

**SUBMINIATURE
V.H.F. OUTPUT PENTODE**

DL70

*Subminiature output pentode suitable for
v.h.f. applications in battery-operated equipment.*

This valve is primarily intended for use in communications equipment of the 'push to talk' type and its continuous life rating under typical supply voltage conditions is relatively short and is chiefly a function of hours of filament operation and filament temperature.

Under 'push to talk' conditions an operating life of about 200 hours may be expected.

FILAMENT

Suitable for d.c. operation only.

V_f	1.25	V
I_f	110	mA

MOUNTING POSITION

Any

Note – Direct soldered connections to the leads of this valve must be at least 5mm from the seal and any bending of the valve leads must be at least 1.5mm from the seal.

If the valve is used with an earthed metal clip a decrease in output power of approximately 10% can be expected up to 200Mc/s.

CAPACITANCES

	Shielded	Unshielded
C_{a-g_1}	< 0.1	0.08 pF
C_{in}	3.0	3.1 pF
C_{out}	5.6	3.9 pF

CHARACTERISTICS

V_a	135	V
V_{g_2}	90	V
I_a	7.5	mA
I_{g_2}	1.5	mA
V_{g_1}	-7.5	V
g_m	1.9	mA/V
r_a	150	k Ω
$\mu_{g_1-g_2}$	6.5	

OPERATING CONDITIONS AS A CLASS 'C' TELEGRAPHY R.F. OSCILLATOR

f	10	50	Mc/s
V_a	150	150	V
V_{g_2}	110	110	V
I_a	10	10	mA
I_{g_2}	3.0	3.0	mA
I_{g_1}	40	40	μ A
R_{g_1}	470	390	k Ω
P_{load}	800	800	mW
η_{load}	53	53	%
$V_{a(pk)}$	120	—	V
$V_{g_1(pk)}$	23	—	V



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OPERATING CONDITIONS AS A CLASS 'C' TELEGRAPHY R.F. AMPLIFIER

f	50	200	Mc/s
V _a	150	150	V
V _{g2}	110	110	V
V _{g1}	-22	-22	V
I _a	9.7	10.5	mA
I _{g2}	3.2	2.5	mA
I _{g1}	80	60	μA
P _{load}	820	450	mW
η _{load}	56	29	%

P_{drive} measured at the control-grid is approximately 50mW at f=200Mc/s and does not include the power lost in the grid tuned circuit.

OPERATING CONDITIONS AS A FREQUENCY MULTIPLIER

Doubler

f _{out}	50	50	100	100	Mc/s
V _a	90	150	90	150	V
V _{g2}	90	110	90	110	V
V _{g1}	-32	-40	-32	-40	V
I _a	4.3*	9.4	4.7*	9.9	mA
I _{g2}	1.5	3.4	1.3	3.0	mA
I _{g1}	13	140	8.0	90	μA
P _{load}	180	590	150	510	mW
η _{load}	47	42	36	34	%

Trebler

f _{out}	50	50	100	100	Mc/s
V _a	90	150	90	150	V
V _{g2}	90	110	90	110	V
V _{g1}	-60	-70	-60	-70	V
I _a	4.4*	9.3	4.6*	9.7	mA
I _{g2}	1.6	3.4	1.4	3.1	mA
I _{g1}	30	24	24	190	μA
P _{load}	140	420	120	360	mW
η _{load}	35	30	29	25	%

Quadrupler

f _{out}		50	50	Mc/s
V _a		90	150	V
V _{g2}		90	110	V
V _{g1}		-65	-80	V
I _a		4.5*	6.2	mA
I _{g2}		1.5	1.8	mA
I _{g1}		32	27	μA
P _{load}		100	220	mW
η _{load}		25	24	%

*For class 'C' r.f. operation at V_a ≤ 90V, I_k max. = 6.0mA.

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**OPERATING CONDITIONS AS SINGLE VALVE CLASS 'A'
AMPLIFIER**

V_a	45	67.5	90	120	135	V
V_{g2}	45	67.5	90	120	90	V
V_{g1}	-2.9	-3.8	-6.5	-12	-7.5	V
I_a	3.0	7.5	9.0	8.0	7.5	mA
$I_{g2(0)}$	0.8	1.8	2.1	1.8	1.5	mA
$I_{g2}(\text{max. sig.})$	1.2	2.7	3.1	3.0	2.5	mA
R_a	12	6.5	7.0	13	16	k Ω
$V_{in(r.m.s.)}$ ($P_{out}=50\text{mW}$)	1.9	1.5	1.5	1.3	1.1	V
P_{out}	58	190	360	460	500	mW
$V_{in(r.m.s.)}$	2.2	3.4	4.7	4.7	4.0	V
D_{tot}	10	10	10	10	10	%

**OPERATING CONDITIONS FOR TWO VALVES IN CLASS 'AB'
PUSH-PULL**

V_{a-e}	90	150	V
V_{g2-e}	90	120	V
$I_{a(0)}$	2×6.5	2×6.3	mA
$I_a(\text{max. sig.})$	2×7.6	2×7.95	mA
$I_{g2(0)}$	2×1.5	2×1.4	mA
$I_{g2}(\text{max. sig.})$	2×2.6	2×2.65	mA
R_k	390	680	Ω
R_{a-a}	11	18	k Ω
$V_{in(g1-g1)r.m.s.}$ ($P_{out}=50\text{mW}$)	2.8	4.2	V
P_{out}	0.65	1.35	W
$V_{in(g1-g1)r.m.s.}$	14.5	11.3	V
D_{tot}	5.7	4.7	%

