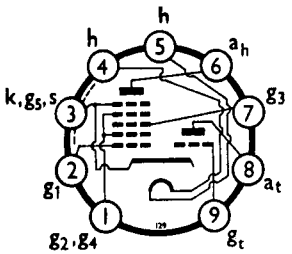
TRIODE-HEPTODE
6·3V INDIRECTLY HEATED

X719/ ECH81
ISSUE 1
JANUARY, 1958

Primarily designed for use as a frequency changer.

BASE CONNECTIONS AND VALVE DIMENSIONS



View from underside of base

Base : B9A
Bulb : Tubular
Max. overall length : 67 mm.
Max. seated length : 60 mm.
Max. diameter : 22·2 mm.

HEATER

V_h	6·3	V
I_h	0·3	A

MAXIMUM RATINGS

Heptode Section

V_a	300	V
$V_{g2, g4}$ (I_a<1mA)	300	V
$V_{g2, g4}$	125	V
V_{g3} (I_{g3}=+0·3μA)	−1·3	V
V_{g1} (I_{g1}=+0·3μA)	−1·3	V
p_a	1·7	W
p_{g2+g4}	1	W
I_k	12·5	mA
V_{h-k}	100	V
R_{g1-k}	3	MΩ
*R_{g3-k}	3	MΩ
R_{h-k}	20	kΩ

*If the two sections of the valve are switched during operation so that there is no direct connection between g_3 and g_t, as may occur in f.m./a.m. receivers, then R_{g3-k}= 20kΩ.

Triode Section

V_a	250	V
p_a	0·8	W
I_k	6·5	mA
V_g (I_g=+0·3μA)	−1·3	V
V_{h-k}	100	V
R_{g-k}	3	MΩ
R_{h-k}	20	kΩ

CAPACITANCES

c_{ah-at} : 0·20 pF	c_{ah-gt} : <0·09 pF	$c_{ah-(g3, gt)}$: <0·35 pF
c_{g1-at} : <0·06 pF	c_{g1-gt} : <0·17 pF	$c_{g1-(g3, gt)}$: <0·45 pF

Heptode Section

$c_{in(g1)}$: 4·8 pF	$c_{in(g3)}$: 5·8 pF		c_{out} : 7·9 pF
c_{a-g1} : <0·01 pF	c_{g1-g3} : <0·3 pF	c_{g1-h} : <0·02 pF	c_{g3-h} : <0·06 pF

Triode Section

C_{in} : 2·6 pF	c_{out} : 2·1 pF	c_{a-g} : 1·0 pF	c_{g-h} : <0·02 pF

CHARACTERISTICS

Triode Section

V_a	100	V
I_a	13·5	mA
V_g	0	V
g_m	3·7	mA/V
μ	22	

TYPICAL OPERATION

Heptode Section as r.f. or i.f. Amplifier

$V_a = V_b$	250	250	V
$V_{g2,\,g4}$	100	103	V
V_{g3}	0	0	V
V_{g1}	−2·0	−2·1	V
V_{g1} (for $g_m/100$)	−42	−42	V
I_a	6·5	6·5	mA
I_{g2+g4}	3·8	4·1	mA
$R_{g2,\,g4}$	39	22*	kΩ
R_{eq}	8·5	8·5	kΩ
r_{in} (at 100 Mc/s)	2·0	—	kΩ
g_m	2·4	2·4	mA/V
r_a	700	700	kΩ
$\mu_{g1-(g2,\,g4)}$	20	20	

*Common screen resistor for X719/ECH81 and W719/EF85. The current through this resistor is 6·7 mA.

