

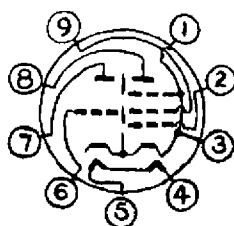
MULLARD LIMITED,  
Mullard House  
Torrington Place,  
L O N D O N, W.C.1.  
ENGLAND.

Combined triode and sharp cut-off frame grid r.f. pentode  
for use as frequency changer at frequencies up to 220 Mc/s.

### PHYSICAL SPECIFICATION

Base	E9-1
Bulb	Glass
Maximum overall height	2 <sup>7</sup> / <sub>32</sub> " (56mm)
Maximum seated height	1 <sup>15</sup> / <sub>16</sub> " (49mm)
Maximum diameter	7/8" (22.2mm)

### BASING DIAGRAM



9MP

### BASING CONNECTIONS

Pin No. 1	Cathode, pentode grid 3, shield
2	Pentode grid 1
3	Cathode, pentode grid 3, shield
4	Heater
5	Heater
6	Triode grid
7	Triode plate
8	Pentode plate
9	Pentode grid 2

### GENERAL ELECTRICAL DATA

Heater voltage	4.6	volts
Heater current	600	m.Amps

### ELECTRODE CAPACITANCES (measured without external shield)

Pentode plate to triode plate	0.14	μF
Pentode plate to triode grid	0.014	μF
Pentode grid 1 to triode plate	0.01	μF max.
Pentode grid 1 to triode grid	0.01	μF max.

Pentode Section

Plate to grid 1	0.012	μμF
Input	6.0	μμF
Output	3.5	μμF
Grid 1 to Grid 2	1.7	μμF

Triode Section

Grid to cathode and heater	2.4	μμF
Plate to cathode and heater	1.1	μμF
Plate to grid	2.0	μμF

MAXIMUM RATINGS (Design centre)Pentode Section

Plate voltage	250	volts max.
Plate dissipation	2.0	watts max.
Grid 2 voltage	150	volts max.
Grid 2 dissipation	500	m.Watts max.
Cathode current	18	m.Amps max.
Grid circuit resistance (cathode bias)	500	k.ohms max.
Grid 1 circuit resistance (fixed bias)	250	k.ohms max.

Triode Section

Plate voltage	125	volts max.
Plate dissipation	1.5	watts max.
Cathode current	15	m.Amps max.
*Grid circuit resistance	500	k.ohms max.
Heater to cathode voltage	100	volts max.

\*To fulfil hum requirements on a.m. sound, it will be necessary for heater to cathode voltage to be less than 50 volts r.m.s.

CHARACTERISTICSPentode Section

Plate voltage	170	volts
Grid 2 voltage	150	volts
Plate current	10	m.Amps
Grid 2 current	3.3	m.Amps
Mutual conductance	12000	μmhos
Plate impedance	>350	k.ohms
Inner amplification (g1 to g2)	70	
Grid 1 voltage	-1.2	volts

Triode Section

Plate voltage	100	volts
Plate current	14	m.Amps
Mutual conductance	5500	$\mu$ hos
Amplification factor	17	
Grid voltage	-3.0	volts

TYPICAL OPERATION AS A FREQUENCY CHANGERPentode Section

Plate voltage	190	volts
Grid 2 supply voltage	190	volts
Grid 2 resistor	18	k.ohms
Grid 1 resistor	100	k.ohms
Plate current	8.5	m.Amps
Grid 2 current	2.7	m.Amps
Oscillator voltage (r.m.s.)	2.3	volts
Conversion conductance	4500	$\mu$ hos