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 Multiplier	Class 'C' Telephony Anode and Screen Grid Modulation	Class 'C' Telegraphy or F.M. Telephony	
f	158/475	180	180	Mc/s
P_{out}	10	43	67	W
f max.	600	600	600	Mc/s
V_a max. (f<250Mc/s)	750	600	750	V
(f=600Mc/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<250Mc/s)	750	600	750	V
(f=600Mc/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	kΩ
R_{g1-k} max. per section (automatic bias)	100	100	100	kΩ
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 = 40mA

g_m	2.5	mA/V
μ_{g1-g2}	8.0	

MOUNTING POSITION

Any

COOLING

Radiation and convection cooled

Maximum temperatures

Base pin	180	°C
Bulb	250	°C
Anode seal	250	°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 = 600V at frequencies up to 150Mc/s
V_a = 500V at frequencies up to 200Mc/s
V_a = 300V 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 $5ft^3$/min, $0.15m^3$/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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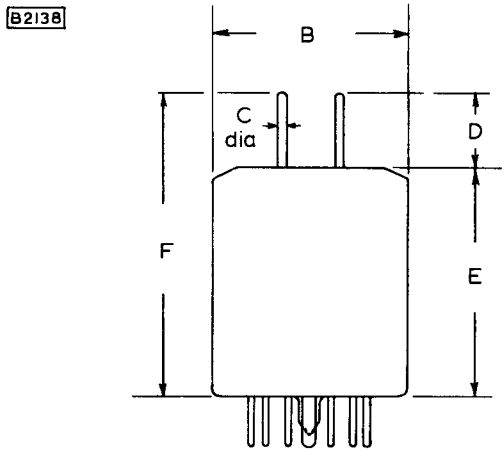
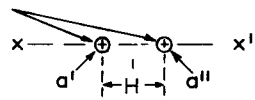
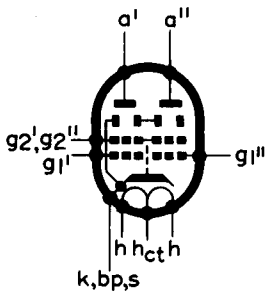
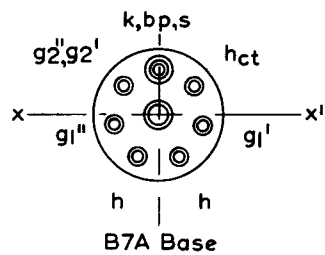


Location of anode pins within circles of dia G.







