

U.H.F. POWER DOUBLE TETRODE

QQV03-25

QUICK REFERENCE DATA

Double tetrode intended for use as v.h.f. power amplifier or frequency multiplier.

	Frequency	Class 'C'	Class 'C'	
	Multiplier	Telephony	Telegraphy or	
		Anode and	F.M. Telephony	
		Screen Grid		
		Modulation		
f	158/475	180	180	Mc/s
P _{out}	10	43	67	W
f max.	600	600	600	Mc/s
V _a max. (f < 250 Mc/s)	750	600	750	V
(f = 600 Mc/s)	600	400	500	V
p _a max.	2 x 12.5	2 x 8.3	2 x 12.5	W

This data should be read in conjunction with GENERAL OPERATIONAL RECOMMENDATIONS - TRANSMITTING VALVES.

CLASS 'C' TELEGRAPHY OR F.M. TELEPHONY

Maximum operating conditions

f	180	180	180	470	600	Mc/s
P _{out}	35	56	67	38	22	W
P _{load}	31	48	57	31	17	W
η_a	73	78	80	63	47	%
V _a	400	600	700	500	400	V
I _a	2 x 60	2 x 60	2 x 60	2 x 60	2 x 59	mA
V _{g2}	250	250	250	250	250	V
I _{g2}	2 x 4.5	2 x 4.5	2 x 4.5	2 x 3.0	2 x 3.0	mA
- V _{g1}	50	60	65	55	50	V
I _{g1}	2 x 1.0	2 x 1.0	2 x 1.0	2 x 1.0	2 x 0.8	mA
P _{load} (driver)	1.2	1.8	2.0	3.0	6.0	W
p _a	2 x 6.5	2 x 8.0	2 x 8.5	2 x 11	2 x 12.5	W

CLASS 'C' TELEPHONY ANODE AND SCREEN-GRID MODULATION

Maximum operating conditions (Carrier conditions for 100% modulation)

f	180	180	180	180	470	Mc/s
P _{out}	19.5	26	35.5	43	17.5	W
P _{load}	16.5	21	29	37	14.5	W
η_a	68	71	74	75	60	%
V _a	300	400	500	600	300	V
I _a	2 x 48	2 x 41	2 x 48	2 x 48	2 x 48	mA
V _{g2}	250	250	250	250	250	V
I _{g2}	2 x 4.5	2 x 4.5	2 x 4.5	2 x 4.5	2 x 3.5	mA
- V _{g1}	50	65	75	80	50	V
I _{g1}	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	2 x 1.5	mA
P _{load (driver)}	2.0	2.5	3.0	3.5	3.0	W
p _a	2 x 4.75	2 x 3.5	2 x 6.25	2 x 7.25	2 x 5.75	W

For 100% modulation

P _{mod}	16.5	18.5	25	31	16.5	W
v _{g2(pk)}	185	185	185	185	185	V

FREQUENCY MULTIPLIER

Maximum operating conditions

f _{out} /f _{in}	180/60	475/158	Mc/s
P _{out}	15	10	W
P _{load}	12	8.0	W
η_a	38	27	%
V _a	400	300	V
I _a	2 x 50	3 x 50	mA
V _{g2}	250	250	V
I _{g2}	2 x 4.0	2 x 4.0	mA
- V _{g1}	175	175	V
I _{g1}	2 x 1.5	2 x 1.5	mA
P _{load (driver)}	4.0	6.0	W
p _a	2 x 12.5	2 x 10	W

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ABSOLUTE MAXIMUM RATINGS

	Frequency Multiplier	Class 'C' Telephony	Class 'C' Telegraphy	
V_a max. ($f < 250\text{Mc/s}$)	750	600	750	V
($f = 600\text{Mc/s}$)	600	400	500	V
V_{g2} max.	300	300	300	V
$-V_{g1}$ max.	200	200	200	V
I_k max.	2 x 60	2 x 50	2 x 66	mA
p_a max.	2 x 12.5	2 x 8.3	2 x 12.5	W
p_{g2} max.	2 x 1.5	2 x 1.2	2 x 1.5	W
I_{g1} max.	2 x 2.5	2 x 2.5	2 x 2.5	mA
p_{g1} max.	2 x 0.5	2 x 0.5	2 x 0.5	W
R_{g1-k} max. per section (fixed bias)	50	50	50	k Ω
R_{g1-k} max. per section (automatic bias)	100	100	100	k Ω
V_{h-k} max.	100	100	100	V
$V_{g2(b)}$ max.	600	600	600	V

