WATER COOLED R.F. POWER TRIODE

QUICK REFERENCE DATA								
Frequency (MHz)	C telegraphy		C anode mod.		RF class B		AF class B Two tubes	
	V_a (kV)	W_o (kW)	V_a (kV)	W_o (kW)	V_a (kV)	W_o (kW)	V_a (kV)	W_o (kW)
10	15	120			15	110	12	78
30	12	90	11	66	12	110	10	78

HEATING: direct by A.C. or D.C.; filament thoriated tungsten

Filament voltage	V_f	=	12.6	V
Filament current	I_f	=	160	A

CAPACITANCES

Grid to filament	C_{gf}	=	120	pF
Anode to filament	C_{af}	=	1.4	pF
Anode to grid	C_{ag}	=	50	pF

TYPICAL CHARACTERISTICS

Anode voltage	V_a	=	3	kV
Anode current	I_a	=	1	A
Amplification factor	μ	=	58	
Mutual conductance	S	=	60	mA/V

TEMPERATURE LIMITS (Absolute limits)

Bulb temperature	t	= max.	220	°C
Seal temperature	t	= max.	220	°C

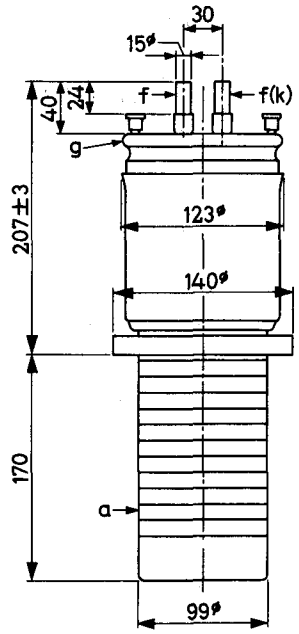
COOLING

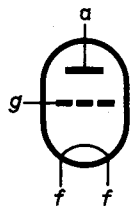
For cooling data see cooling curves.
For water inlet temperatures between 20 °C and 50 °C the required quantity of water can be found by proportional interpolation.
At frequencies higher than 10 MHz a low velocity air flow should be directed to the grid and filament seals.

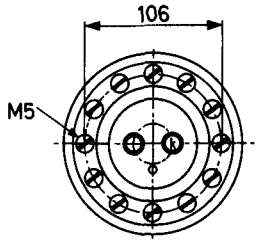
MECHANICAL DATA

Dimensions in mm

Net weight: 6.2 kg







Mounting position: vertical with anode down

ACCESSORIES

Water jacket	K724
Filament connector	40670
Grid connector	40671

R.F. CLASS C TELEGRAPHY or F.M. TELEPHONY

LIMITING VALUES (Absolute limits)

Frequency	f		up to 10	up to 30	MHz
Anode voltage	V_a	=	max. 16	max. 12.5	kV
Anode dissipation	W_a	=	max. 45	max. 45	kW
Negative grid voltage	$-V_g$	=	max. 1000	max. 1000	V
Grid dissipation	W_g	=	max. 1.3	max. 1.3	kW
Anode current	I_a	=	max. 13	max. 13	A
Grid current	I_g	=	max. 3.3	max. 3.3	A

OPERATING CONDITIONS

Frequency	f	=	10	30	30	30	MHz
Anode voltage	V_a	=	15	12	10	8	kV
Grid voltage	V_g	=	-600	-550	-500	-450	V
Anode current	I_a	=	9.75	9.25	9.0	8.75	A
Grid current	I_g	=	2.2	2.2	2.1	1.85	A
Peak grid driving voltage	V_{gp}	=	1000	940	875	810	V
Grid driving power	W_{dr}	=	2.1	1.9	1.7	1.55	kW
Anode input power	Wi_a	=	146	111	90	70	kW
Anode dissipation	W_a	=	26	21	18	15	kW
Output power	W_o	=	120	90	72	55	kW
Efficiency	η	=	82	81	80	78.5	%