Heptode Section as a.m. Frequency Changer

$V_a = V_b$	250	250	250	V
$V_{g2,g4}$	103	97	92	V
V_{g1}	−2	−1·9	−2	V
V_{g1} (for $g_c/100$)	−28·5	−28·5	−28·5	V
I_a	3·25	3	2·5	mA
I_{g2+g4}	6·7	6·1	5·5	mA
I_{g3+gt}	200	200	200	μA
$R_{g2,\,g4}$	22	18*	22†	kΩ
R_{eq}	70	70	66	kΩ
g_c	775	750	700	μA/V
r_a	1	1	1	MΩ

*Common screen resistor for X719/ECH81 and W719/EF85. The current through this resistor is 8·5 mA.

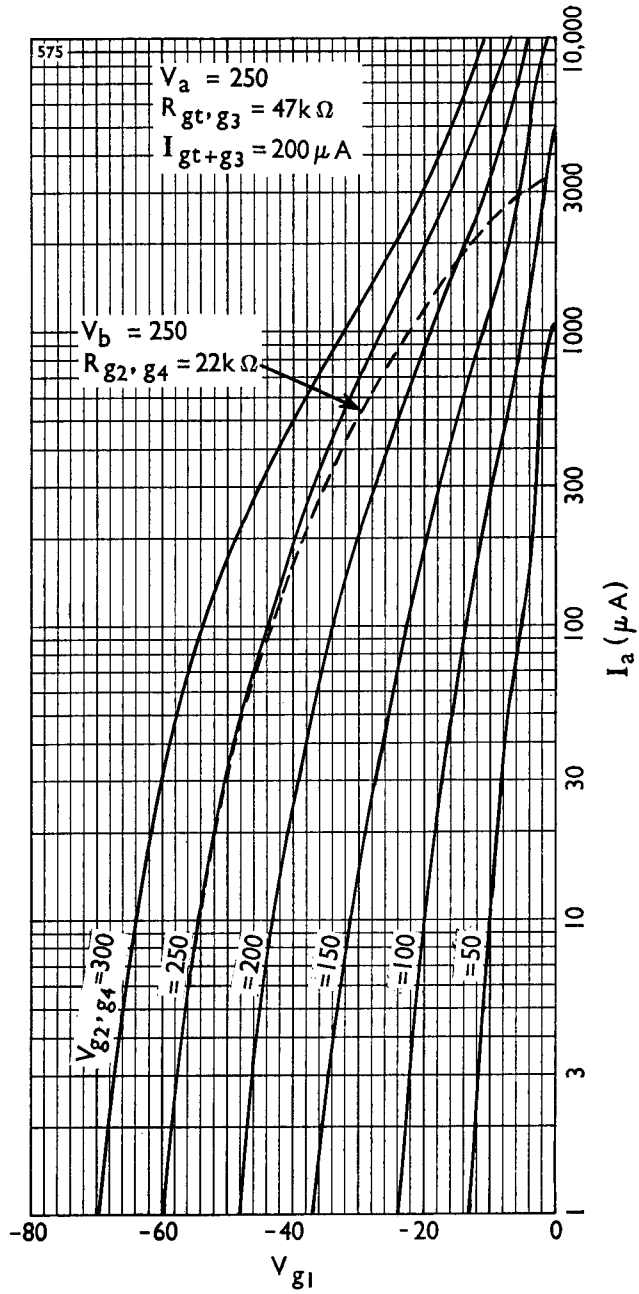
†Common screen resistor for X719/ECH81 and WD709/EBF80. The current through this resistor is 7·2 mA.