CATHODE

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

	Series	Parallel	
V_h	12.6	6.3	V
I_h	0.65	1.3	A

CAPACITANCES

* c_{a-g1} (each section)	40	mpF
c_{g1-all} (each section)	7.5	pF
c_{a-all} (each section)	2.6	pF
c_{out} (two sections in push pull)	1.6	pF
c_{in} (two sections in push pull)	4.4	pF

* Internally neutralised for push-pull operation.

CHARACTERISTICS (each section) measured at $I_a = 40\text{mA}$

g_m	2.5	mA/V
μ_{g1-g2}	8.0	

MOUNTING POSITION

Any

COOLING

Radiation and convection cooled

Maximum temperatures

Base pin	180	$^{\circ}\text{C}$
Bulb	250	$^{\circ}\text{C}$
Anode seal	250	$^{\circ}\text{C}$

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

Natural cooling is sufficient with:-

$V_a = 600\text{V}$ at frequencies up to 150Mc/s

$V_a = 500\text{V}$ at frequencies up to 200Mc/s

$V_a = 300\text{V}$ at frequencies up to 430Mc/s

Above these limits or with high ambient temperatures it may be necessary to direct a flow of air (up to $5\text{ft}^3/\text{min}$, $0.15\text{m}^3/\text{min}$) on the top of the bulb to keep the seal temperature within the stated limit.

PHYSICAL DATA

	oz	g
Weight of valve	2.0	57

ACCESSORIES

socket 40202

DIMENSIONS

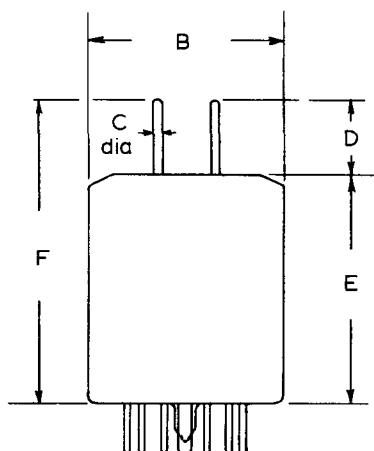
	Inches	millimetres
B	1.772 ± 0.039	45 ± 1
C	0.079 ± 0.001	2.0 ± 0.01
D	0.650 ± 0.059	16.5 ± 1.5
E	2.165	55 max
F	2.874	73 max
G	0.098 ± 0.001	2.5 ± 0.03
H	0.551 ± 0.001	14 ± 0.03

Inch dimensions are derived from original millimetre dimensions.

