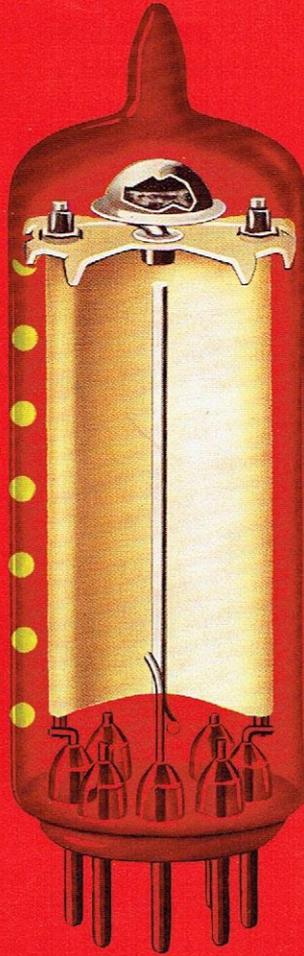
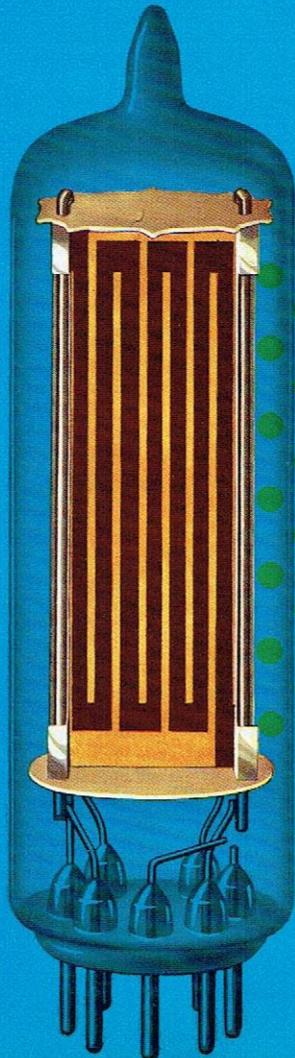


# ADZAM

phototubes and

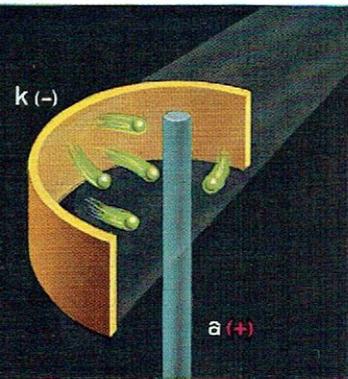


photoconductive cells



M. B. L. E. ELECTRONICS

## phototubes

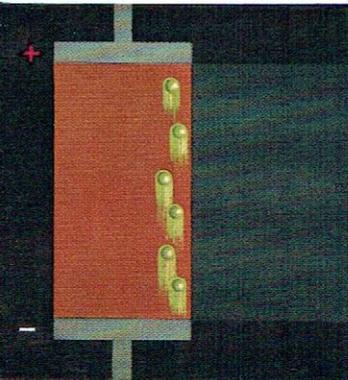


As a result of the close and stimulating contact with our customers, we have been able to build up a range of phototubes that fully answers the severe demands made on them by modern electronics. The complete series includes both gas-filled and high-vacuum phototubes; their good photoelectric properties render both types very suitable for use in applications of the most varying nature.

Due to their high sensitivity, gas-filled phototubes are extensively used at present for scanning sound-tracks of cinematograph films, as well as for industrial relay work. Where stability and constancy are of prime importance, vacuum types are used, e.g. in light measurements. Both types of phototube are of sturdy construction, which greatly contributes to a long and reliable service-life, provided that the tubes are operated under recommended conditions.

Preferred types are the red-sensitive types 90 CV and 90 CG and the blue-sensitive types 92 AV and 92 AG. The latter are improved versions of the 90 AV and 90 AG, their photosensitive layer being applied on a silver plate instead of on the glass wall.

## photoconductive cells



Recently a new phenomenon in photoelectricity, viz. photoconductivity, has been applied for the construction of a new and very promising device. The sensitivity of such a device, the photoconductive cell, is of the order of  $10^4$  times that of conventional phototubes.