R.F. CLASS B AMPLIFIER

LIMITING VALUES (Absolute limits)

Frequency	f		up to 10	up to 30	MHz
Anode voltage	V_a	=	max. 16	max. 12.5	kV
Anode dissipation	W_a	=	max. 45	max. 45	kW
Negative grid voltage	$-V_g$	=	max. 1000	max. 1000	V
Grid dissipation	W_g	=	max. 1.3	max. 1.3	kW
Anode current	I_a	=	max. 13	max. 13	A
Grid current	I_g	=	max. 3.3	max. 3.3	A

OPERATING CONDITIONS

Frequency	f	=	10	10	30	30	MHz
Anode voltage	V_a	=	15	15	12	12	kV
Grid voltage	V_g	=	-260	-260	-210	-210	V
Anode current	I_a	=	10.1	7.75	12.7	9.85	A
Grid current	I_g	=	2.0	1.3	3.0	1.9	A
Peak grid driving voltage	V_{g_p}	=	600	520	650	520	V
Grid driving power	W_{dr}	=	1080	610	1770	880	W
Anode input power	W_{i_a}	=	151	116.3	153	118	kW
Anode dissipation	W_a	=	41	31.3	43	33	kW
Output power	W_o	=	110	85	110	85	kW
Efficiency	η	=	73	73	72	72	%

R.F. CLASS C ANODE MODULATION

LIMITING VALUES (Absolute limits)

Frequency	f		up to	30	MHz
Anode voltage	V_a	=	max.	11.5	kV
Anode dissipation	W_a	=	max.	30	kW
Negative grid voltage	$-V_g$	=	max.	1000	V
Grid dissipation	W_g	=	max.	1.3	kW
Anode current	I_a	=	max.	9	A
Grid current	I_g	=	max.	3.3	A

OPERATING CONDITIONS

Frequency	f	=	30	30	MHz
Anode voltage	V_a	=	11	10	kV
Grid voltage	Vg	=	-480	-440	V [1])
Anode current	I_a	=	7.6	6.9	A
Grid current	I_g	=	3.1	3.1	A
Grid resistor	R_g	=	90	80	Ω
Peak grid driving voltage	V_{g_p}	=	880	810	V
Grid driving power	W_{dr}	=	2.7	2.4	kW
Anode input power	Wi_a	=	83.6	69	kW
Anode dissipation	W_a	=	17.6	14	kW
Output power	W_o	=	66	55	kW
Efficiency	η	=	79	79	%
Modulation depth	m	=	100	100	%
Modulation power	W_{mod}	=	41.8	34.5	kW

[1]) Partially obtained by the grid resistor and grid current.