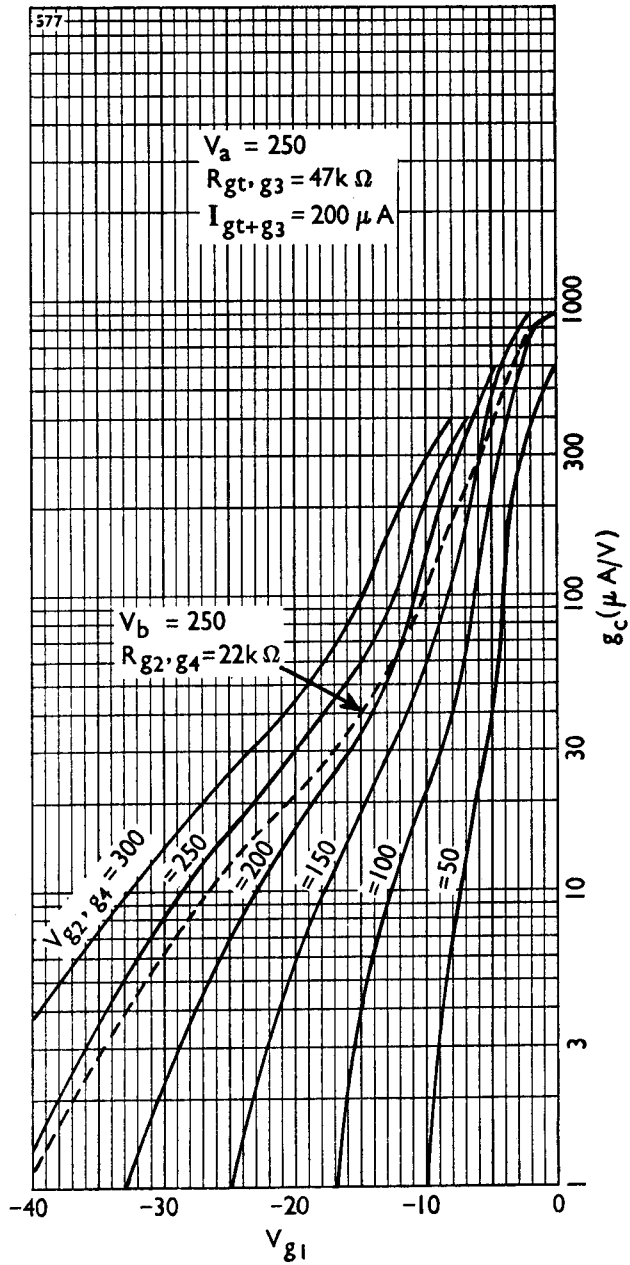
Triode Section as r.f. Oscillator

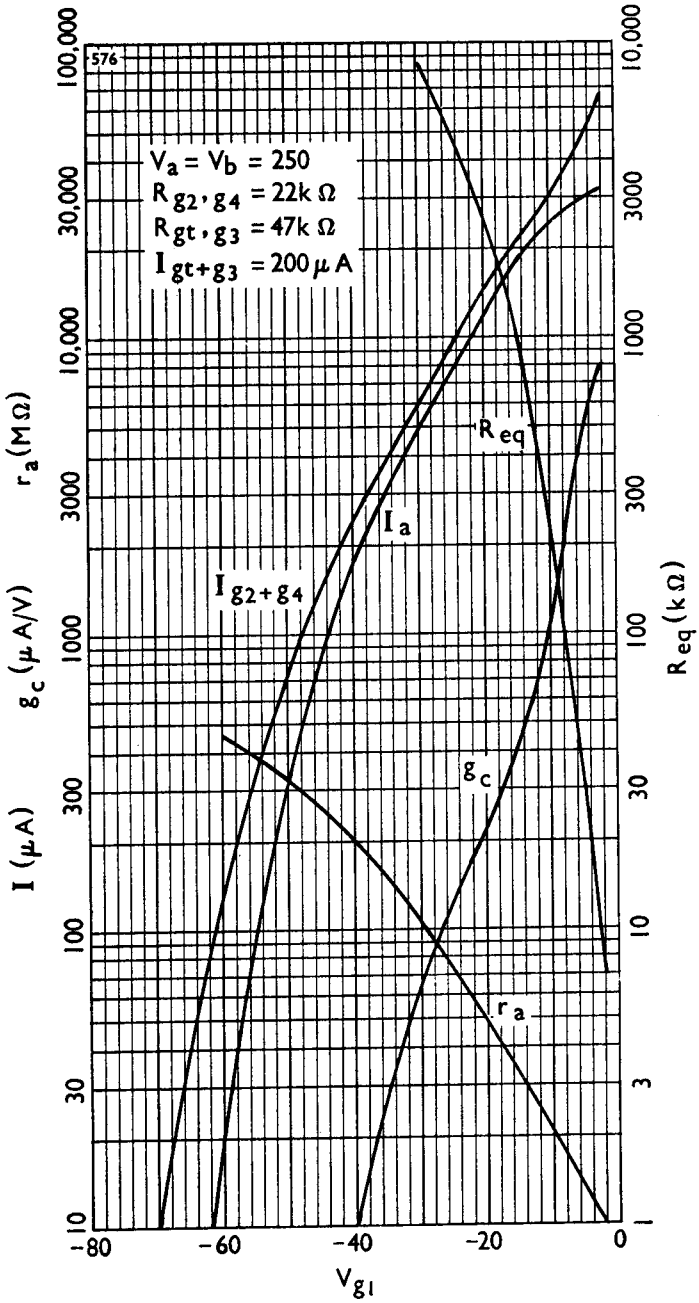
V_b	250	V
R_{at}	33	kΩ
I_{at}	4·5	mA
$R_{g3,\,gt}$	47	kΩ
I_{g3+gt}	200	μA
g_m (effective)	650	μA/V