**Cadmium-sulphide** photoconductive cells, thanks to their great sensitivity and high permissible dissipation, not only can take the place of a phototube, but also of the appertaining amplifier.

The side-sensitive type ORP 90, which has the same base connections as the phototubes of the 90-series, can replace these tubes directly in the probes of flame-control apparatus. Thus a simpler and cheaper set-up for this important application can be achieved, as the amplifier is rendered superfluous.

Besides the ORP 90, the top-sensitive cells ORP 11 and ORP 30 are also able to operate large relays directly.

The ORP 60 and ORP 61 are the latest types in our range of cadmium-sulphide cells. They are microtypes that can be used for those applications in which their small dimensions are of utmost importance, e.g. in computers and television. For flame control they can be used in combination with a cold-cathode tube.

Except for sound reproduction, cadmium-sulphide cells are increasingly used instead of gas-filled phototubes, particularly in on-off applications.

The **lead-sulphide** cell type 61 SV is excellently suited for control in steel mills and for heat-radiation measurements, due to its high sensitivity in the far infra-red region.

## PHOTOTUBES

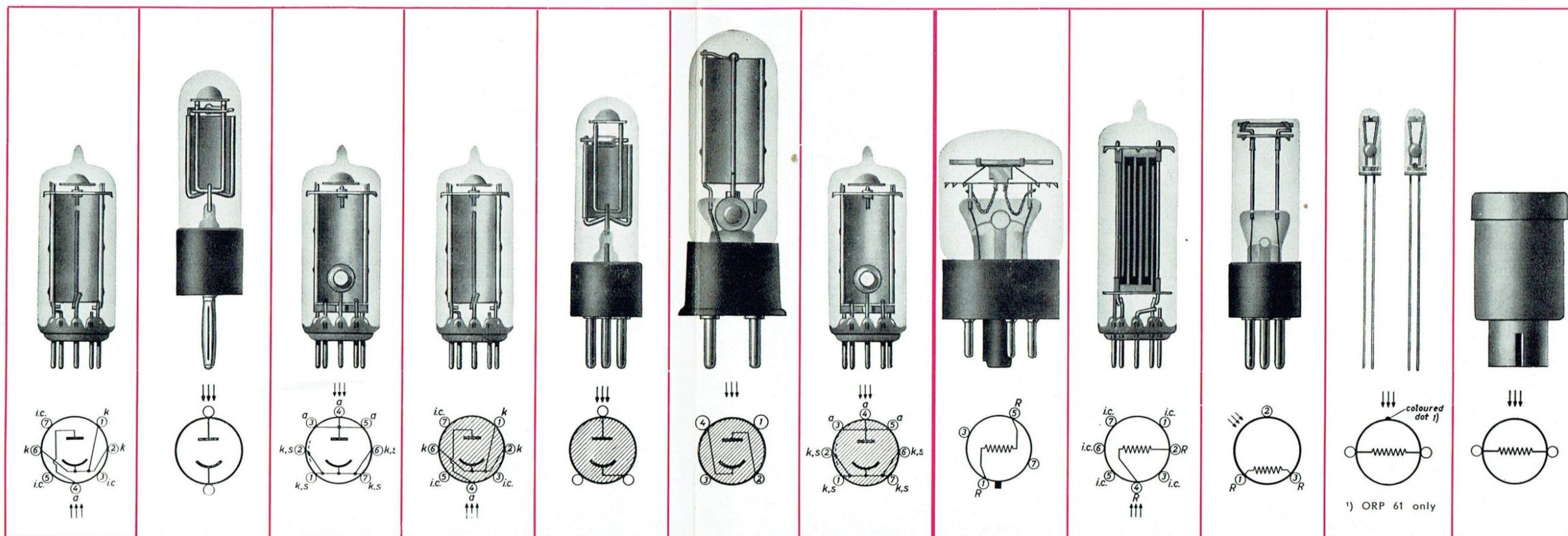
## PHOTOCONDUCTIVE CELLS

	90 CV	3545 PW 3545	92 AV	90 CG	3546 PW 3546	3554	92 AG	ORP 30	ORP 90	ORP 11	ORP 60 ORP 61	61 SV
Spectral response	red	red	blue	red	red	red	blue	visible	visible	visible	visible	infra-red
Photosensitive material	Cs—Ag <sub>2</sub> O	Cs—Ag <sub>2</sub> O	Cs—Sb	Cs—Ag <sub>2</sub> O	Cs—Ag <sub>2</sub> O	Cs—Ag <sub>2</sub> O	Cs—Sb	CdS	CdS	CdS	CdS	PbS
Projected sensitive area	2.4 cm <sup>2</sup>	0.9 cm <sup>2</sup>	2.1 cm <sup>2</sup>	2.4 cm <sup>2</sup>	0.9 cm <sup>2</sup>	5.2 cm <sup>2</sup>	2.1 cm <sup>2</sup>	4.5 cm <sup>2</sup>	1.8 cm <sup>2</sup>	1.25 cm <sup>2</sup>	2.5 × 10 <sup>-3</sup> cm <sup>2</sup>	0.36 cm <sup>2</sup>