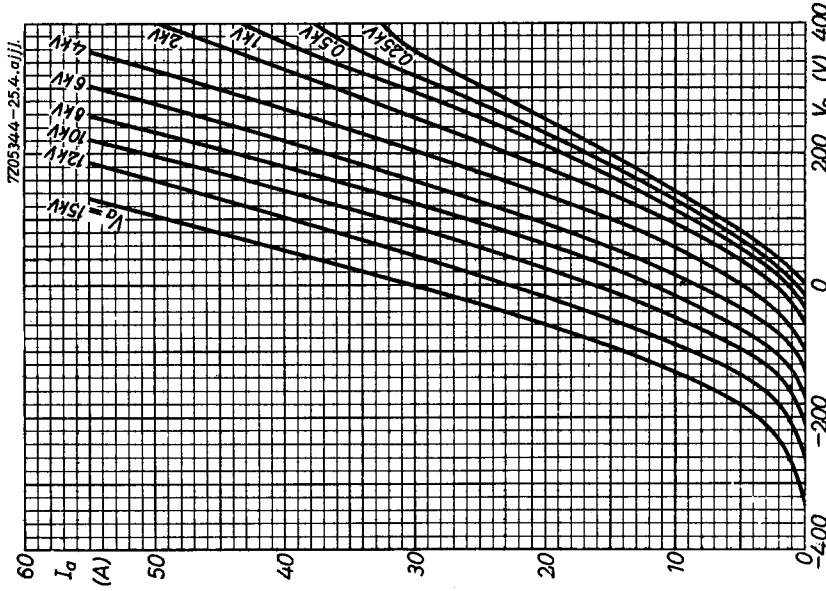
A.F. CLASS B AMPLIFIER AND MODULATOR

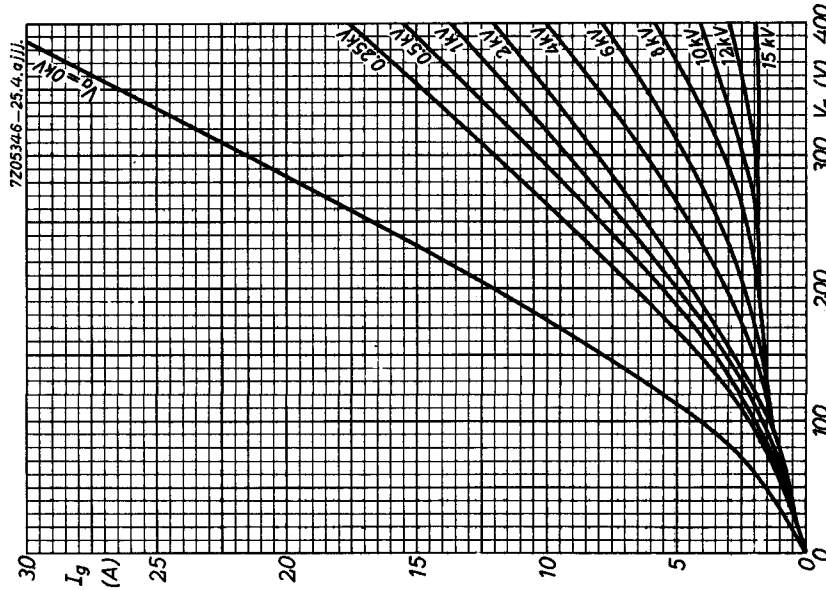
LIMITING VALUES (Absolute limits)

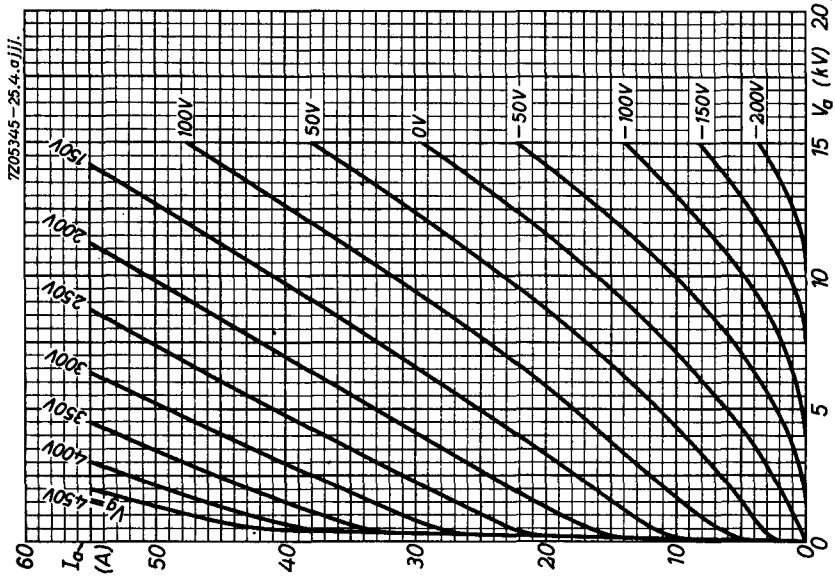
Anode voltage	V_a	= max.	12	kV
Anode dissipation	W_a	= max.	45	kW
Negative grid voltage	$-V_g$	= max.	1000	V
Grid dissipation	W_g	= max.	1.3	kW
Anode current	I_a	= max.	13	A
Grid current	I_g	= max.	3.3	A

