

V.H.F. POWER DOUBLE TETRODE

QQV06-40A

Beam power double tetrode rated for a maximum anode dissipation of 20W at each anode and intended for use at frequencies up to 500Mc/s.

This data should be read in conjunction with GENERAL OPERATIONAL RECOMMENDATIONS – TRANSMITTING VALVES included in this volume of the handbook.

CATHODE

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

	Series	Parallel	
V_h	12.6	6.3	V
I_h	0.9	1.8	A

MOUNTING POSITION

Fixed station operation	Vertical – base up or down Horizontal – anode pins in horizontal plane
Mobile operation	Vertical – base up or down

CAPACITANCES

* C_{a-g1} (each section)	0.06	pF ←
C_{g1-all} (each section)	10.5	pF
C_{a-all} (each section)	3.2	pF
C_{out} (two sections in push-pull)	2.1	pF
C_{in} (two sections in push-pull)	6.7	pF

*Internally neutralised for push-pull operation

CHARACTERISTICS (each section) measured at $I_a = 30mA$

g_m	4.5 mA/V
μ_{g1-g2}	8.0

COOLING

Max. base pin temperature	180 °C
Max. bulb and anode seal temperature	200 °C

Anode connectors providing a high degree of heat transfer by radiation or by conduction should be used.

Natural cooling is sufficient with –

$V_a = 750V$ at frequencies up to 100Mc/s
$V_a = 600V$ at frequencies up to 150Mc/s
$V_a = 300V$ at frequencies up to 450Mc/s

Above these limits or with high ambient temperatures it may be necessary to direct a flow of air (up to 5cu.ft. per min.) on the top of the bulb to keep the seal temperature within the stated limit.

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OPERATING CONDITIONS AS A PUSH-PULL R.F. POWER AMPLIFIER (CLASS "C" TELEGRAPHY OR F.M. TELEPHONY)

Limiting values

V_a max.	See page 15	
p_a max.	2×20	W
$V_{g2(b)}$ max.	600	V ←
V_{g2} max.	300	V ←
p_{g2} max.	2×3.5	W
p_{g1} max.	2×1.0	W
I_{g1} max.	2×5.0	mA
I_k max.	2×120	mA
$I_{k(pk)}$ max.	2×700	mA
$-V_{g1}$ max.	100	V ←
R_{g1-k} max. per section (fixed bias)	50	kΩ
R_{g1-k} max. per section (automatic bias)	100	kΩ
V_{h-k} max.	100	V

Typical operating conditions

f	200	200	400	400	Mc/s
V_a	400	600	400	540	V
V_{g2}	250	250	250	250	V
V_{g1}	-60	-80	-50	-55	V
I_a	2×100	2×100	2×100	2×100	mA
I_{g2}	2×8.0	2×9.0	2×5.0	2×7.0	mA
I_{g1}	2×3.0	2×3.5	2×2.0	2×1.5	mA
$P_{load(driver)}$	3.0	3.0	11	12	W
p_a	2×12	2×15	2×15	2×20	W
P_{out}	56	90	50	70	W ←
η	70	75	63	65	%
P_{load}	47	78	42	59	W ←
f			475	475	Mc/s
V_a			350	500	V
V_{g2}			250	250	V
V_{g1}			-45	-50	V
I_a			2×100	2×100	mA
I_{g2}			2×4.5	2×4.5	mA
I_{g1}			2×2.0	2×2.0	mA
$P_{load(driver)}$			10	12	W
p_a			2×15	2×20	W
P_{out}			40	60	W ←
η			57	60	%
P_{load}			33	51	W ←



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OPERATING CONDITIONS AS ANODE AND SCREEN-GRID MODULATED R.F. POWER AMPLIFIER (CLASS "C" TELEPHONY)

Limiting values (carrier condition for modulation factor of 1)

V_a max.	See page 17	
p_a max.	2×14	W
$V_{g2(b)}$ max.	600	V ←
V_{g2} max.	300	V ←
p_{g2} max.	2×2.3	W ←
$-V_{g1}$ max.	175	V ←
I_{g1} max.	2×5.0	mA
p_{g1} max.	2×1.0	W
I_k max.	2×120	mA
$i_{k(pk)}$ max.	2×1.0	A
R_{g1-k} max. per section (fixed bias)	50	kΩ
R_{g1-k} max. per section (automatic bias)	100	kΩ
V_{h-k} max.	100	V

Typical operating conditions

f	60	200	200	250	Mc/s
V_a	600	400	600	600	V
V_{g2}	250	250	250	250	V
V_{g1}	-80	-70	-80	-80	V
I_a	2×75	2×75	2×75	2×75	mA
I_{g2}	2×10	2×9.0	2×9.0	2×9.0	mA
I_{g1}	2×4.0	2×2.0	2×2.0	2×1.5	mA
p_a	2×9.5	2×9.5	2×11.5	2×13	W
P_{out}	71	41	67	64	W
r_i	79	69	75	71	Ω
P_{load}	60	35	57	54	W
For 100% modulation					
P_{mod}	47	47	47	47	W
$V_{g2(pk)}$	185	185	185	185	V

f	400	475	Mc/s
V _a	400	400	V
V _{g2}	250	250	V
V _{g1}	-70	-70	V
I _a	2 × 75	2 × 75	mA
I _{g2}	2 × 8.0	2 × 7.5	mA
I _{g1}	2 × 1.5	2 × 1.5	mA
p _a	2 × 11.5	2 × 13	W
P _{out}	37	34	W
r _i	62	57	Ω
P _{load}	32	30	W
For 100% modulation			
P _{mod}	47	47	W
V _{g2(pk)}	185	185	V