B7A Base

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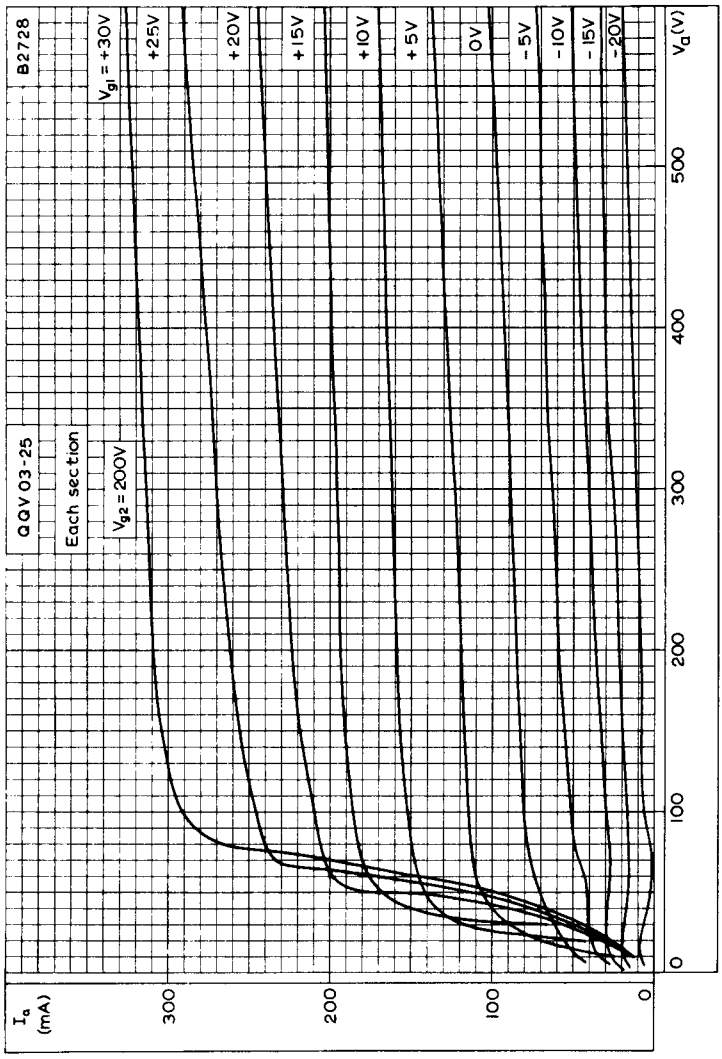
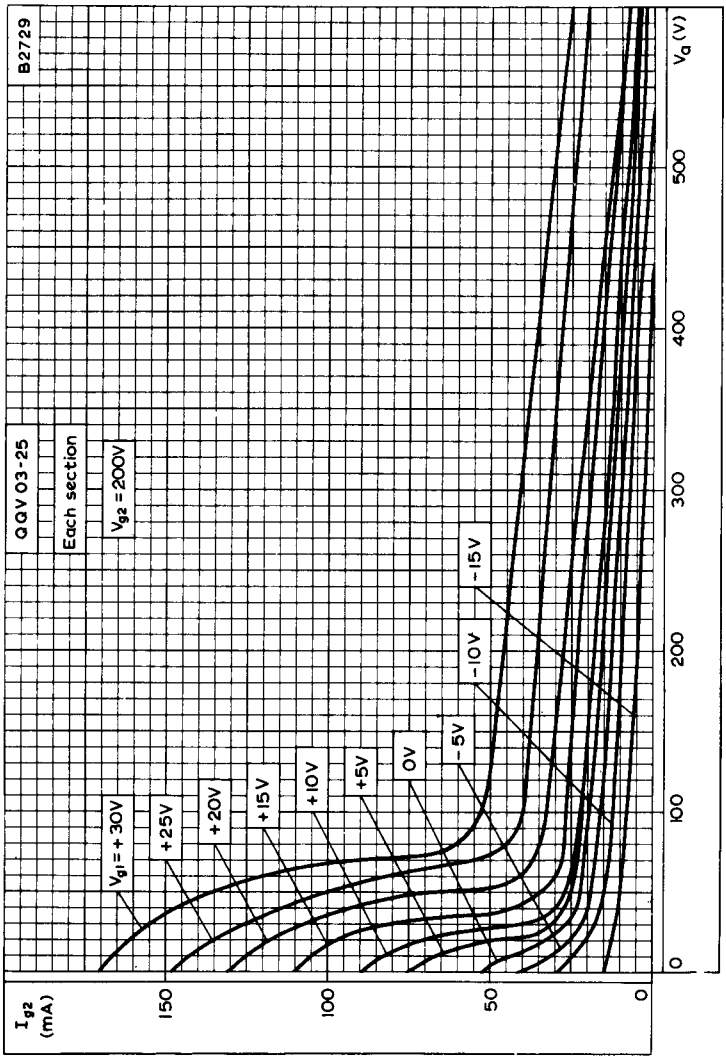
QQV03-25