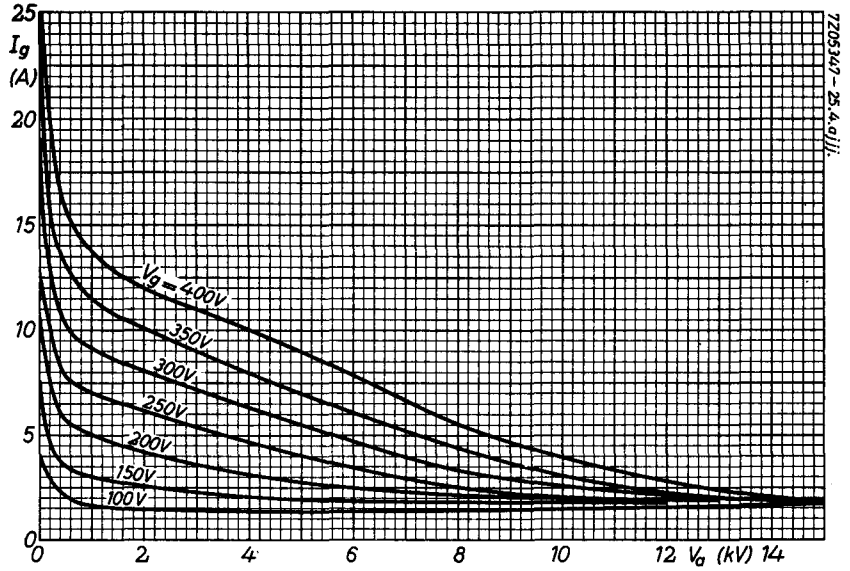
OPERATING CONDITIONS (two tubes in push-pull)