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OPERATING CONDITIONS AS FREQUENCY TREBLER

Limiting values

V_a max.	750	V
p_a max.	2×20	W
$V_{g2(b)}$ max.	600	V
V_{g2} max.	300	V
p_{g2} max.	2×3.5	W
p_{g1} max.	2×1.0	W
I_k max.	2×100	mA
$i_{k(pk)}$ max.	2×700	mA
$-V_{g1}$ max.	175	V
R_{g1-k} max. per section (fixed bias)	50	k Ω
R_{g1-k} max. per section (automatic bias)	100	k Ω
V_{h-k} max.	100	V

Typical operating conditions

f_{out}	150	150	230	Mc/s
V_a	400	500	400	V
V_{g2}	250	250	250	V
V_{g1}	-150	-150	-150	V
I_a	2×72	2×60	2×65	mA
I_{g2}	2×8.0	2×5.0	2×10	mA
I_{g1}	2×2.5	2×3.0	2×1.5	mA
$V_{in(g1-g1)pk}$	360	360	360	V
p_a	2×20	2×20	2×20	W
P_{out}	18	20	12	W
η	31	33	23	%
P_{load}	14.5	16	10	W

OPERATING CONDITIONS AS A.F. POWER AMPLIFIER AND MODULATOR (CLASS "B")

Limiting values

V_a max.	600	V
p_a max.	2×20	W
$V_{g2(b)}$ max.	600	V
V_{g2} max.	300	V
p_{g2} max.	2×3.5	W
p_{g1} max.	2×1.0	W
I_k max.	2×140	mA
$i_{k(pk)}$ max.	2×450	mA
R_{g1-k} max. per section (fixed bias)	50	k Ω
R_{g1-k} max. per section (automatic bias)	100	k Ω
V_{h-k} max.	100	V

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Typical operating conditions (without grid current)

V_a	300	450	600	V
V_{g2}	250	250	250	V
V_{g1}	-26	-27	-27	V
$I_{a(u)}$	2×20	2×20	2×20	mA
I_a (max. sig.)	2×56	2×58	2×62	mA
$I_{g2(u)}$	2×1.0	2×0.7	2×0.45	mA
I_{g2} (max. sig.)	2×14	2×13.5	2×11.5	mA
$V_{in(g1-g1)r.m.s.}$	36	38	39	V
P_a	2×5.6	2×8.5	2×12	W
R_{a-a}	6.5	10	12.5	k Ω
P_{out}	22.5	35	50	W
η_i	67	67.5	67.5	%
D_{tot}	2.9	3.1	2.4	%

Typical operating conditions (with grid current)

V_a	300	450	600	V
V_{g2}	250	250	250	V
V_{g1}	-25	-25	-25	V
$I_{a(u)}$	2×25	2×25	2×25	mA
I_a (max. sig.)	2×94	2×97	2×100	mA
$I_{g2(u)}$	2×1.4	2×0.95	2×0.7	mA
I_{g2} (max. sig.)	2×14	2×14	2×13	mA
I_{g1}	2×2.6	2×2.6	2×2.6	mA
$V_{in(g1-g1)r.m.s.}$	52	54	55	V
P_a	2×9.7	2×13.5	2×17	W
R_{a-a}	4.0	6.0	8.0	k Ω
P_{out}	37	60	86	W
η_i	65.5	69	71.5	%
D_{tot}	5.0	5.0	5.0	%

ACCESSORIES

Information on these items can be obtained from the Industrial Technical Service Dept., Mullard Ltd.

WEIGHT

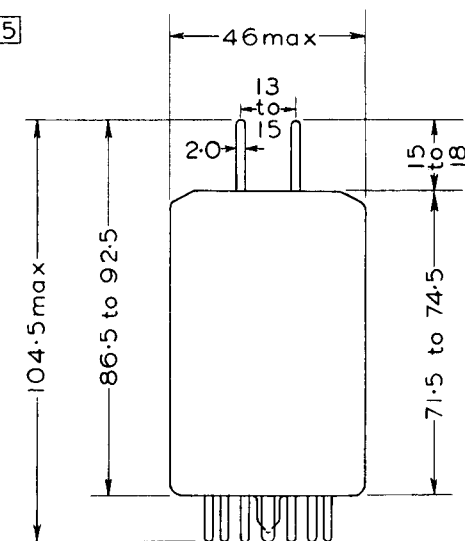
Valve only	{ 2.3 oz 65 g
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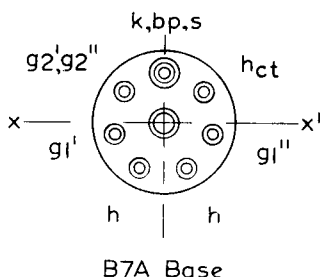
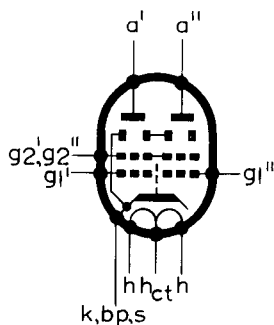
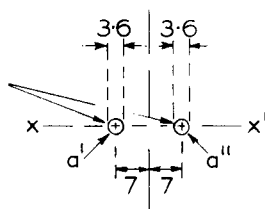
V.H.F. POWER DOUBLE TETRODE

Beam power double tetrode rated for a maximum anode dissipation of 20W at each anode and intended for use at frequencies up to 500Mc/s.

