

## SPECIAL QUALITY DOUBLE TRIODE

Special quality double triode for use in equipment where mechanical vibration and shocks are unavoidable and where statistically controlled major electrical characteristics are required.

# M8162

This data should be read in conjunction with GENERAL NOTES—SPECIAL QUALITY VALVES which precede this section of the handbook, and the index numbers are used to indicate where reference should be made to a specific note.

### HEATER

The heater is centre-tapped and the two sections may be operated in series or parallel with one another.

Series

$V_h$  applied between pins 4 and 5

Parallel

$V_h$  applied between pin 9 and pins 4 and 5 connected together.

	Series	Parallel	
$V_h$	12.6	6.3	V
$I_h$	150	300	mA

### CAPACITANCES<sup>2</sup> (measured without an external shield)

* $C_{a-g}$	1.6	pF
* $C_{Jn}$	2.5	pF
$C_{ou'}$	470	mpF
$C_{out'}$	400	mpF
$C_{h-k'+k''}$	4.75	pF
$C_{a'-a''}$	240	mpF

\*Each section

### CHARACTERISTICS<sup>3</sup> (each section)

$V_a$	250	V
$I_a$	10	mA
$V_g$	-2.0	V
$g_m$	5.5	mA/V
$\mu$	60	
$r_a$	11	kΩ
$R_k$	0	Ω

### LIMITING VALUES<sup>4</sup> (absolute ratings) each section

$V_{a(b)}$ max.	550	V
$V_a$ max.	380	V
$P_a$ max.	2.8	W
$I_a$ max.	15	mA
- $V_g$ max.	55	V
$R_{g-k}$ max. (cathode bias)	1.0	MΩ
$R_{g-k}$ max. (fixed bias)	500	kΩ
$V_{h-k}$ max.	100	V
Maximum acceleration (continuous operation)	2.5	g
Maximum shock (short duration)	500	g
$T_{bulb}$ max.	200	°C

# M8162

SPECIAL QUALITY DOUBLE TRIODE

**TEST CONDITIONS** (unless otherwise specified)

TESTS	V <sub>h</sub> (V)	V <sub>a-c</sub> (V)	V <sub>g-e</sub> (V)	R <sub>le</sub> (Ω)	C <sub>le</sub> (μF)	V <sub>h-k</sub> (V)	A.Q.L. <sup>5</sup> (%)	Bogey <sup>6</sup> Individuals <sup>6</sup>	Lot average <sup>7</sup> Min.	Max.	Lot standard deviations <sup>8</sup> Max.
<b>GROUP A</b>											
Insulation											
a-rest measured at -300V	0.25	—	—	—	—	—	—	—	—	—	MQ
g-rest measured at -100V	0.25	—	—	—	—	—	—	—	—	—	MQ
Reverse grid current. R <sub>g</sub> max. = 500kΩ	0.25	—	—	0.7	—	—	—	—	—	—	μA
<b>GROUP B</b>											
Heater current	0.65	—	138	162	—	—	—	—	—	—	mA
Heater to cathode leakage current	—	—	—	—	10	—	—	—	2.0	—	μA
V <sub>h-k</sub> = 100V cathode negative	—	—	—	—	10	—	—	—	2.0	—	μA
V <sub>h-k</sub> = 100V cathode positive	—	—	—	—	10	7.0	14	—	—	—	mA
Anode current	{ 0.65 — — } —	—	—	—	—	—	—	8.6	11.4	1.24	mA
Anode current V <sub>g-e</sub> = -20V	0.65	—	—	—	—	—	—	—	—	—	μA
Mutual conductance	{ 0.65 — — } 1.0	—	—	—	4.5	6.5	—	—	—	—	mA/V
Group quality level <sup>10</sup>	—	—	—	—	—	4.9	6.1	—	0.46	—	mA/V

SPECIAL QUALITY DOUBLE TRIODE

**M8162****GROUP C**

Anode current difference between sections	2.5	—	—	3.2	—	—	mA
Change in mutual conductance. $V_{th} = 11.4V$	{2.5	—	—	4.0	—	—	$\frac{mA/V}{mA/V}$
Microphonic noise at the anode at 50c/s and 2g min. peak acceleration, $V_b = 250V$ , $R_a = 2k\Omega$ , $R_k = 100\Omega$ . Both sections connected in parallel	—	—	—	—	—	4.4	—
Group quality level <sup>10</sup>	2.5	—	—	25	—	—	—
	6.5	—	—	—	—	—	—