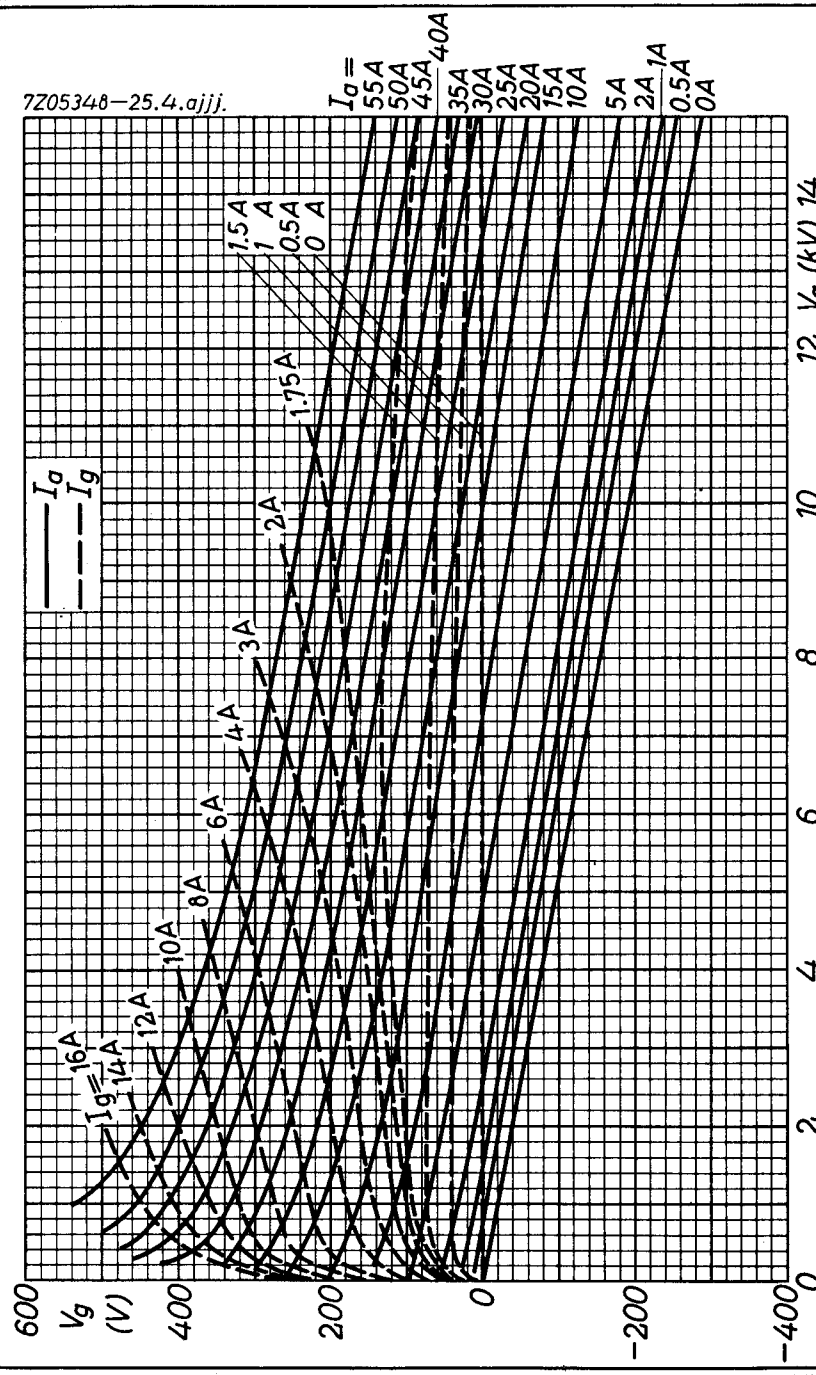
Anode voltage	V_a	=	12		10		kV
Grid voltage	V_g	=	−205		−170		V
Load resistance	$R_{aa\sim}$	=	2720		1810		Ω
Peak grid driving voltage	V_{ggp}	=	0	710	0	710	V
Anode current	I_a	=	2x0.4	2x4.75	2x0.4	2x5.75	A
Average grid current	I_g	=	0	2x0.45	0	2x0.72	A
Peak grid current	I_{gp}	=	0	2x2.9	0	2x4.0	A
Grid driving power	W_{dr}	=	0	2x150	0	2x235	W
Anode input power	Wi_a	=	2x4.0	2x57	2x4.0	2x57.5	kW
Anode dissipation	W_a	=	2x4.0	2x18	2x4.0	2x18.5	kW
Output power	W_o	=	0	78	0	78	kW
Efficiency	η	=	–	68.5	–	68	%