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Location of anode pins within circles

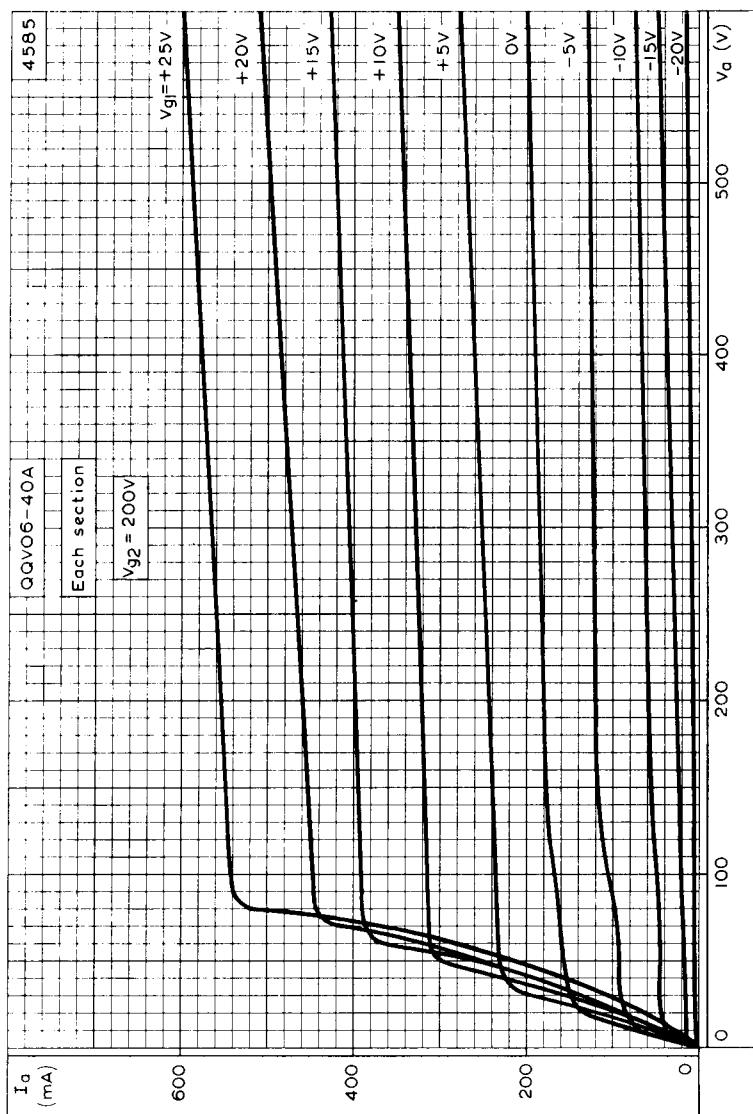


All dimensions in mm

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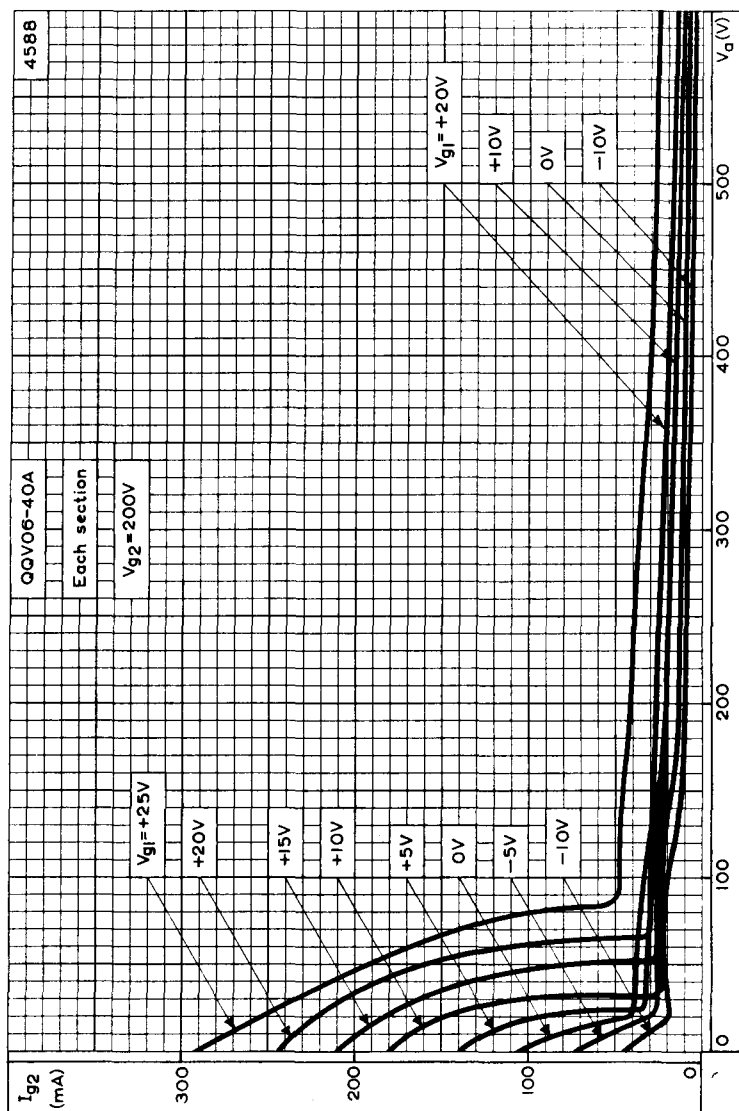