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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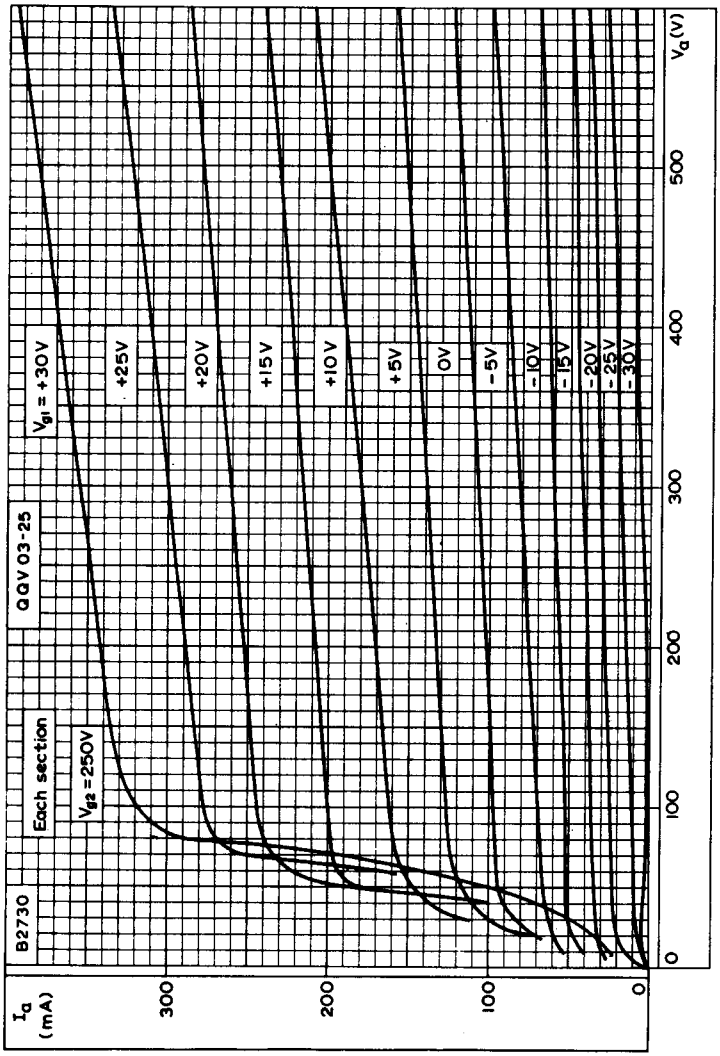
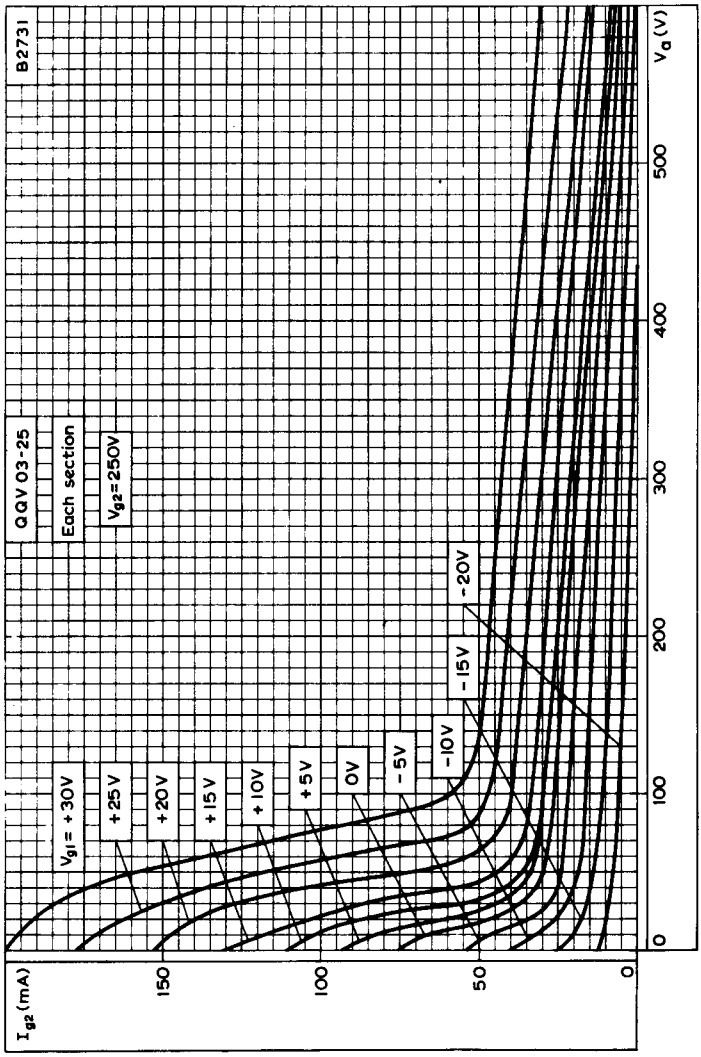
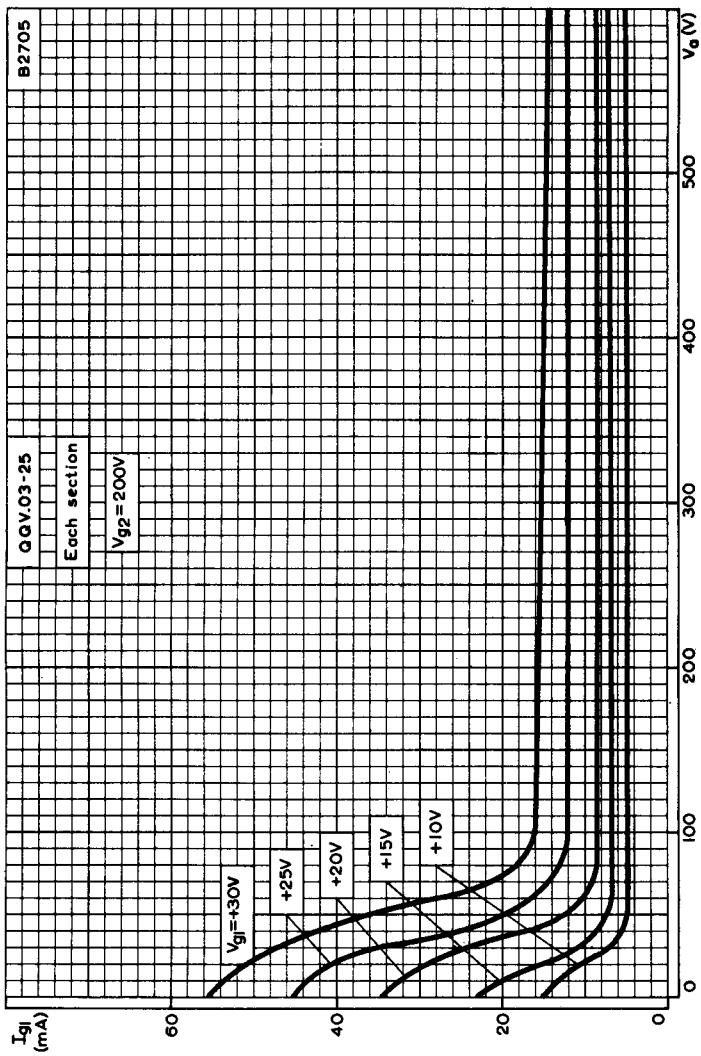
QQV03-25



