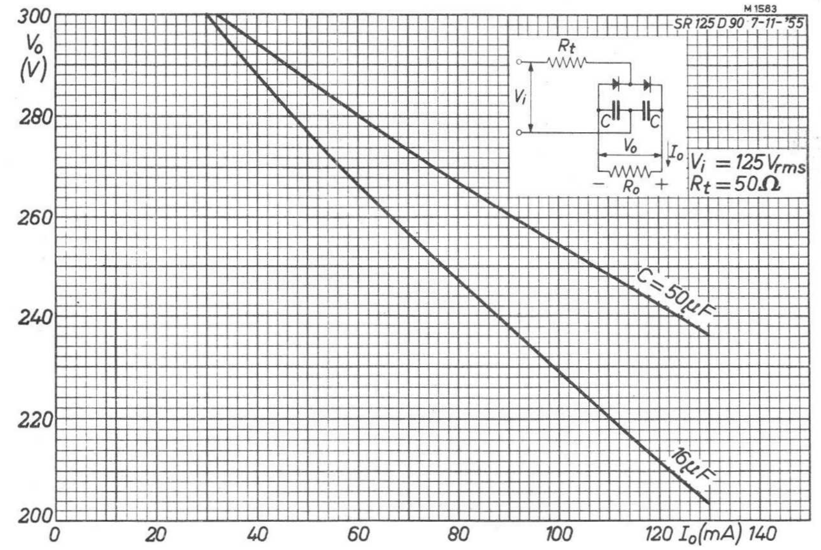






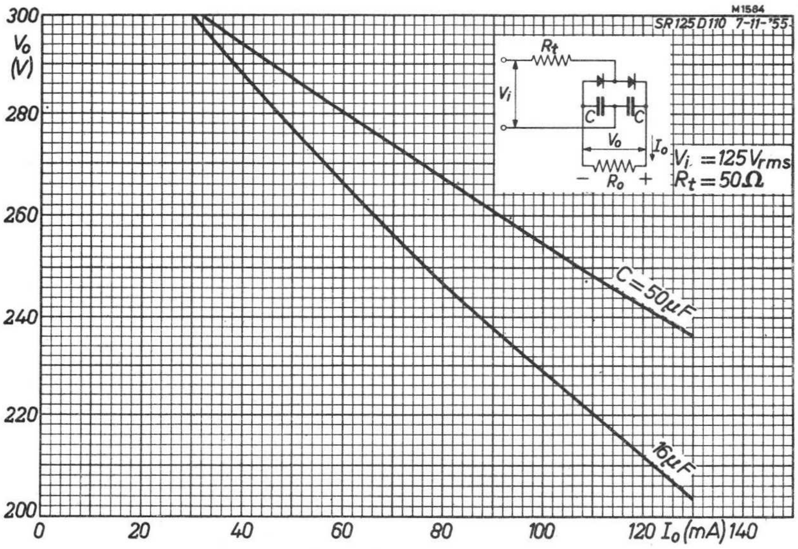


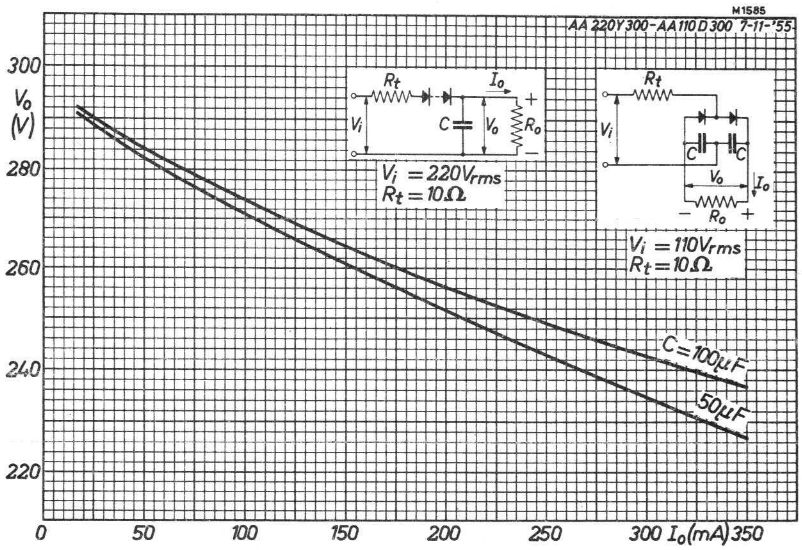


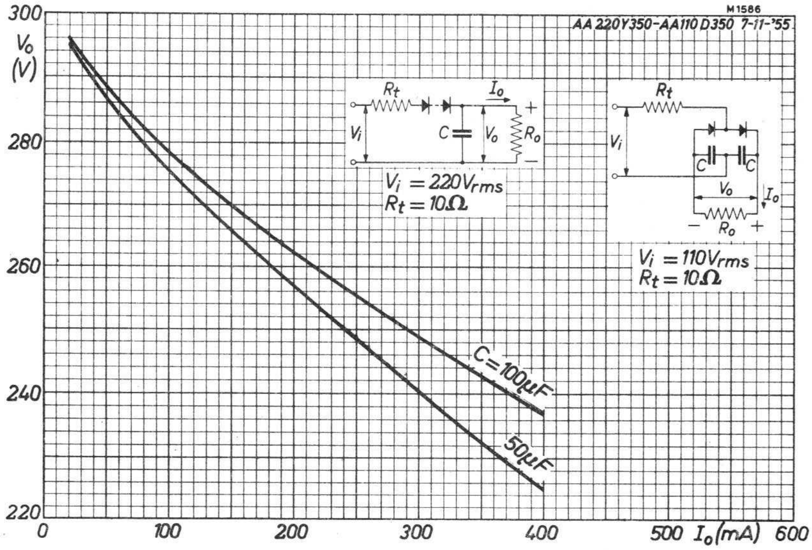


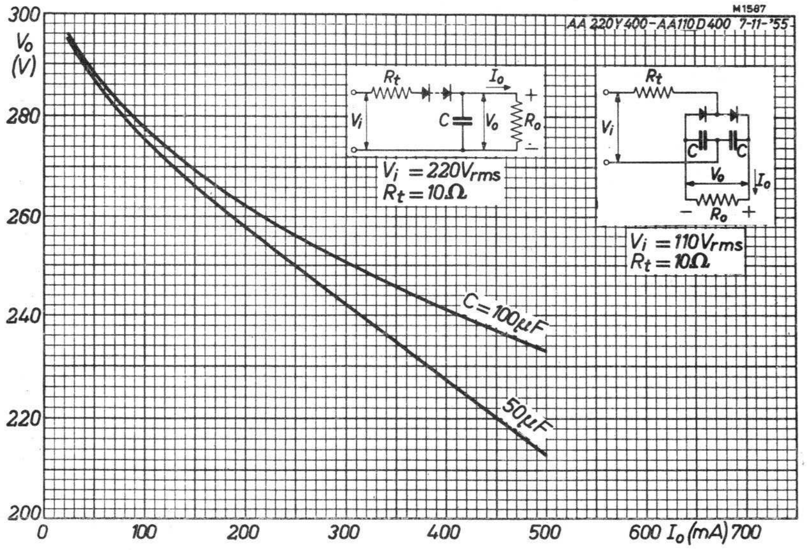
V_i = r.m.s. alternating supply voltage
V_o = direct output voltage
I_o = direct output current
R_t = protecting resistance

Voltage V_o across the load capacitor as a function of the direct output current I_o with the load capacitance C as parameter:



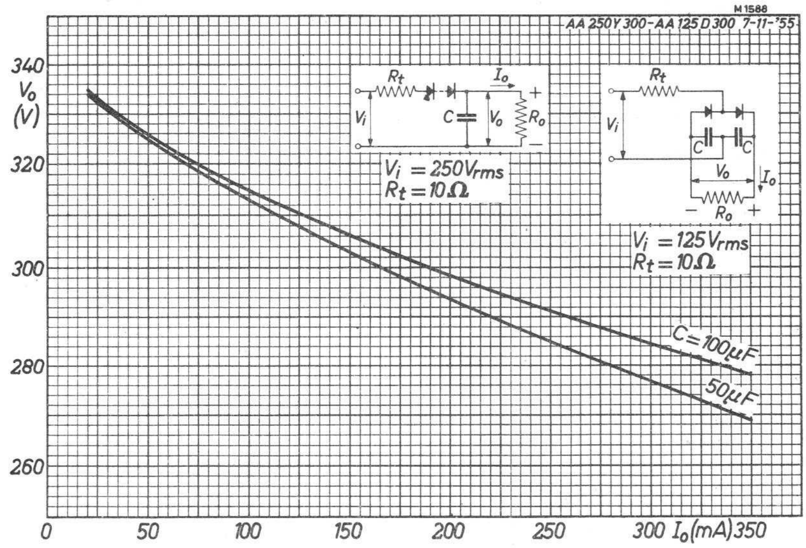


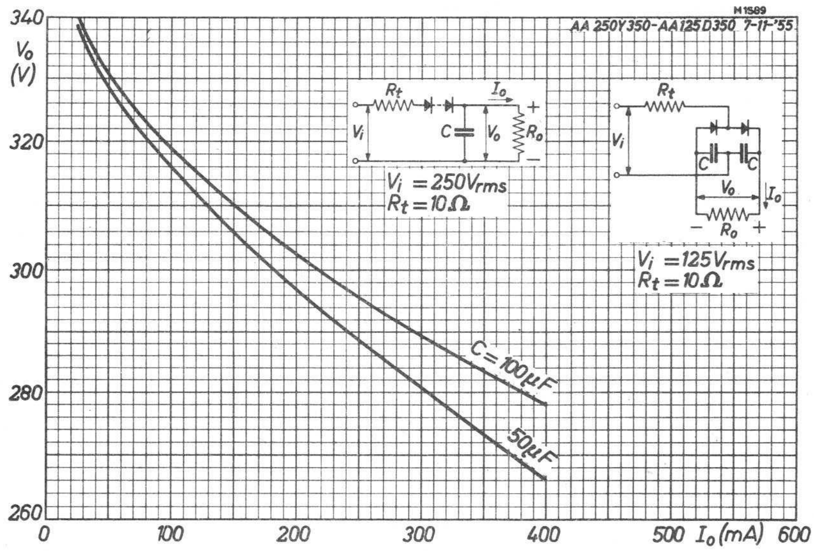


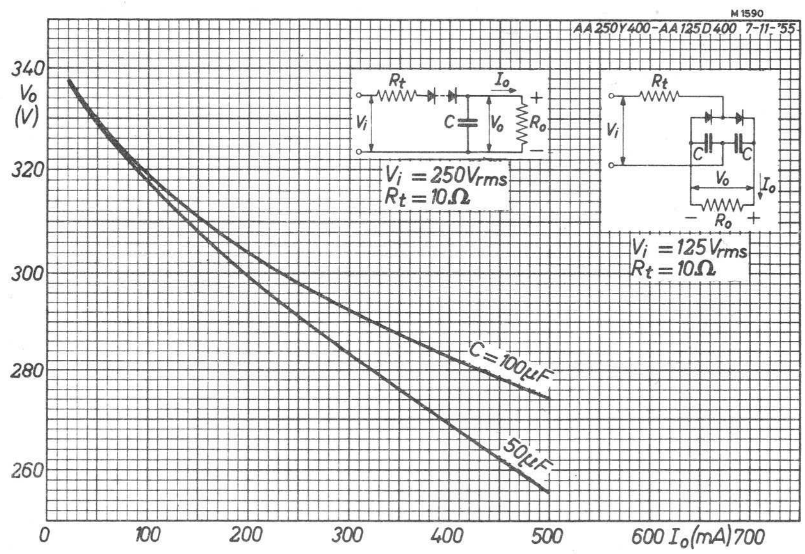


V_i = r.m.s. alternating supply voltage
V_o = direct output voltage
I_o = direct output current
R_t = protecting resistance

Voltage V_o across the load capacitor as a function of the direct output current I_o with the load capacitance C as parameter:







V_i = r.m.s. alternating supply voltage

V_o = direct output voltage

I_o = direct output current

R_t = protecting resistance

CIRCUITS

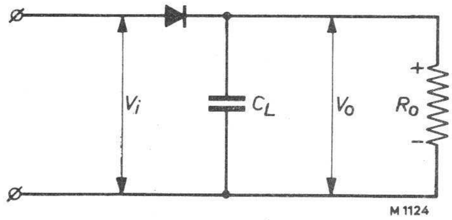


Fig.7. Half-wave rectifying circuit (*Y*).

Half-wave rectifiers can also be delivered with a centre tapping for use as voltage doublers (*D*).

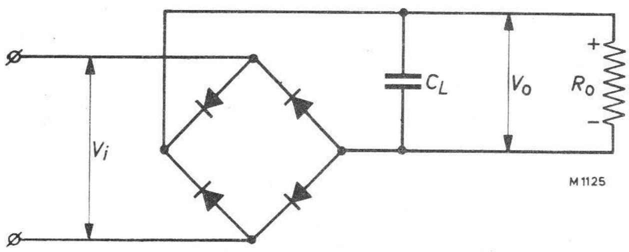


Fig.8. Bridge circuit (*B*).