ANODE CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 200V$

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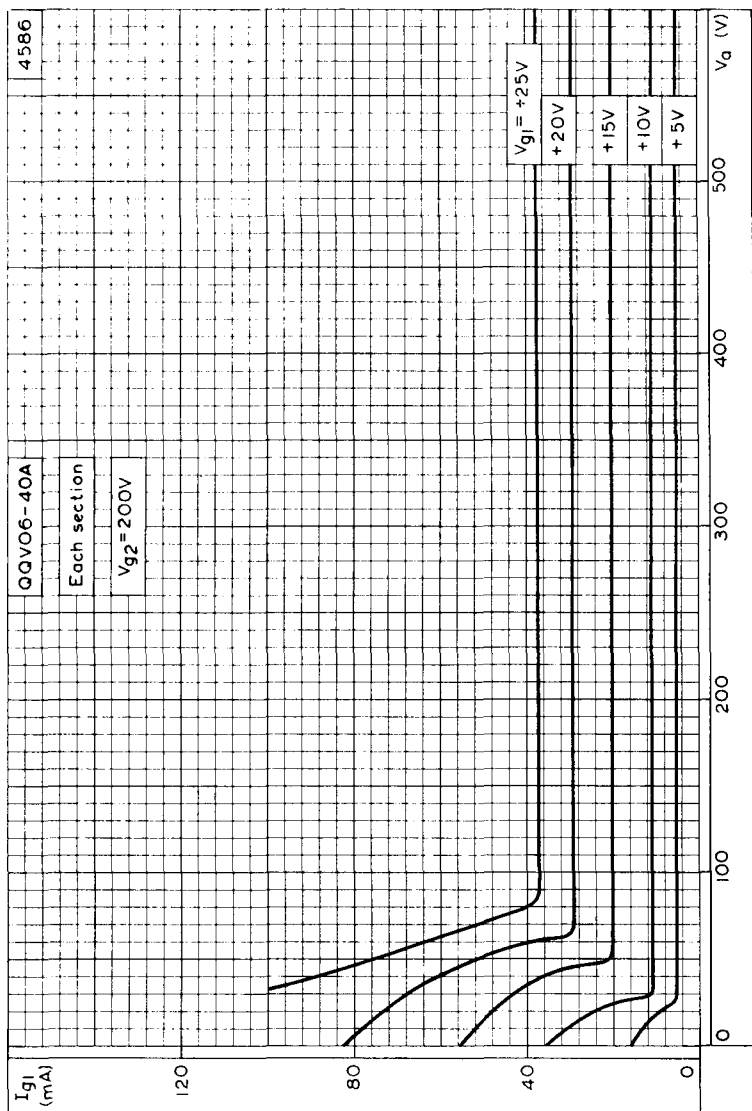


SCREEN-GRID CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 200V$

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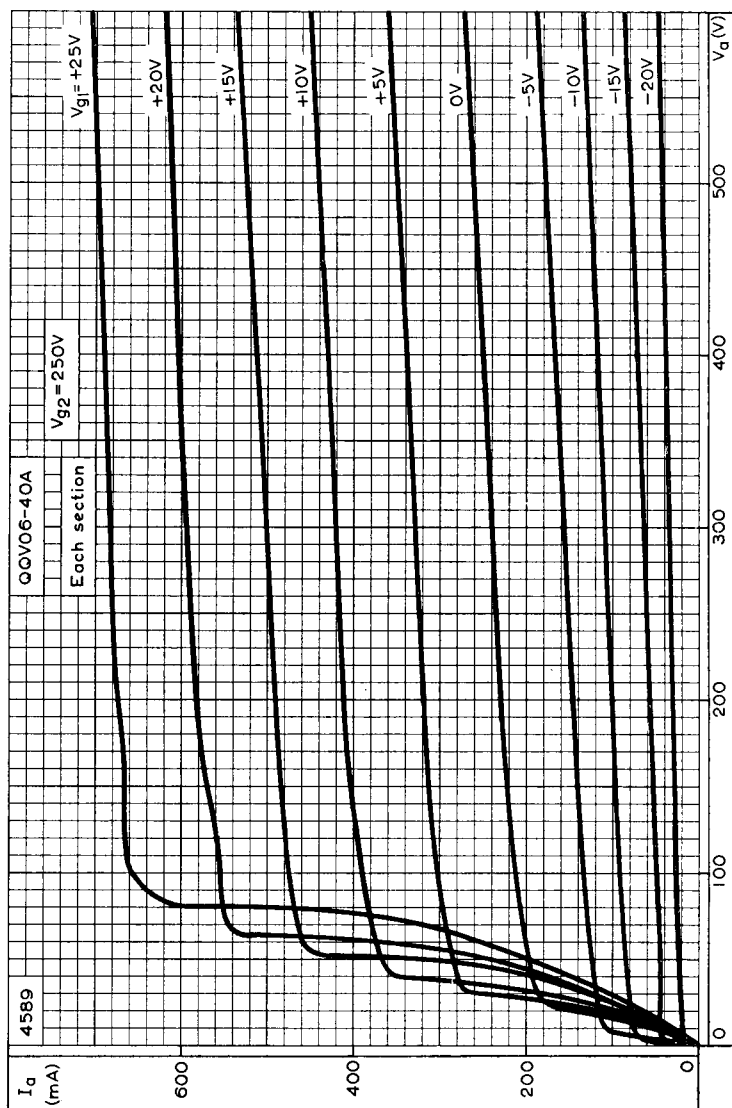