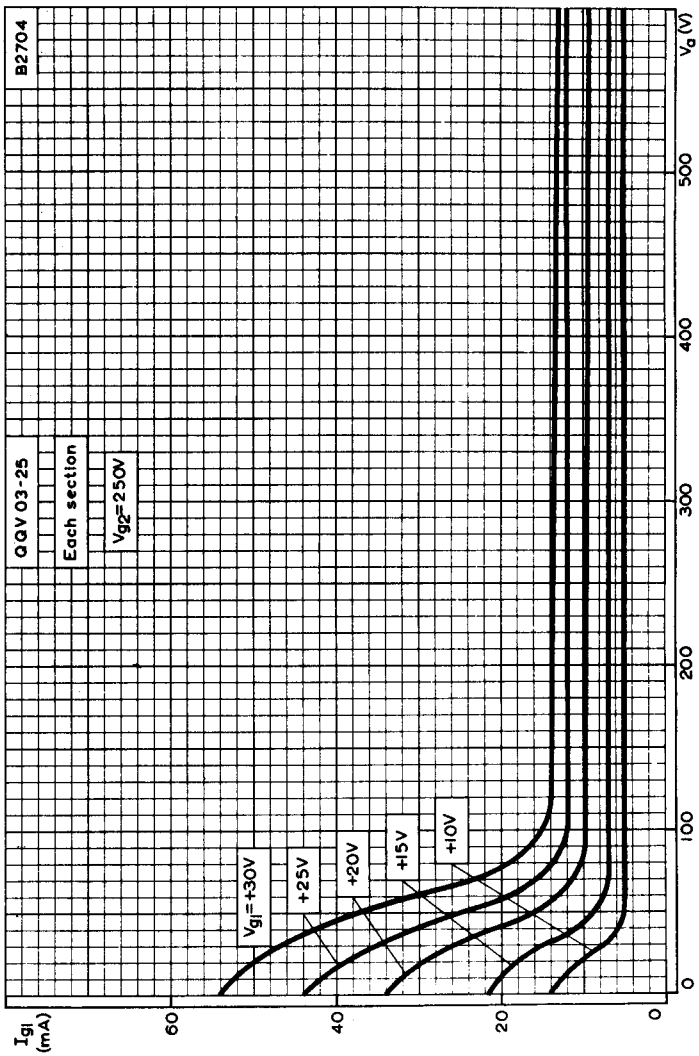
ANODE CURRENT FOR EACH SECTION PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER V_{g2}=250V