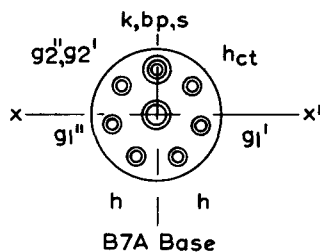
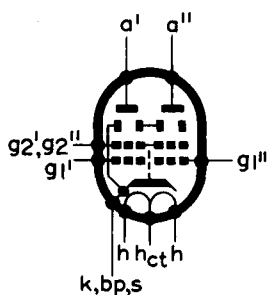
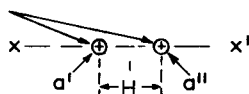
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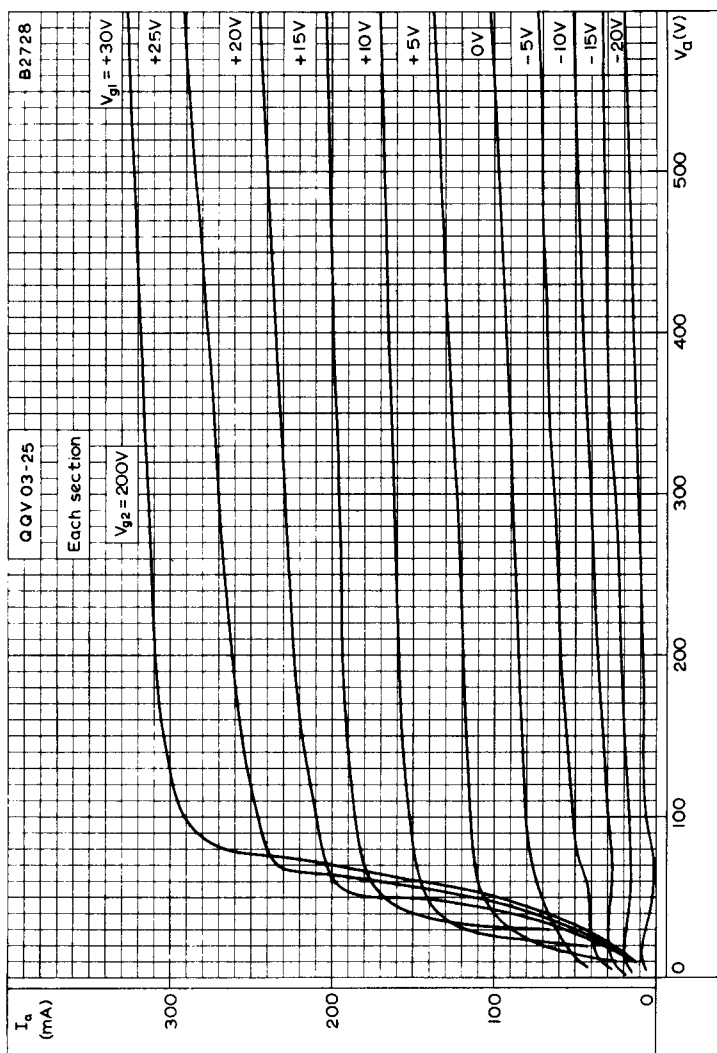


Location of
anode pins
within circles
of dia G.

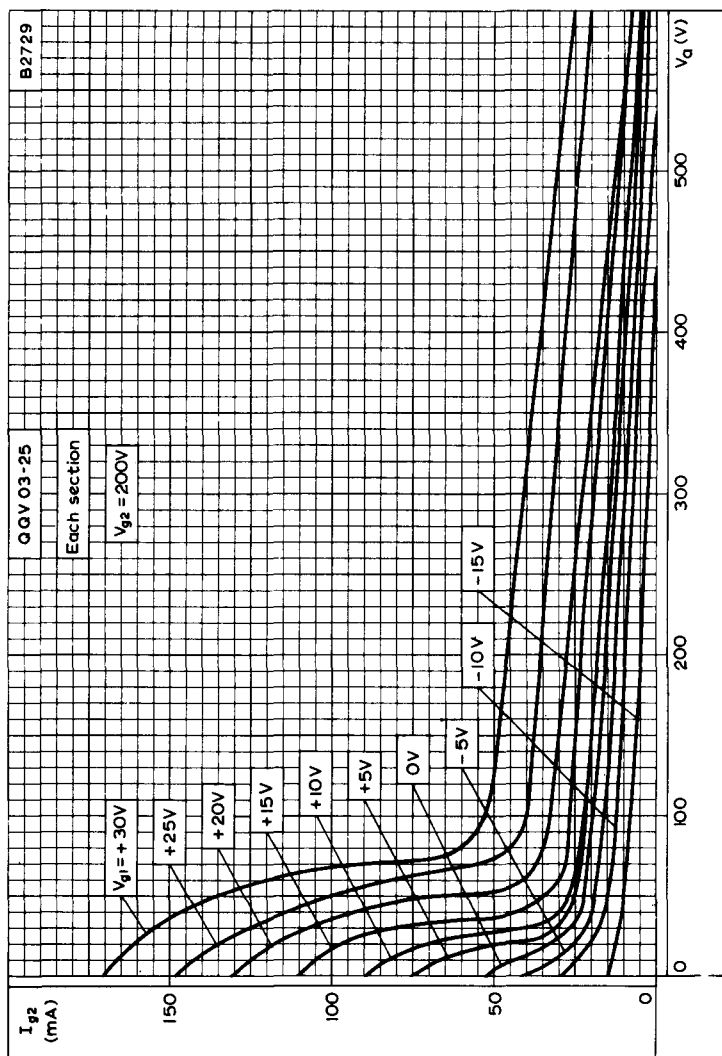


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ANODE CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE
WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 200V$