CONTROL-GRID CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 200V$

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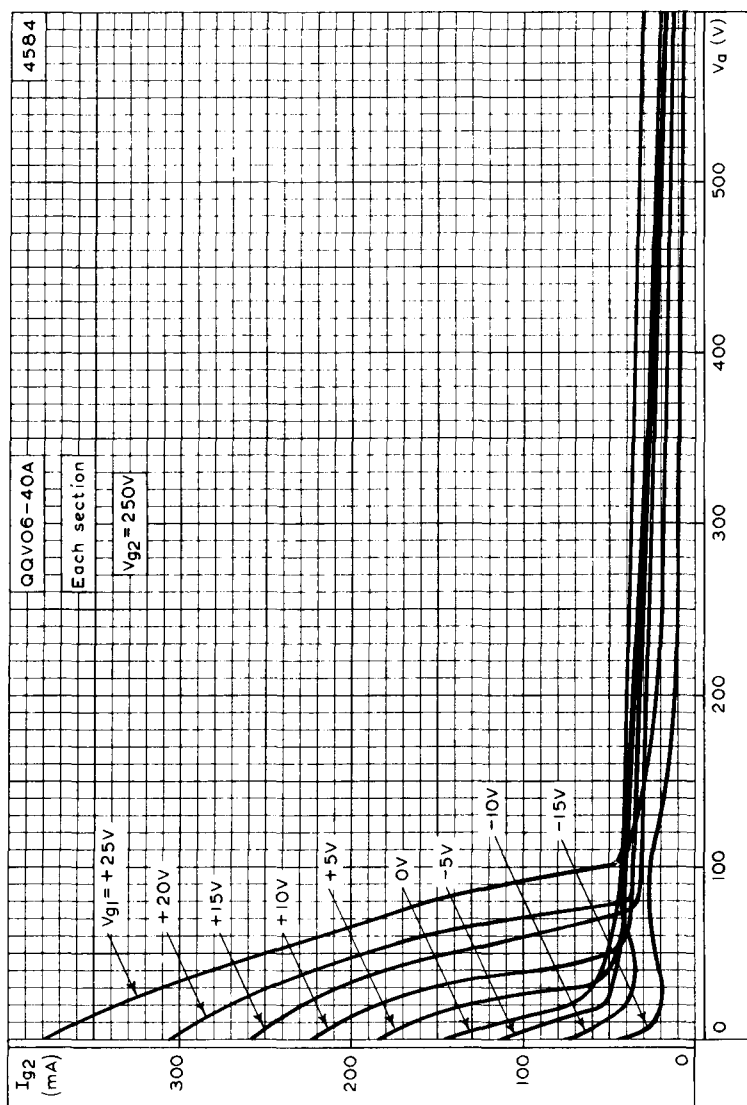