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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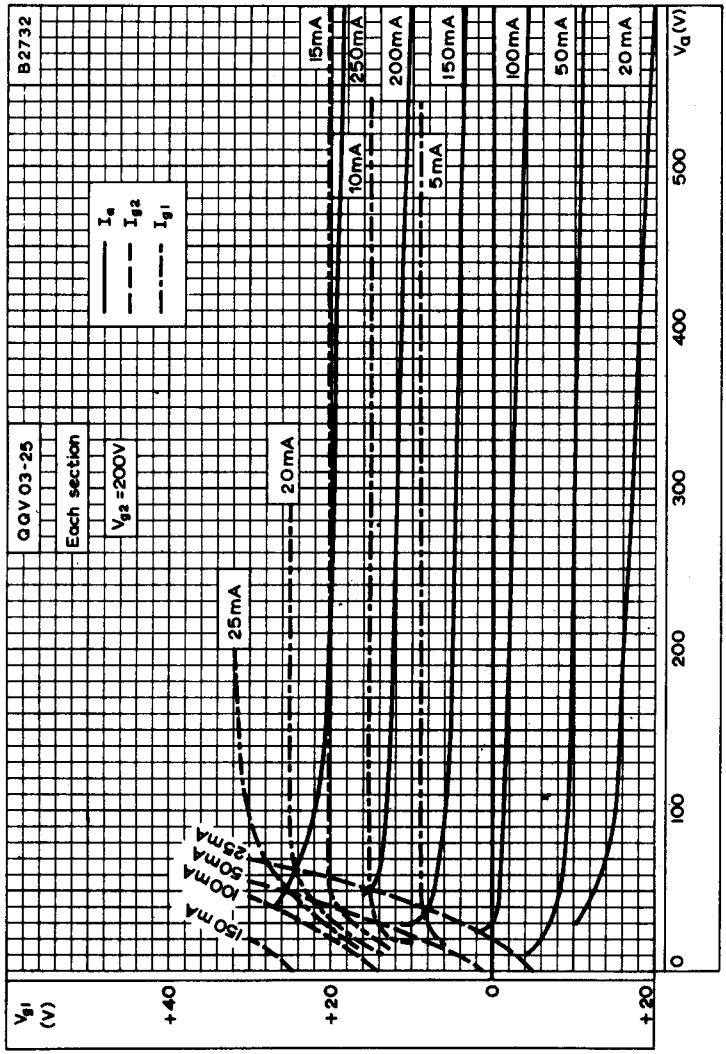
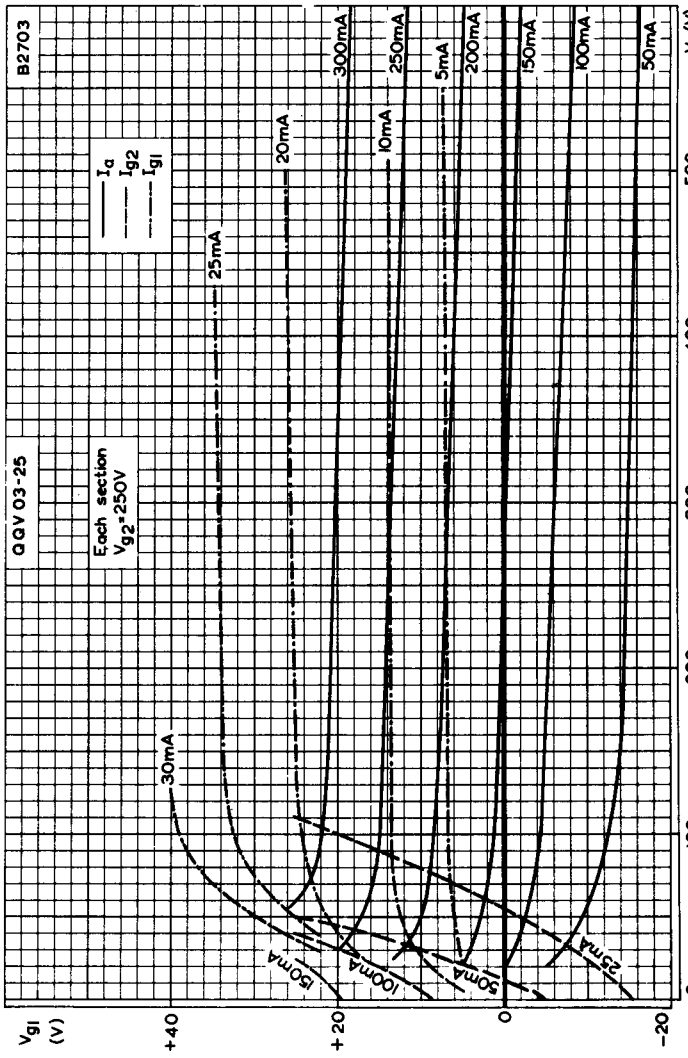
QQV03-25