**GROUP D**

Glass strain test <sup>11</sup> , No applied voltages	6.5	—	—	—	—	—	—
Base strain test <sup>12</sup> , No applied voltages	6.5	—	—	—	—	—	—
Capacitances (unshielded). No applied voltages	6.5	—	—	—	—	—	—
$C_{in}$	—	—	—	2.0	3.0	—	pF
$C_{out}$	—	—	—	200	700	—	mpF
$C_{out^*}$	—	—	—	160	600	—	mpF
$C_{a-g}$	—	—	—	—	—	1.3	pF
$C_{a'-a''}$	—	—	—	150	330	—	mpF
$C_{h-k'+k''}$	—	—	—	2.7	5.5	—	pF
Amplification factor	6.5	—	50	70	—	—	$\mu A$
Grid emission $V_h = 15V$ , $V_r = -20V$	—	—	—	1.5	—	—	—
$R_g = 500k\Omega$ , $R_k = 0\Omega$	6.5	—	—	—	—	—	—

# M8162

SPECIAL QUALITY DOUBLE TRIODE

TESTS GROUP E	A.Q.L. <sup>5</sup> (%)	Individuals <sup>6</sup>			Lot average <sup>7</sup> Min.	Max.	Lot standard deviation <sup>8</sup> Max.				
		Bogey <sup>9</sup>	Min.	Max.							
<i>Fatigue<sup>14</sup></i>											
$V_h = 14V$ , 1 minute on 3 minutes off. No other voltages applied. $5g$ min. peak acceleration, $f = 170$ c/s for 33 hours in each of 3 mutually perpendicular planes											
<i>Post fatigue tests</i>											
Heater to cathode leakage current. $V_{h-k} = \pm 100V$	2.5	—	—	30	—	—	$\mu A$				
Reverse grid current. $R_g$ max. = $500k\Omega$	2.5	—	—	1.5	—	—	$\mu A$				
Mutual conductance	2.5	—	—	3.8	—	—	$mA/V$				
Microphonic noise as in group C	2.5	—	—	100	—	—	$mV$				
Sub-group quality level 10	6.5	—	—	—	—	—	(r.m.s.)				
<i>Shock<sup>15</sup></i>											
No applied voltages, $500g$											
<i>Post shock tests</i>											
Heater to cathode leakage current. $V_{h-k} = \pm 100V$	2.5	—	—	30	—	—	$\mu A$				
Reverse grid current. $R_g$ max. = $500k\Omega$	2.5	—	—	1.5	—	—	$\mu A$				
Mutual conductance	2.5	—	—	3.8	—	—	$mA/V$				
Microphonic noise as in group C	2.5	—	—	100	—	—	$mV$				
Sub-group quality level 10	6.5	—	—	—	—	—	(r.m.s.)				

SPECIAL QUALITY DOUBLE TRIODE

**M8162**

**GROUP F**

**Stability life test<sup>14</sup>**

Running conditions.  $R_g = 500k\Omega$ ,  $C_k = 0\mu F$   
 $V_{h-k} = 135V$  (cathode negative)

**Stability life test end points**

Change in mutual conductance after 1 hour      1.0      —      10      —      —      —      —      —      —      —      —      —      —

**Intermittent life test**

Running conditions  $R_g' = 500k\Omega$ ,  $C_k = 0\mu F$   
 $V_{h-k} = 135V$  (cathode negative)

**Intermittent life test end points**

		A.O.L. <sup>5</sup> (%)	Min.	Max.
Sub-group (a)				
Inoperatives <sup>16</sup>	..	2.5	—	—
Heater current	..	4.0	—	—
Heater to cathode leakage current. $V_{h-k} = \pm 100V$	..	2.5	138	162
Reverse grid current. $R_g$ max. = 500k $\Omega$	..	4.0	—	$\mu A$
Mutual conductance	..	2.5	—	$\mu A$
Average change in mutual conductance	..	4.0	3.8	6.5
Sub-group (b)				
Anode current	..	4.0	6.0	14
Insulation as in group A	..	6.5	5.35	14
Group quality level <sup>10</sup>	..	4.0	50	$M\Omega$
		6.5	30	$M\Omega$
		6.5	—	$M\Omega$
		10	—	—

# M8162

SPECIAL QUALITY DOUBLE TRIODE

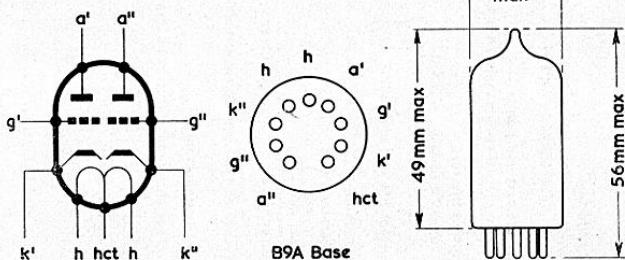
## GROUP G

Valves are held for 28 days and retested for  
Inoperatives<sup>16</sup>

Reverse grid current.  $R_g$  max. = 500k $\Omega$

A.Q.L. <sup>5</sup> (%)	Min.	Max.
0.5	—	—
0.5	—	0.7 $\mu$ A

2678



The bulb and base dimensions of this valve are in accordance with BS448,  
Section B9A