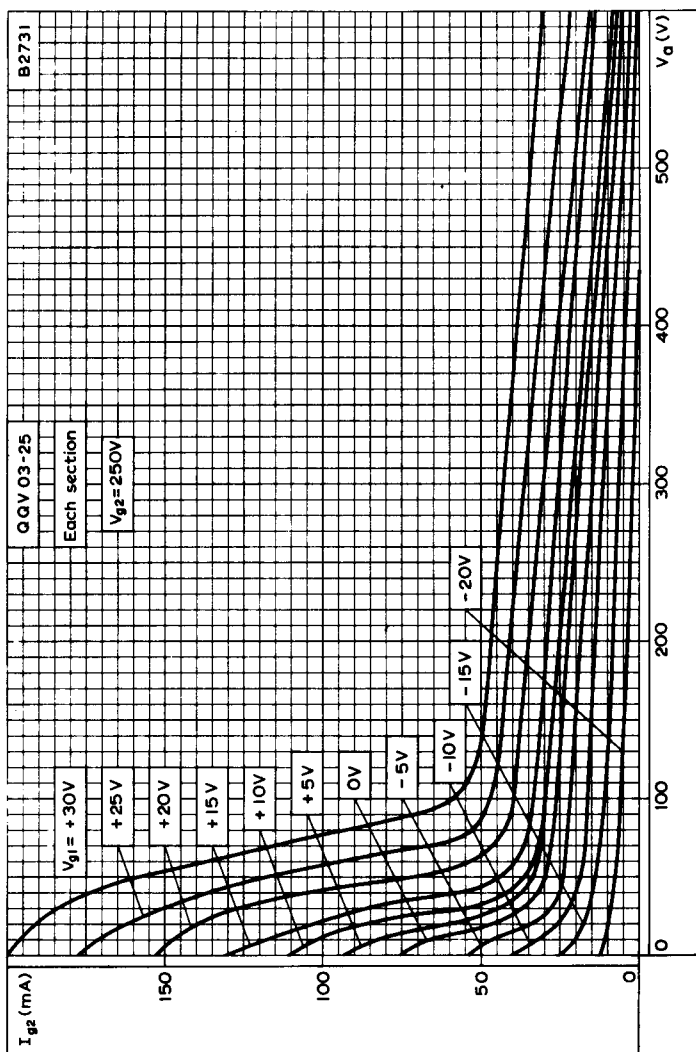
SCREEN-GRID CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 200V$