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



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

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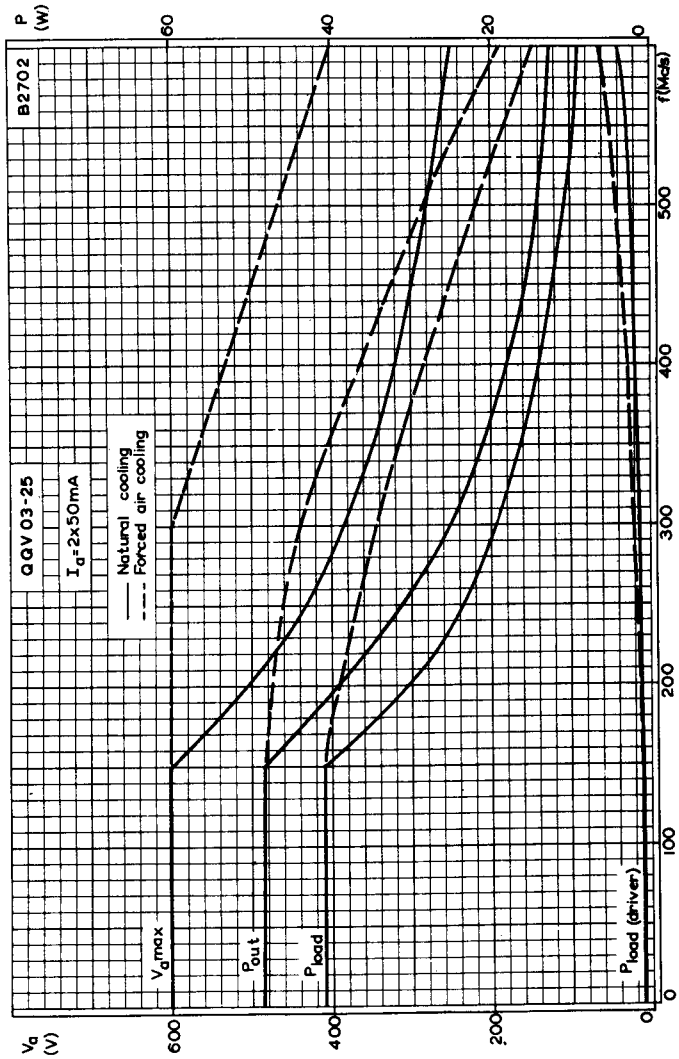
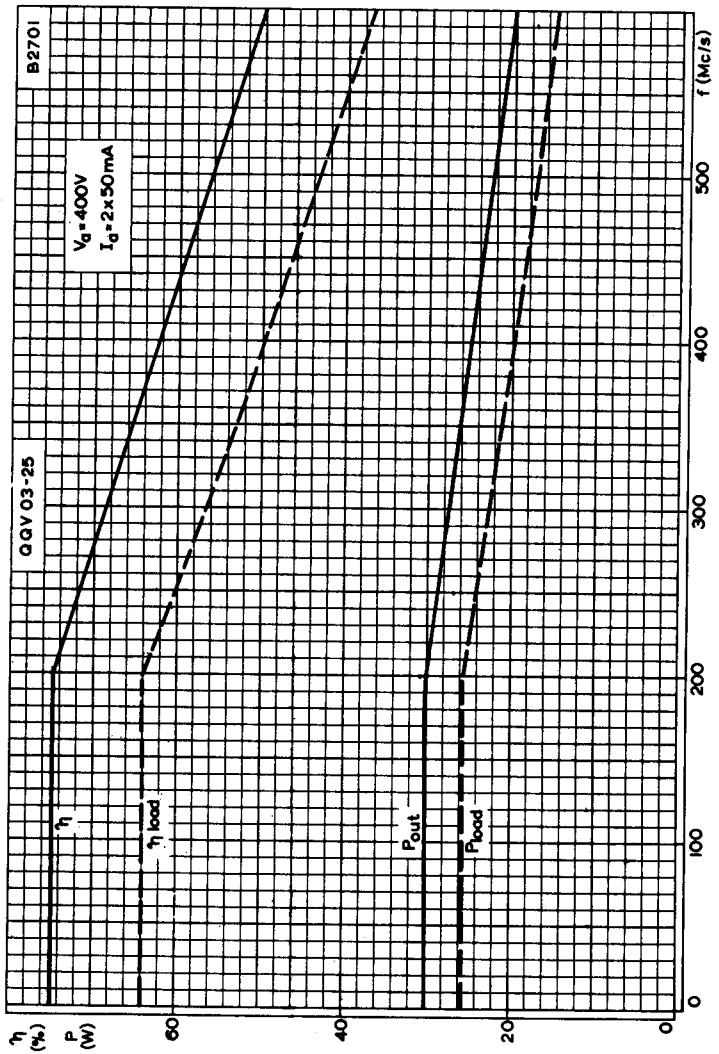
QQV03-25