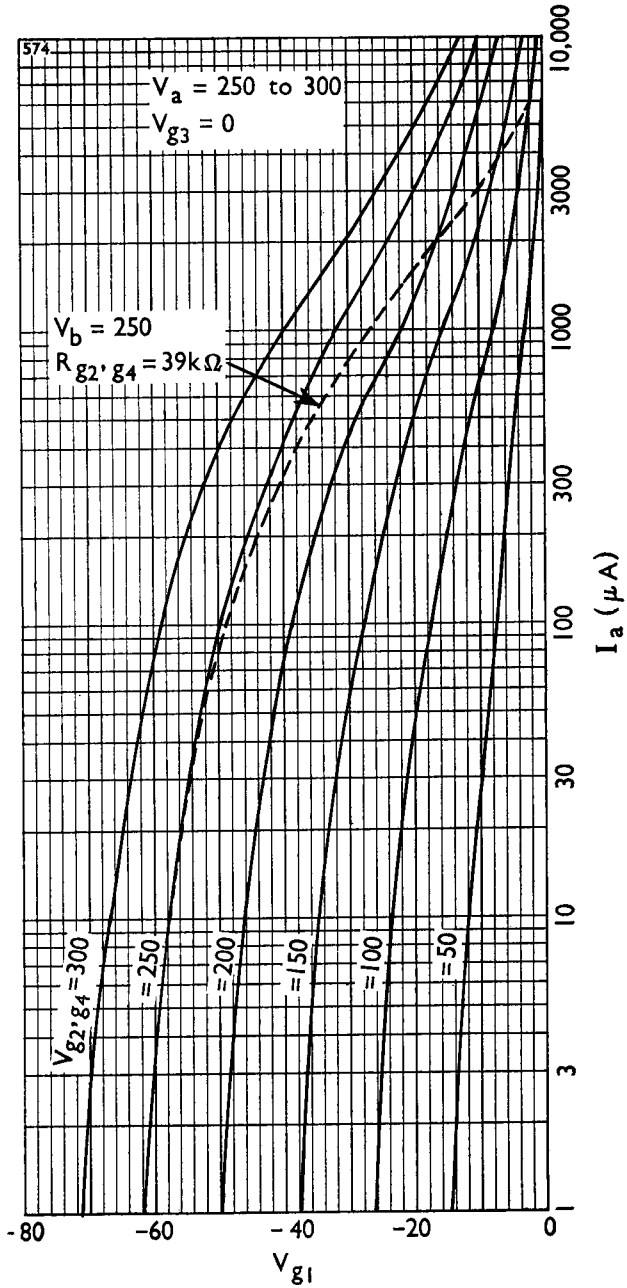
MOUNTING

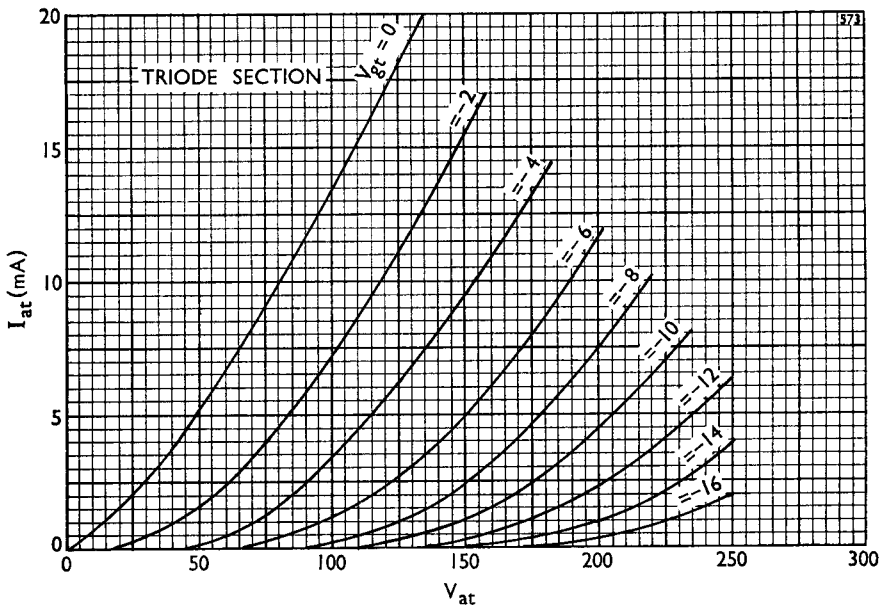
Any position.


575
V_a = 250
$R_{gt, g3}$ = 47k Ω
I_{gt+g3} = 200 μA
V_b = 250
$R_{g2, g4}$ = 22k Ω
$V_{g2, g4}$ = 300
= 250
= 200
= 150
= 100
= 50
10,000
3000
1000
300
100
30
10
3
1
I_a (μA)
-80
-60
-40
-20
0
V_{g1}


577
V_a = 250
R_{gt}, g_3 = 47k Ω
I_{gt+g_3} = 200 μA
V_b = 250
R_{g2}, g_4 = 22k Ω
V_{g2}, g_4 = 300
=250
=200
=150
=100
=50
g_c (μA/V)
1000
300
100
30
10
3
1
−40
−30
−20
−10
0
V_{g1}


576
$V_a = V_b = 250$
$R_{g2,g4} = 22k\,\Omega$
$R_{gt,g3} = 47k\,\Omega$
$I_{gt+g3} = 200\,\mu A$
I_a
I_{g2+g4}
R_{eq}
g_c
r_a
$I\ (\mu A)$
$g_c\ (\mu A/V)$
$r_a\ (M\Omega)$
$R_{eq}\ (k\Omega)$
100,000
30,000
10,000
3000
1000
300
100
30
10
10,000
3000
1000
300
100
30
10
3
1
-80
-60
-40
-20
0
V_{g1}


574
V_a = 250 to 300
V_{g3} = 0
V_b = 250
$R_{g2, g4}$ = 39kΩ
$V_{g2, g4}$ = 300
= 250
= 200
= 150
= 100
= 50
10,000
3000
1000
300
100
30
10
3
1
I_a (μA)
-80
-60
-40
-20
0
V_{g1}


TRIODE SECTION
$V_{gt} = 0$
$= -2$
$= -4$
$= -6$
$= -8$
$= -10$
$= -12$
$= -14$
$= -16$
I_{at} (mA)
V_{at}
0
5
10
15
20
50
100
150
200
250
300

X719/ECH81

OV.4170

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