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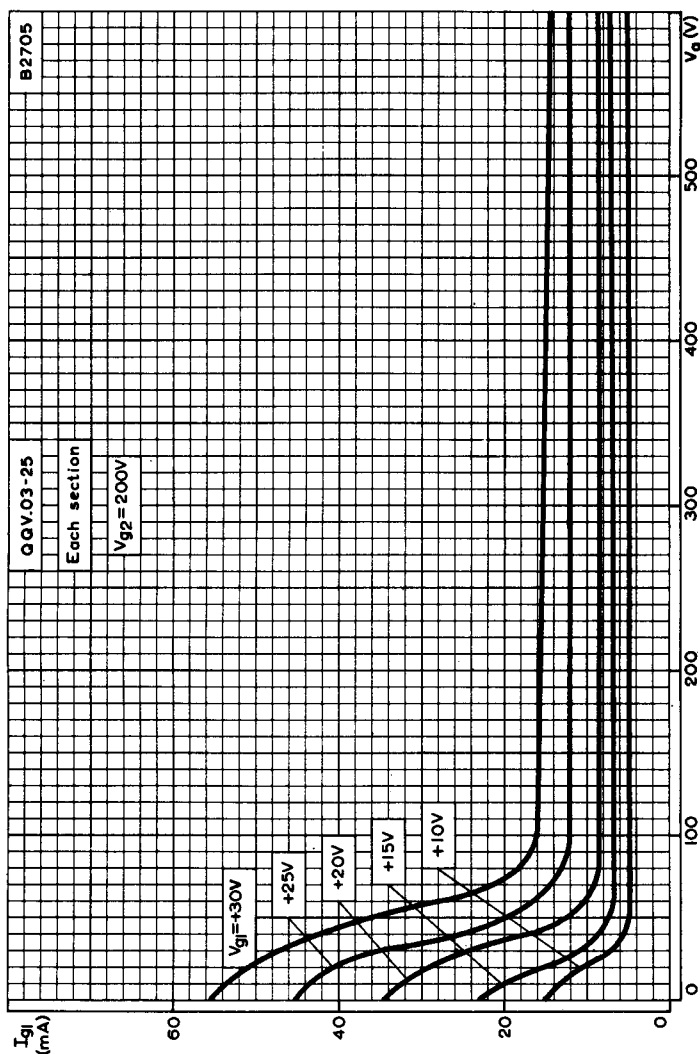
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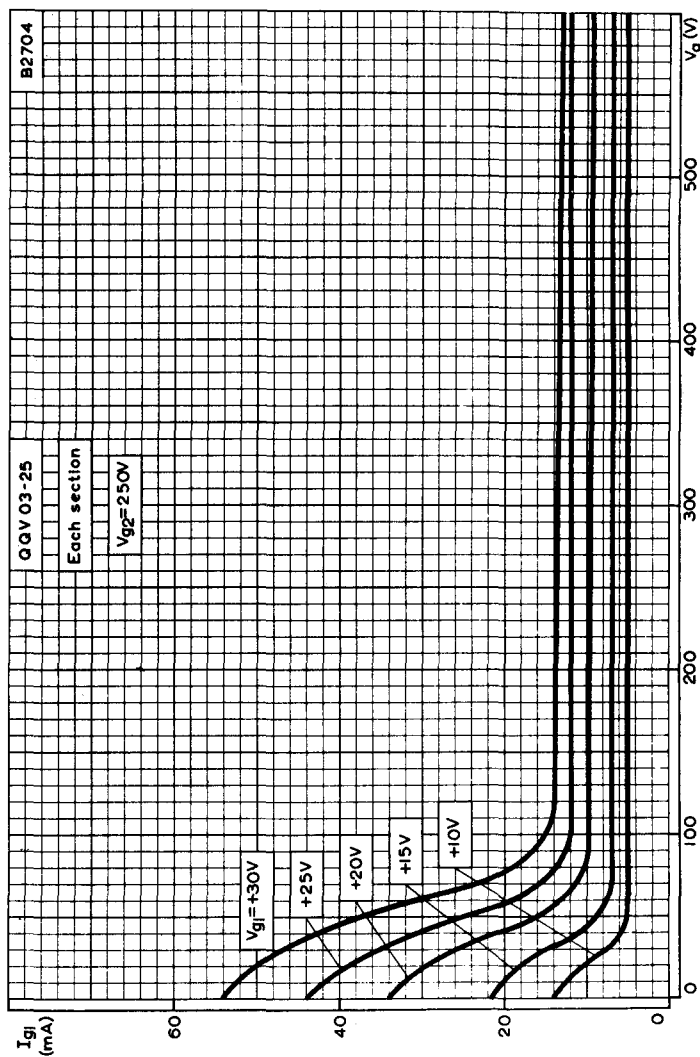
ANODE CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE
WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 250V$