Mounting position	any	any	any	any	any	any	any	any	any	any	any	any
<b>CHARACTERISTICS</b>												
Max. dark current <sup>1)</sup>	at V <sub>a</sub> = 50 V 0.05 μA	at V <sub>a</sub> = 90 V 0.05 μA	at V <sub>a</sub> = 85 V 0.05 μA	at V <sub>a</sub> = 85 V 0.1 μA	at V <sub>a</sub> = 90 V 0.1 μA	at V <sub>a</sub> = 90 V 0.1 μA	at V <sub>a</sub> = 85 V 0.1 μA	at V = 300 V 5 μA	at V = 300 V 2.5 μA	at V = 100 V 5 μA	at V = 100 V 0.15 μA	at V = 200 V 50 to 200 μA
Recommended anode supply voltage	50 V	90 V	85 V	85 V	90 V	90 V	85 V					
Sensitivity at V <sub>a</sub> recomm. and 2700 °K	20 μA/lm	25 μA/lm	45 μA/lm	125 μA/lm	150 μA/lm	150 μA/lm	130 μA/lm					180 μV <sub>rms</sub> /W/μpk <sup>2)</sup>
Series resistor	1 MΩ	1 MΩ	1 MΩ	1 MΩ	1 MΩ	1 MΩ	1 MΩ					min. 0.2 MΩ
Average cell current at 53.8 lux (= 5.0 footcandle) and 2700 °K								at V = 10 V 30 mA	at V = 10 V 10 mA	at V = 10 V 6 mA	at V = 30 V 0.5 mA	
<b>LIMITING VALUES</b>												
Max. supply voltage	250 V	250 V	100 V	90 V	90 V	90 V	90 V	V <sub>-</sub> = 350 V V <sub>~</sub> = 250 V	V <sub>-</sub> = 350 V V <sub>~</sub> = 250 V	V <sub>-</sub> = 100 V V <sub>~</sub> = 70 V	V <sub>-</sub> = 350 V V <sub>~</sub> = 250 V	250 V
Max. current per mm <sup>2</sup> (cathode)	0.03 μA	0.05 μA	0.025 μA	0.007 μA	0.02 μA	0.02 μA	0.0125 μA					0.01 mA
Max. ambient temperature	100°C	100°C	70°C	100°C	100°C	100°C	70°C	70°C	70°C	70°C	70°C	60°C
Max. cell dissipation								1.2 W (25°C) 0.35 W (70°C)	1 W (25°C) 0.3 W (70°C)	0.2 W (25°C) 0.05 W (70°C)	70 mW (25°C) 20 mW (70°C)	
<b>DIMENSIONS (in mm)</b>												
Max. length without pins	48	55	48	48	55	88	48	60	54	47	15	28.5
Maximum diameter	19	16.5	19	19	16.5	30	19	39	19	17	5.9	22