ANODE CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 250V$

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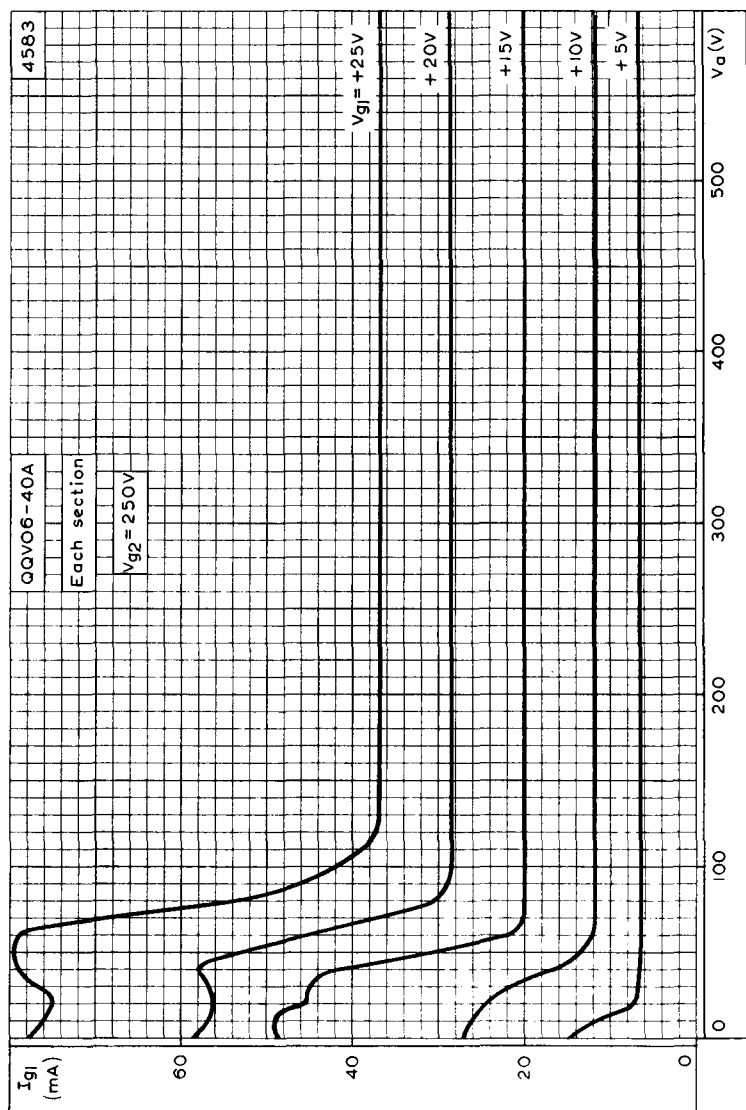


SCREEN-GRID CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 250V$

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CONTROL-GRID CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER
 $V_{g2} = 250V$



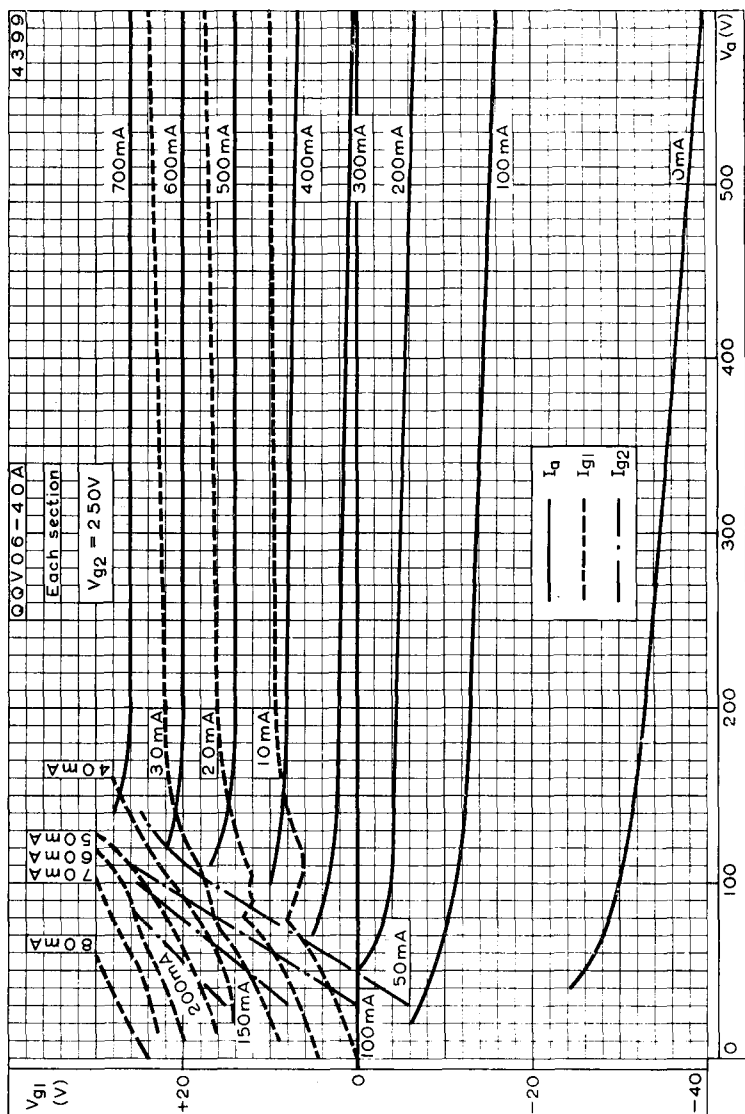
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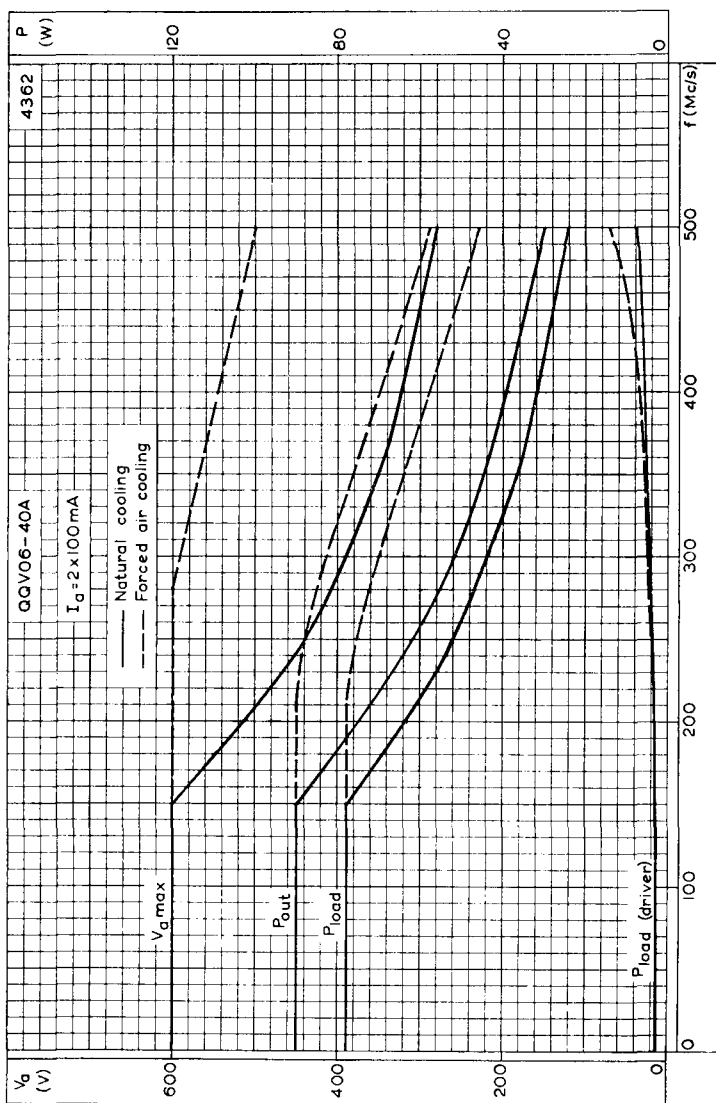