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



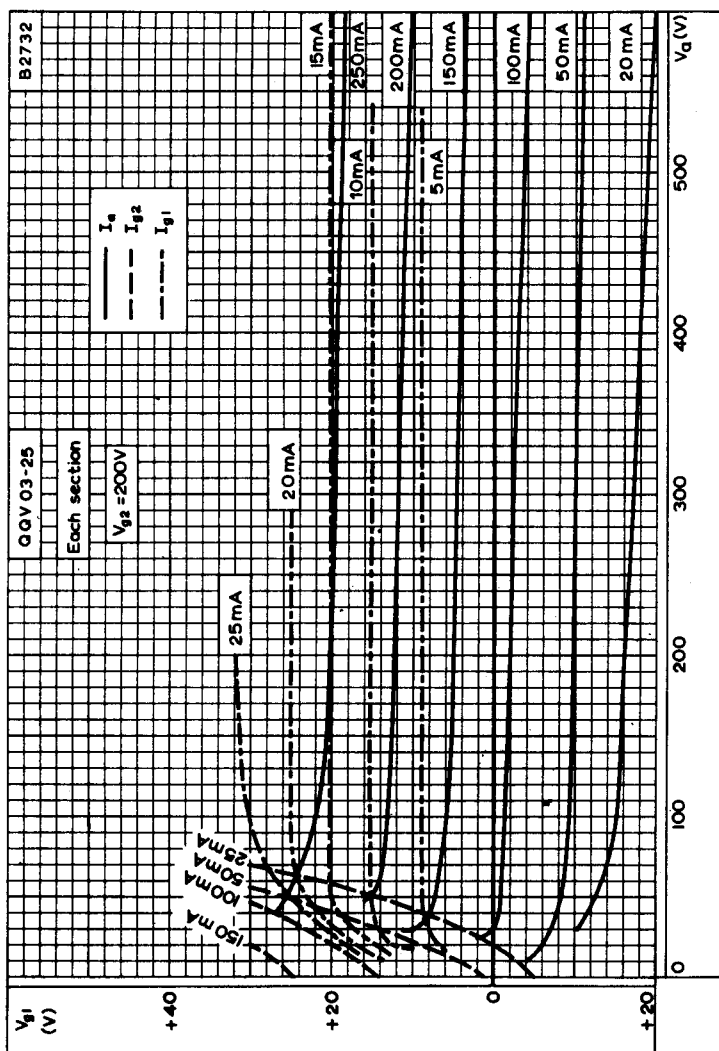
CONTROL-GRID CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER $V_{g2} = 200V$