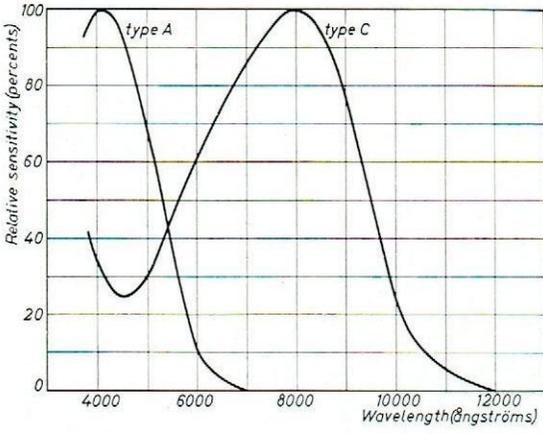
<sup>1)</sup> At room temperature; at higher temperature the dark current increases.

<sup>2)</sup> For a black body at 200°C, chopped light of 800 c/s.

# ADZAM



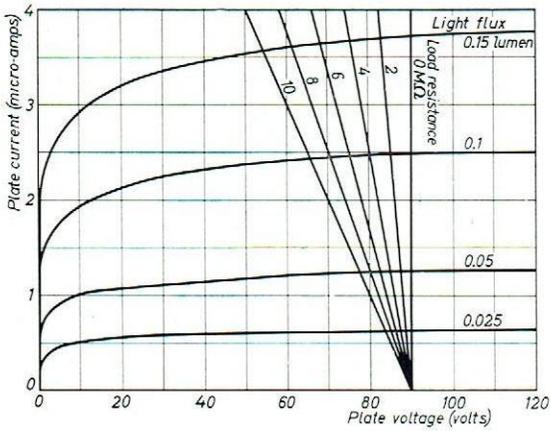
<sup>1)</sup> ORP 61 only



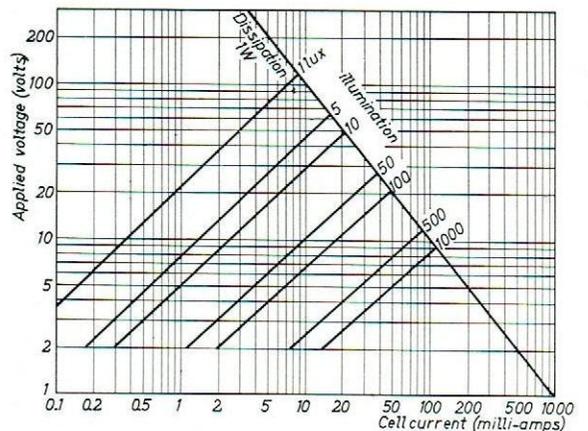
Spectral response curve of a blue- and red-sensitive phototube (type A and C respectively).



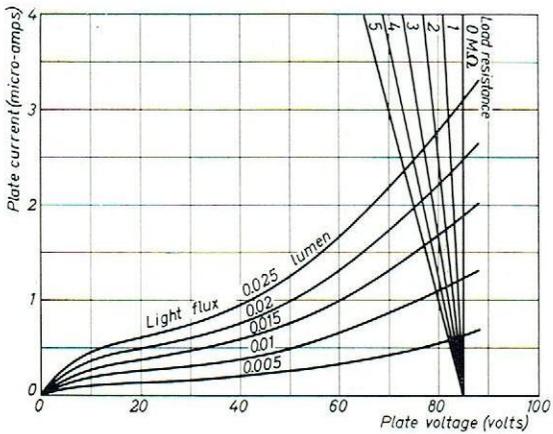
Spectral response curve of the cadmium-sulphide photoconductive cells.



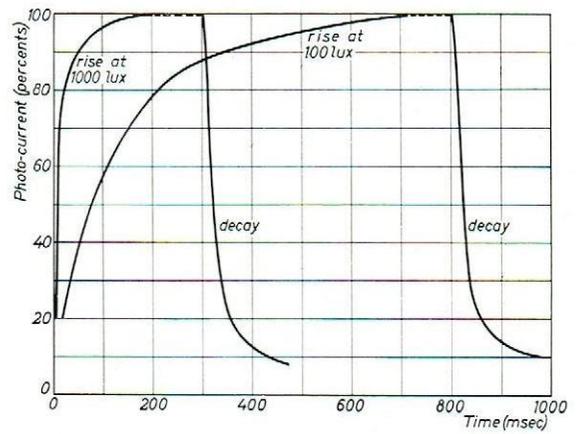
Anode characteristic of a high-vacuum phototube (3545).