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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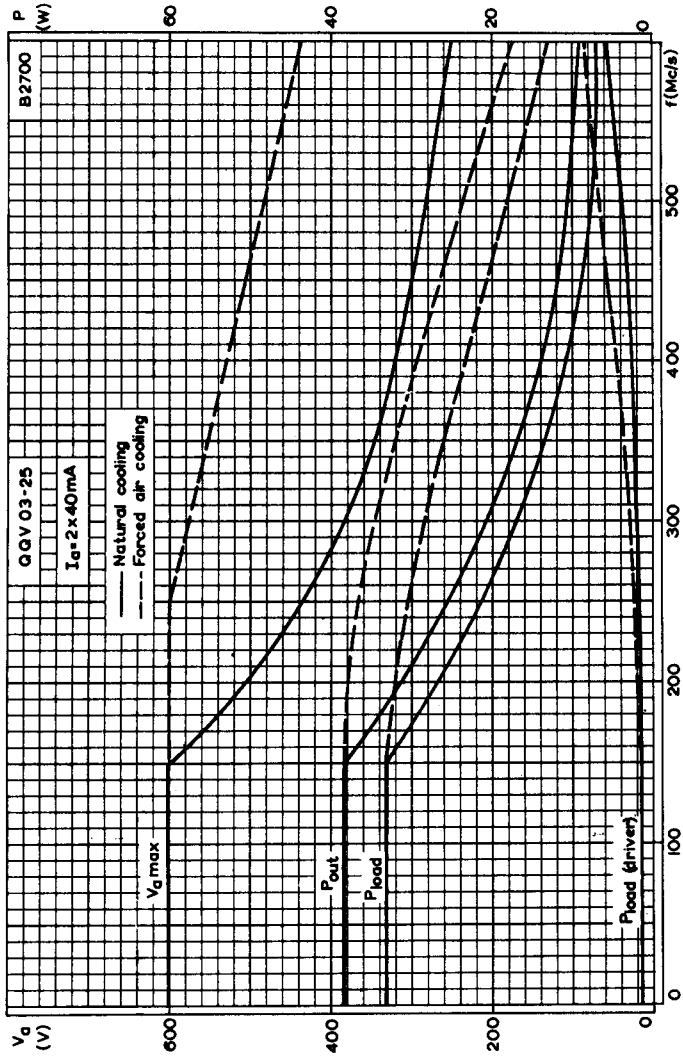
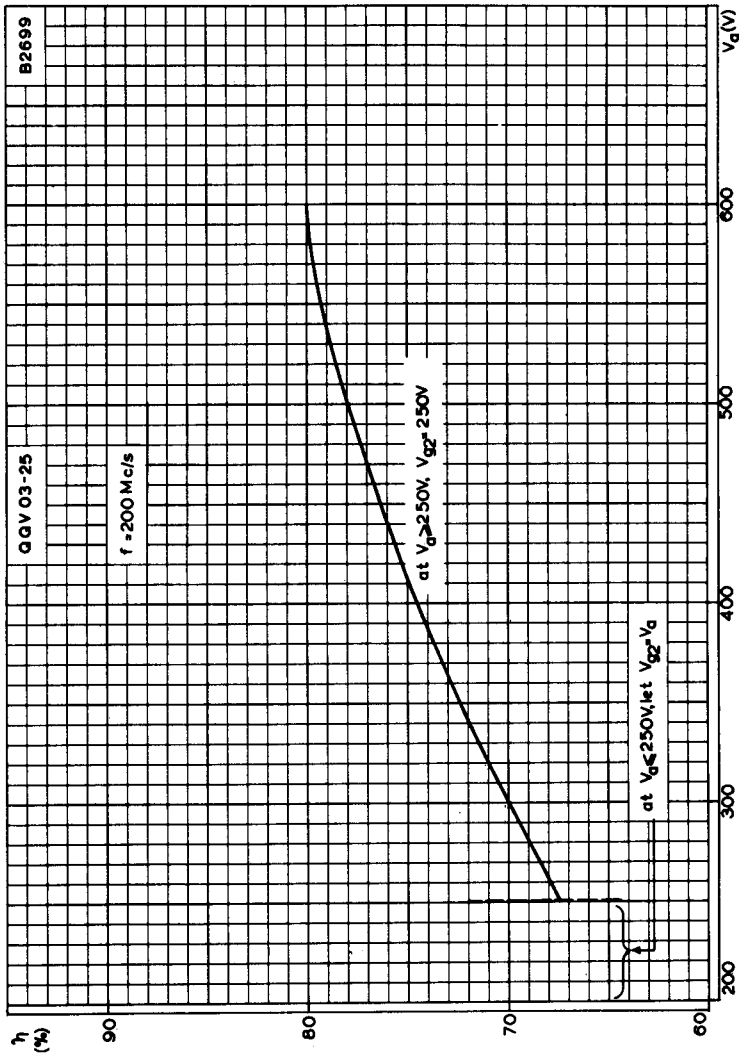
QQV03-25



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