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

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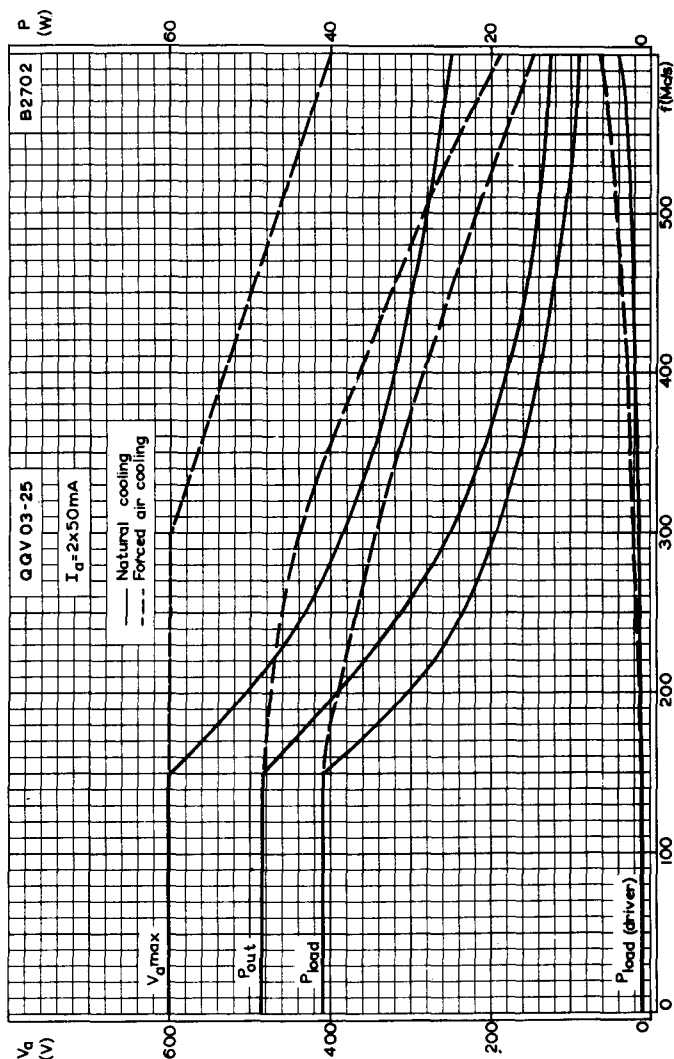
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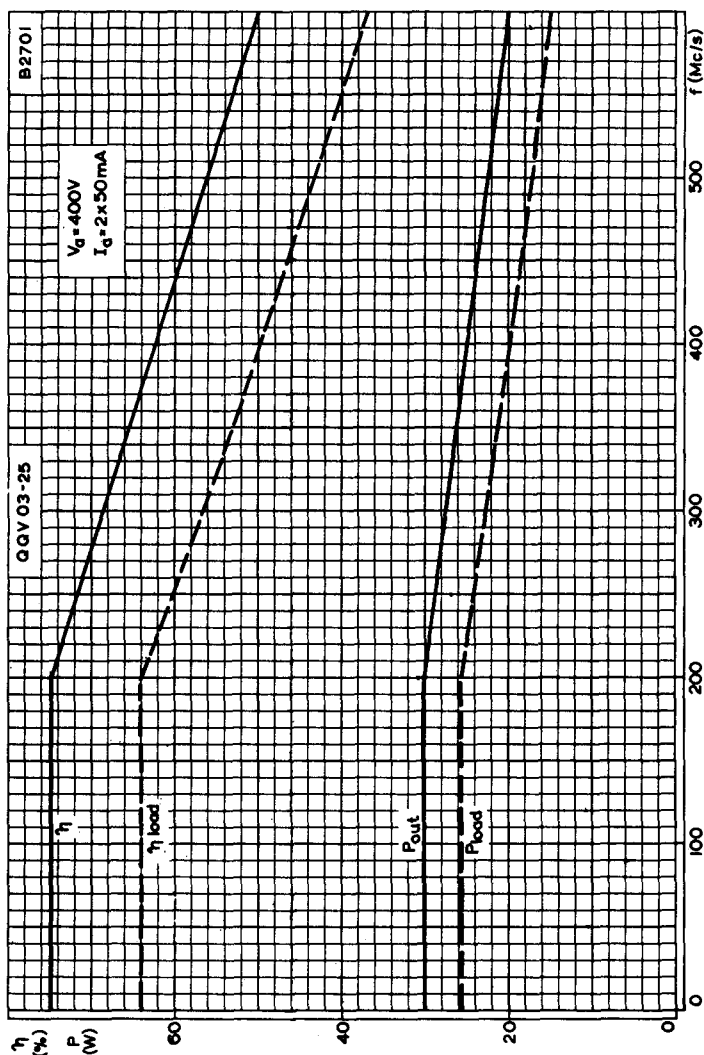
CONSTANT CURRENT CHARACTERISTICS FOR EACH SECTION $V_{g2} = 200V$

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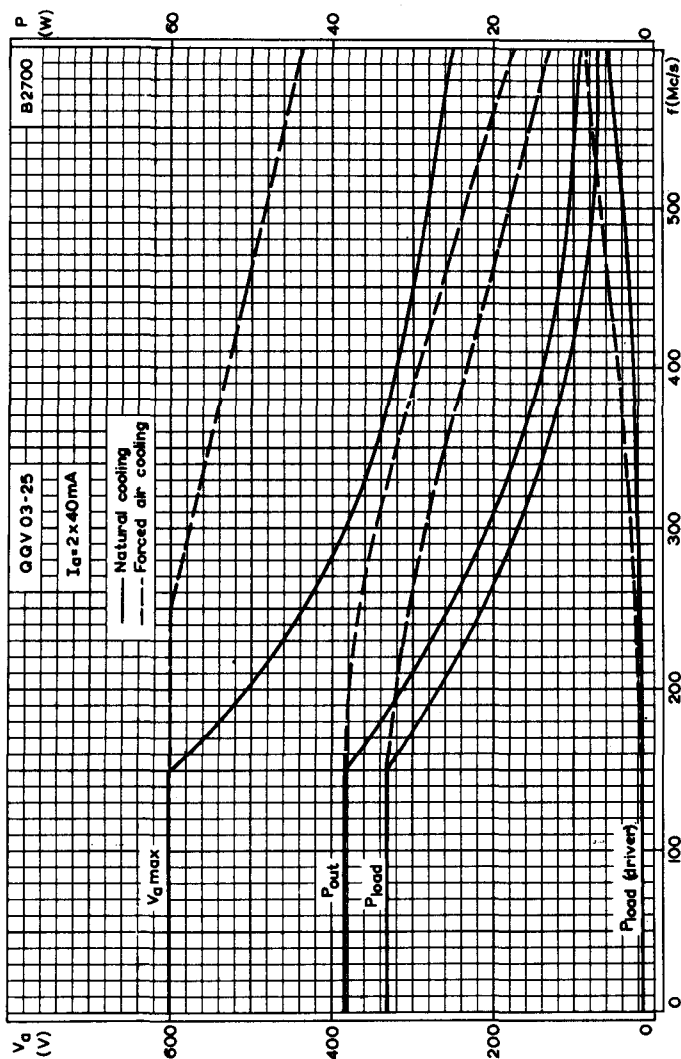
MAXIMUM OPERATING CONDITIONS FOR A PUSH-PULL R. F. POWER
AMPLIFIER (CLASS 'C' TELEGRAPHY OR F. M. TELEPHONY)