Since in voltage doubler circuits the entire supply voltage is applied alternately to each of the two series-connected rectifier halves, these must each be designed for the entire supply voltage. The direct output voltage has about twice the value of that of the corresponding half-wave rectifier at the same direct current.

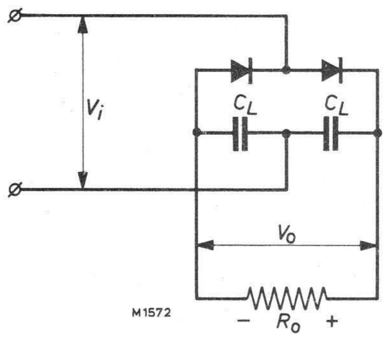


Fig.9. Voltage doubler circuit (*D*).

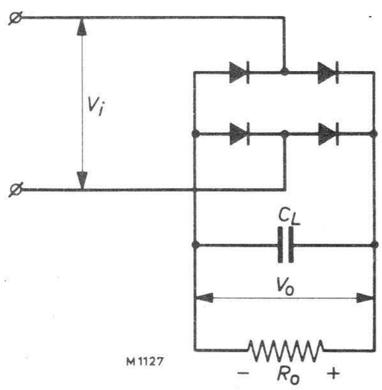


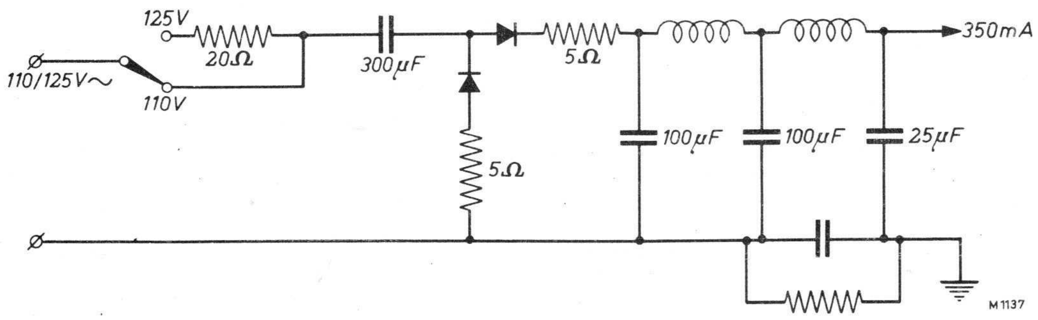
Fig.10. Bridge circuit consisting of two voltage doubler circuits.

By means of two rectifiers of the type *D* (e.g. SR 125D90) a bridge circuit can be constructed. In this way the nominal voltage and nominal direct current can be doubled (in this example consequently to 250 V_{rms} and 180 mA direct current).

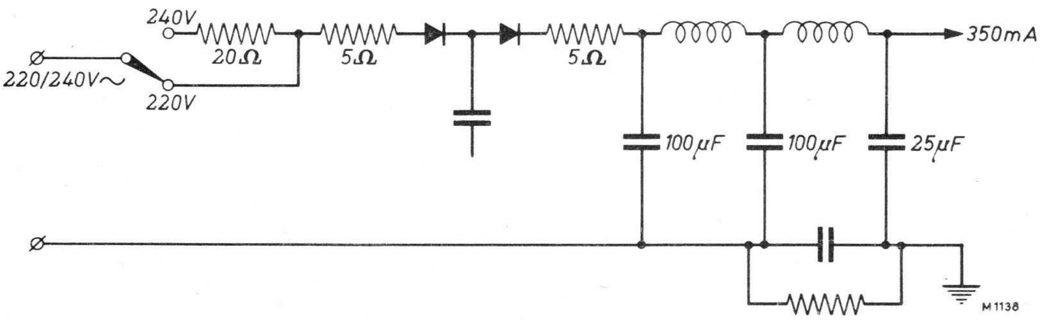
In the same way a unit for twice the nominal alternating voltage and approximetely twice the direct current can be constructed by means of 4 half-wave rectifiers.

CIRCUIT EXAMPLES

Example of the supply unit for 110 V and 125 V mains:



Example of the supply unit for 220 V and 240 V mains:



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Printed in Holland 20/114/D/E-1-'56