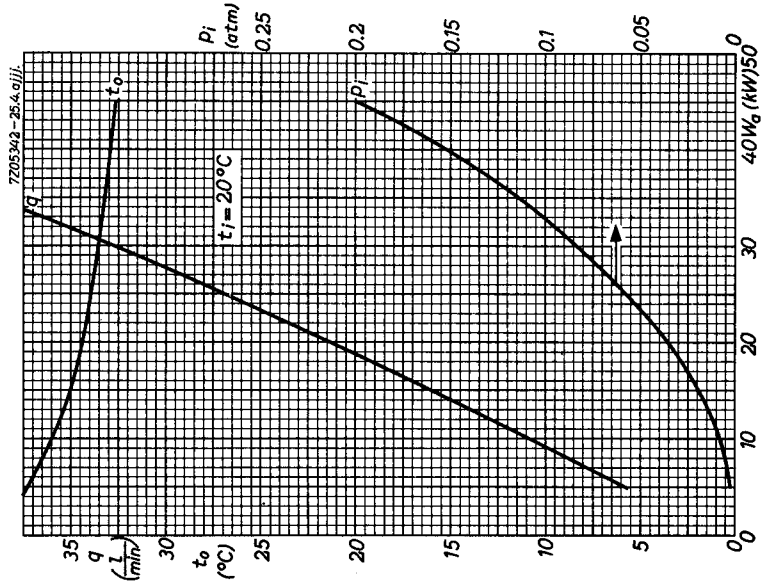

7205344-25.4.ojjj
Va = 15kV
12kV
10kV
8kV
6kV
4kV
2kV
1kV
0.5kV
0.25kV
Ia (A)
60
50
40
30
20
10
0
Vg (V)
400
200
0
-200
-400

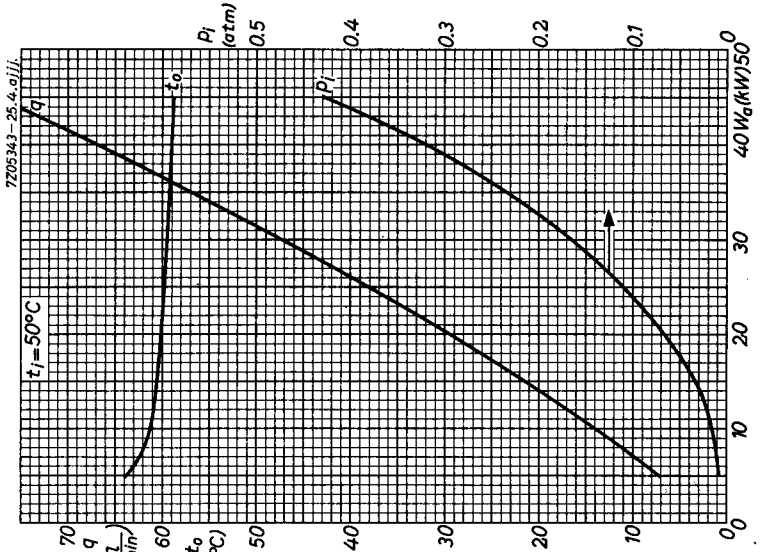

7205346-25.4.ojjj
Va = 0kV
0.25kV
0.5kV
1kV
2kV
4kV
6kV
8kV
10kV
12kV
15kV
Ig (A)
30
25
20
15
10
5
0
Vg (V)
400
300
200
100
0


7Z05345-25.4.ojjj.
100V
50V
0V
−50V
−100V
−150V
−200V
150V
200V
250V
300V
350V
400V
V_g = 450V
60
I_a (A)
50
40
30
20
10
0
15
V_a (kV) 20
5
10


25
I_g
(A)
20
15
10
5
0
V_g = 400V
350V
300V
250V
200V
150V
100V
0
2
4
6
8
10
12 V_a (kV) 14
7Z05340-25.4.ojjj.


7Z05348—25.4.ajjj.
Ia
Ig
Ia =
55A
50A
45A
40A
35A
30A
25A
20A
15A
10A
5A
2A
1A
0.5A
0A
1.5A
1A
0.5A
0A
1.75A
2A
3A
4A
6A
8A
10A
12A
14A
16A
Ig=
600
400
200
0
−200
−400
Vg (V)
0
2
4
6
8
10
12
14
Va (kV)


7205342-25.4.ajjj
t_i = 20°C
q
t_o
p_i (atm)
0.25
0.2
0.15
0.1
0.05
0
$40W_o$ (kW)50
30
20
10
0
p_i
35
30
25
20
15
10
5
0
q $(\frac{l}{min})$
t_o (°C)


7205343-25.4.ajjj
t_i = 50°C
q
t_o
p_i (atm)
0.5
0.4
0.3
0.2
0.1
0
$40W_o$(kW)50
30
20
10
0
p_i
70
60
50
40
30
20
10
0
q $(\frac{l}{min})$
t_o (°C)