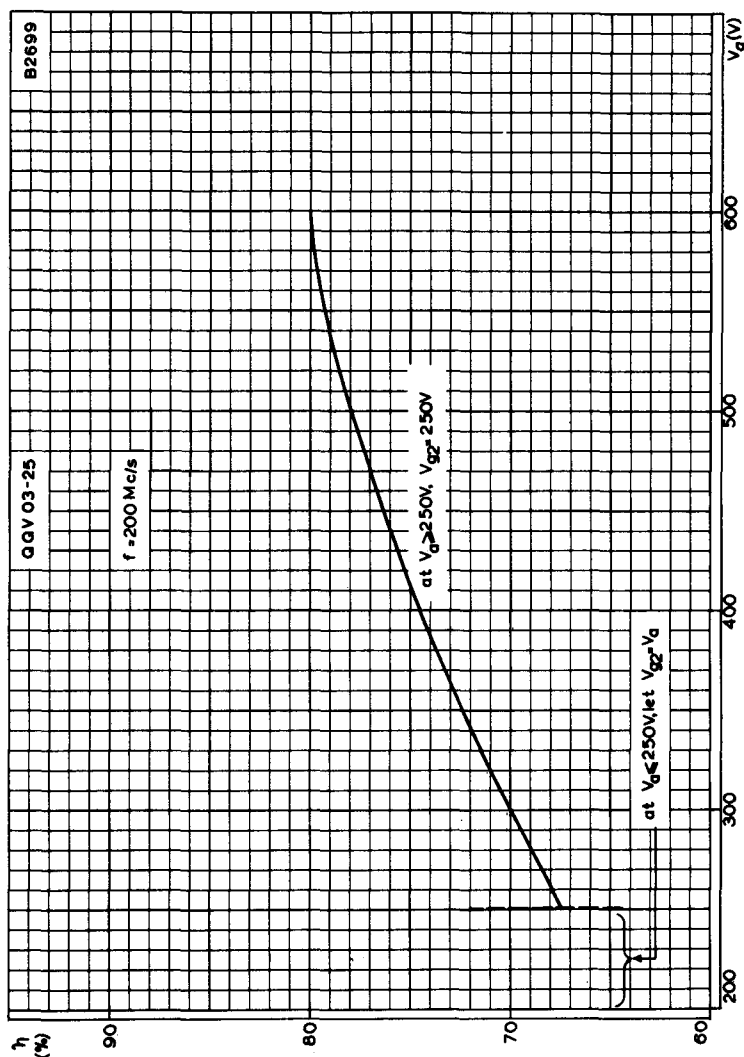
FREQUENCY CHARACTERISTICS FOR OPERATING CONDITIONS AS A PUSH-PULL R.F. POWER AMPLIFIER (CLASS 'C' TELEGRAPHY OR F.M. TELEPHONY)

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MAXIMUM OPERATING CONDITIONS FOR AN ANODE AND SCREEN-GRID
MODULATED R. F. POWER AMPLIFIER (CLASS 'C' TELEPHONY)



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