

Windowless electron multipliers

Four windowless electron multipliers are currently available from EMI as preferred types. Three are venetian blind multipliers, type 9603/2B having 15 BeCu dynodes and types 9643/2B and 9643/4B having 17 BeCu dynodes. The latter two differ in that type 9643/4B has replaceable dynodes and incorporates an internal bakeable resistor chain (2M Ω per stage Pyrofilm). Venetian blind dynode assemblies are also available in evacuated envelopes but are not wired or tested and do not include the filament.

Type 9707B utilises the box and grid system and has 17 BeCu stages. An internal bakeable resistor chain (again 2M Ω per stage Pyrofilm) is included in the assembly and the first dynode is replaceable.

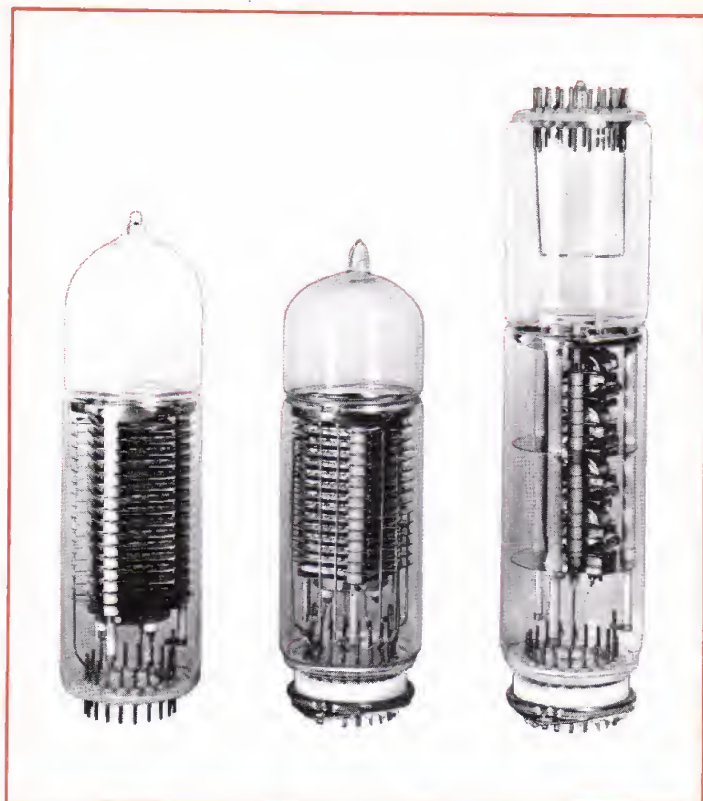
A small tungsten filament is mounted in each multiplier and thermionic electrons for checking the operation of the multiplier can be produced by applying 1.5 to 2V at 1.5A to the filament. Mean currents of up to 1mA may be drawn for a short time from the anode of the multiplier. The maximum tolerable operating pressure is 10⁻⁴ torr.

The multipliers are mounted on a standard 19-pin pressed glass base, and furnished with a low loss Teflon socket type B19A. The tube envelope is of Kodial glass and, as supplied, is approximately 100 mm longer than the dynode system: it may therefore be cut at any convenient point for sealing to the vacuum system.

In addition to the standard tubes, several variants, including AgMgO types, are available to special order. Further details of these are given in the table of "Mechanical and Electrical Characteristics".

Particle detectors find application in the monitoring of vacuum UV photons and soft X-ray quanta, electrons and ions. Type 9707B is widely used for ion detection in mass spectrometer systems. Both BeCuO and AgMgO dynode multipliers are insensitive to visible radiation, having their long wavelength threshold at about 2900-3000Å.

A more detailed treatment of the performance and applications of particle detectors is given in the EMI document R/P034, available on request.



Notes

- 1 When grinding the envelope, care must be taken to avoid contamination of the dynodes by grinding fluid. The dynodes must not be heated when down to air.
- 2 The dynodes may be exposed to dry air for periods of up to 24 hours without serious detriment to the gain. Should the gain be found to be low after the tube has been let down to air, it may be restored in some cases by running an electrical discharge in oxygen through it. (See R/P034 available on request.) When not in use, windowless multipliers may be conveniently stored in a vacuum desiccator.
- 3 To minimise the effect of statistical noise it is important to have an adequate integrating time in the measuring system. (See R/P034.)
- 4 It is strongly recommended that windowless multipliers should be operated inside an appropriate mu-metal shield (type PS6B) to eliminate the effect of environmental magnetic fields.
- 5 The maximum bake-out temperature recommended is 450°C for box and grid multipliers and 400°C for venetian blind types. It should be noted that the maximum temperature for certain earlier types is 250°C.

MECHANICAL AND ELECTRICAL CHARACTERISTICS

Multiplier Type	Dynode Material	No.	Structure	Internal resistors etc.	Overall Gain		Corresponding Voltage kV
					Min.	Typ.	
Preferred Types							
9603/2B	BeCu	15	Venetian blind	—	2×10 ⁴	3.5×10 ⁵	2.5
9643/2B	BeCu	17	Venetian blind	—	2×10 ⁵	2.5×10 ⁶	2.85
9643/4B	BeCu	17	Venetian blind	Replaceable dynodes and resistors	2×10 ⁵	2.5×10 ⁶	2.85
9707B	BeCu	17	Box and grid	Resistors included, also replaceable D1	2×10 ⁵	6×10 ⁵	2.85
Variants (to special order)							
9603/1B	AgMgO	15	Venetian blind	—	2×10 ³	3.5×10 ⁴	2.5
9603/3B	BeCu	15	Venetian blind	Resistors included	2×10 ⁴	3.5×10 ⁵	2.5
9603/4B	BeCu	15	Venetian blind	Replaceable dynodes and resistors	2×10 ⁴	3.5×10 ⁵	2.5
9641/1B	AgMgO	17	Box and grid	—	2×10 ⁴	6×10 ⁴	2.85
9641/2B	BeCu	17	Box and grid	—	2×10 ⁵	6×10 ⁵	2.85
9642/1B	AgMgO	18	Venetian blind	—	5×10 ⁴	5×10 ⁵	3.0
9642/2B	BeCu	18	Venetian blind	—	5×10 ⁵	5×10 ⁶	3.0
9642/3B	BeCu	18	Venetian blind	Resistors included	5×10 ⁵	5×10 ⁶	3.0
9642/4B	BeCu	18	Venetian blind	Replaceable dynodes and resistors	5×10 ⁵	5×10 ⁶	3.0
9643/1B	AgMgO	17	Venetian blind	—	2×10 ⁴	2.5×10 ⁵	2.85
9643/3B	BeCu	17	Venetian blind	Resistors included	2×10 ⁵	2.5×10 ⁶	2.85
9741/1B	AgMgO	16	Shielded anode	—	2×10 ⁴	6×10 ⁴	2.85
9741/2B	BeCu	16	Box and grid	—	2×10 ⁵	6×10 ⁵	2.85
9741/3B	BeCu	16	Shielded anode	—	2×10 ⁵	6×10 ⁵	2.85
9741/3B	BeCu	16	Box and grid	Resistors included	2×10 ⁵	6×10 ⁵	2.85