CONSTANT CURRENT CURVES FOR EACH SECTION $V_{g2} = 250V$

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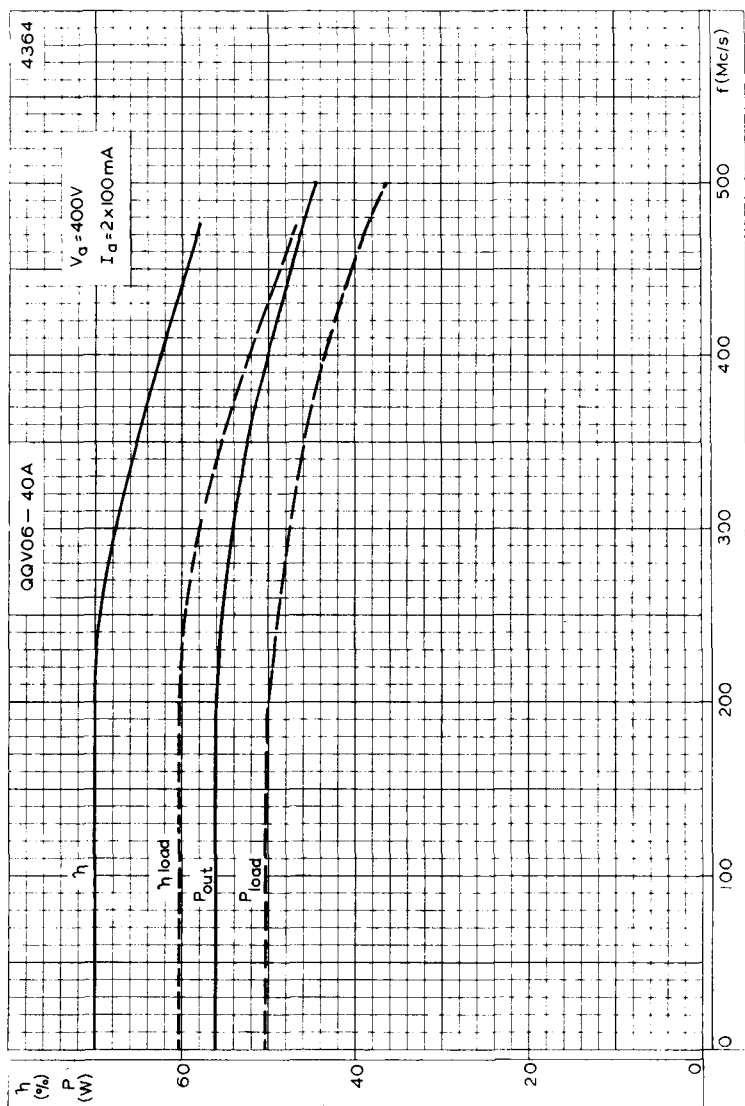


FREQUENCY CHARACTERISTICS FOR OPERATING CONDITIONS AS A PUSH-PULL R.F. POWER AMPLIFIER (CLASS "C" TELEGRAPHY OR F.M. TELEPHONY)