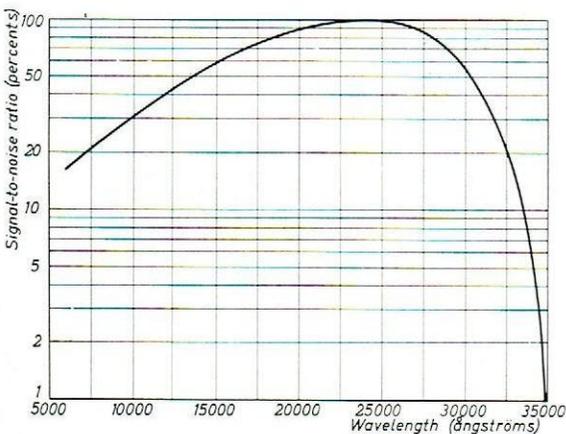
Cell voltage versus cell current of a cadmium-sulphide photoconductive cell (ORP 90).



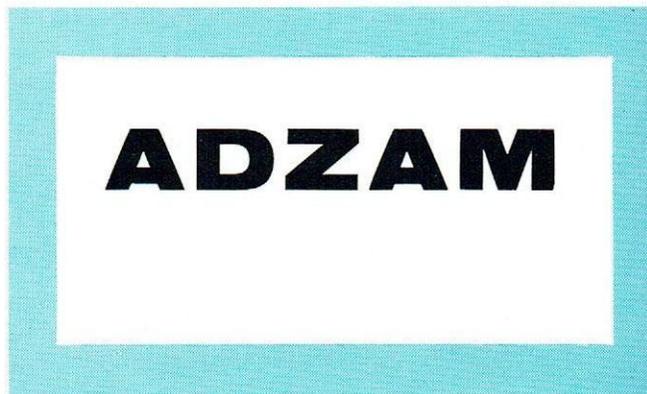
Anode characteristic of a gasfilled phototube.



Response time of a cadmium-sulphide photoconductive cell.



Relative spectral dependence of the signal-to-noise ratio of a lead-sulphide cell.



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Twee Stationsstraat 80, BRUSSEL  
Division Commerciale „ELECTRONIQUE“  
Bureau de Documentation Technique  
Commerciële Afdeling „ELECTRONICA“  
Technisch Documentatie Bureau



## Some applications for photosensitive devices

Flame control

Automatic contrast and brightness control in TV receivers

Motion-picture sound pick-up

Fire alarm

Smoke alarm

Automation in industry, i.a.

automatic weighing

counting

switching

level control

density control

Colorimetry

Photometry

Astronomy

Register control

Photography (exposure control)

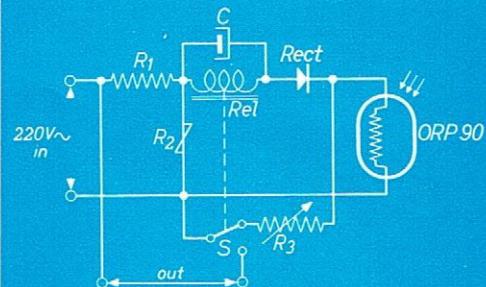
Spectrometry

Automatic streetlight control

### Typical circuit

#### for a large-surface photoconductive cell

The 220 V a.c. mains voltage is rectified to prevent fluttering of the relay. The control range can be adjusted by means of the potentiometer  $R_3$ . The VDR resistor has been inserted to compensate for mains voltage fluctuations.



### Typical circuit

#### for a gas-filled phototube

In darkness the control-grid voltage of the PL2D21 is determined by the voltage derived from the potentiometer  $R_3$ , which is so adjusted that the tube does not ignite. When the phototube is exposed to light, a voltage drop will be produced across  $R_1$ . The control grid of the thyatron will consequently become more positive, the tube ignites and relay Rel is energised.