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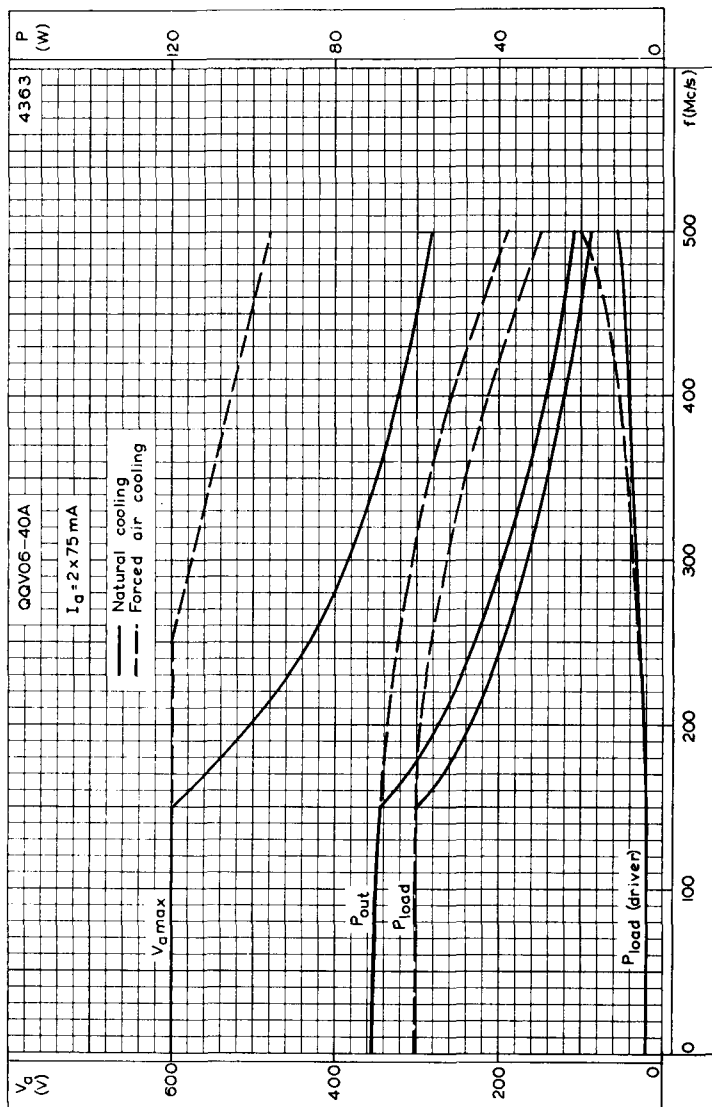


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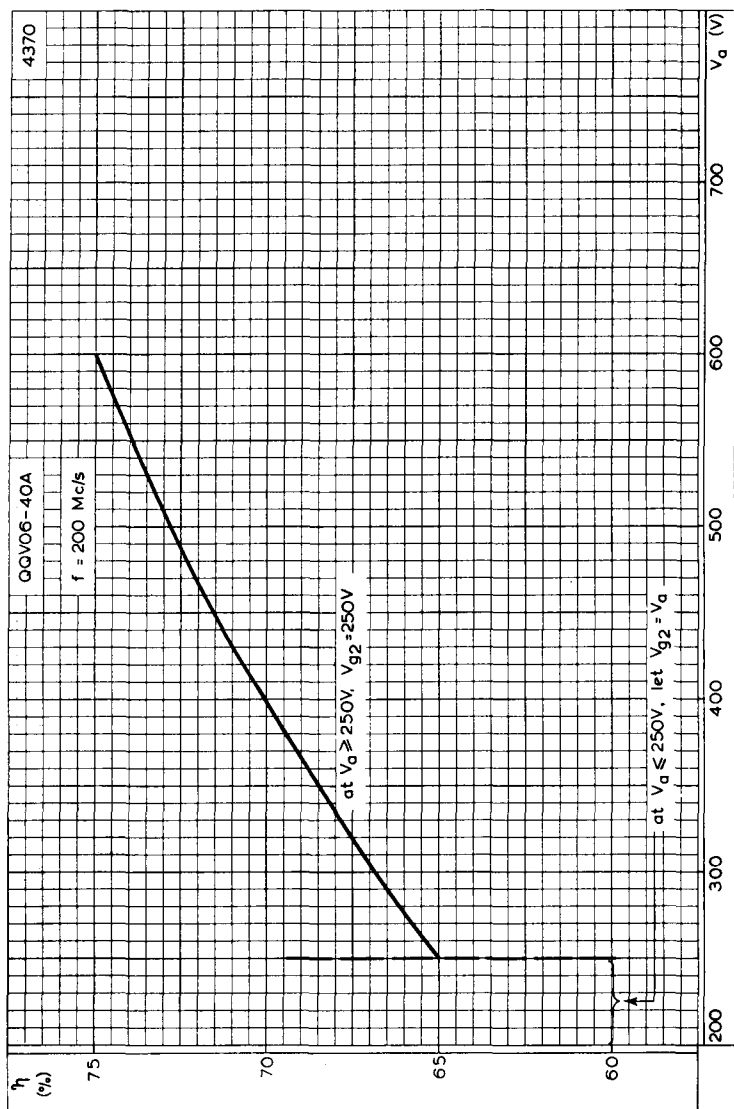


FREQUENCY CHARACTERISTICS FOR OPERATING CONDITIONS AS ANODE AND SCREEN-GRID MODULATED R.F. POWER AMPLIFIER (CLASS "C" TELEPHONY)

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ANODE EFFICIENCY PLOTTED AGAINST ANODE VOLTAGE FOR CLASS "C" PUSH-PULL TELEGRAPHY