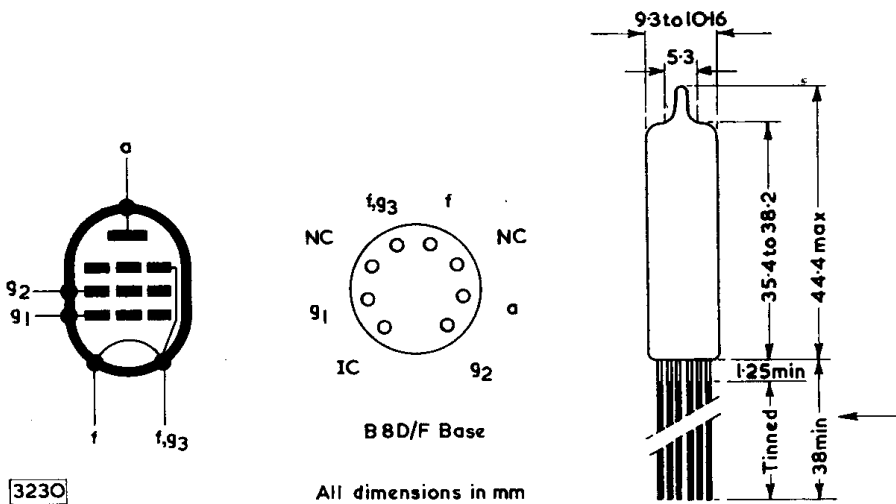
LIMITING VALUES

V_a max.	150	V
p_a max.	1.0	W
V_{g2} max.	150	V
p_{g2} max.	450	mW
R_{g1-f} max.	2.2	M Ω
V_f max. (absolute)	1.35	V
V_{g1} max.:—r.f. amplifier	-25	V
frequency doubler	-40	V
frequency trebler	-70	V
frequency quadrupler	-80	V
I_k max.:—	13	mA
frequency quadrupler ($V_a \geq 90\text{V}$)	8.0	mA

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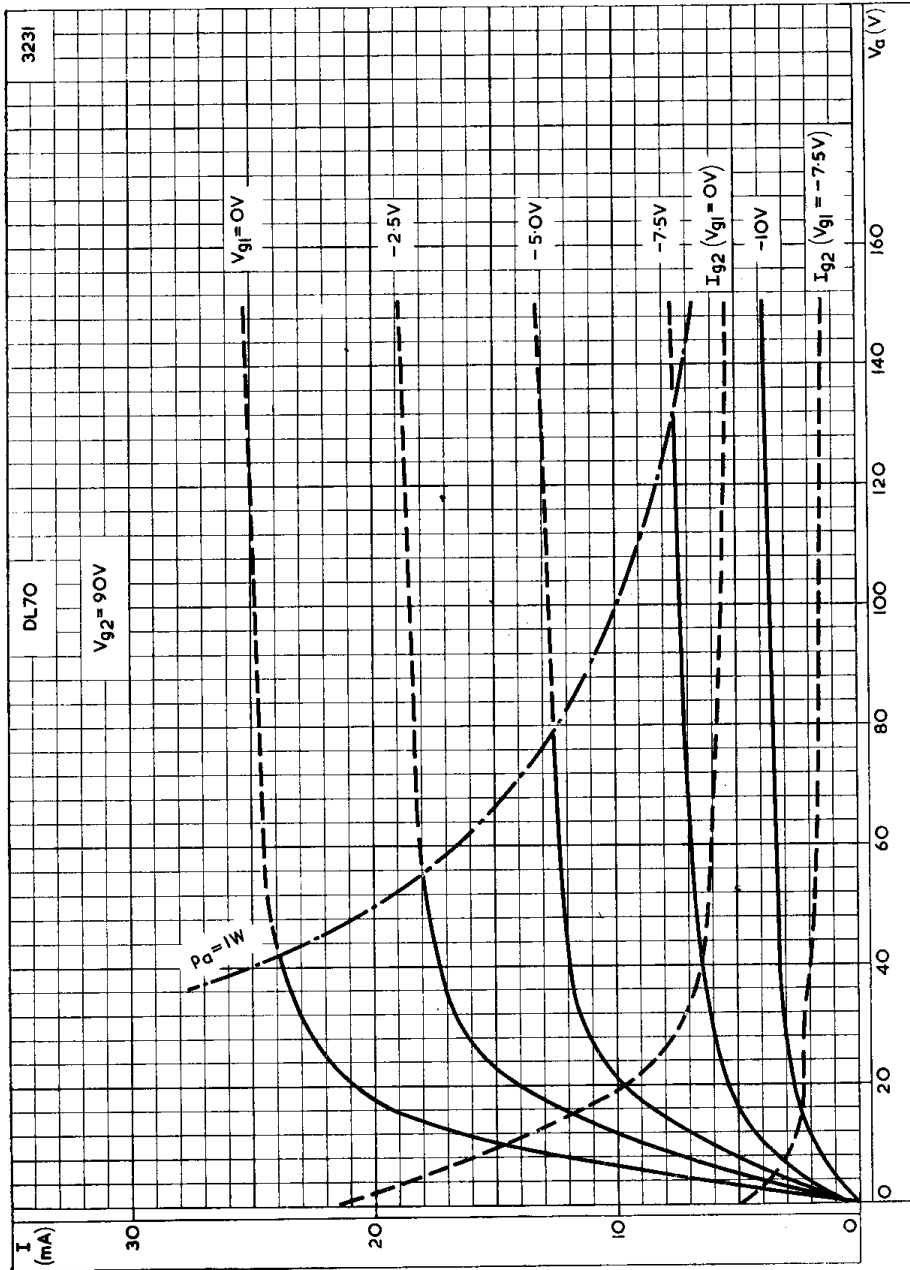
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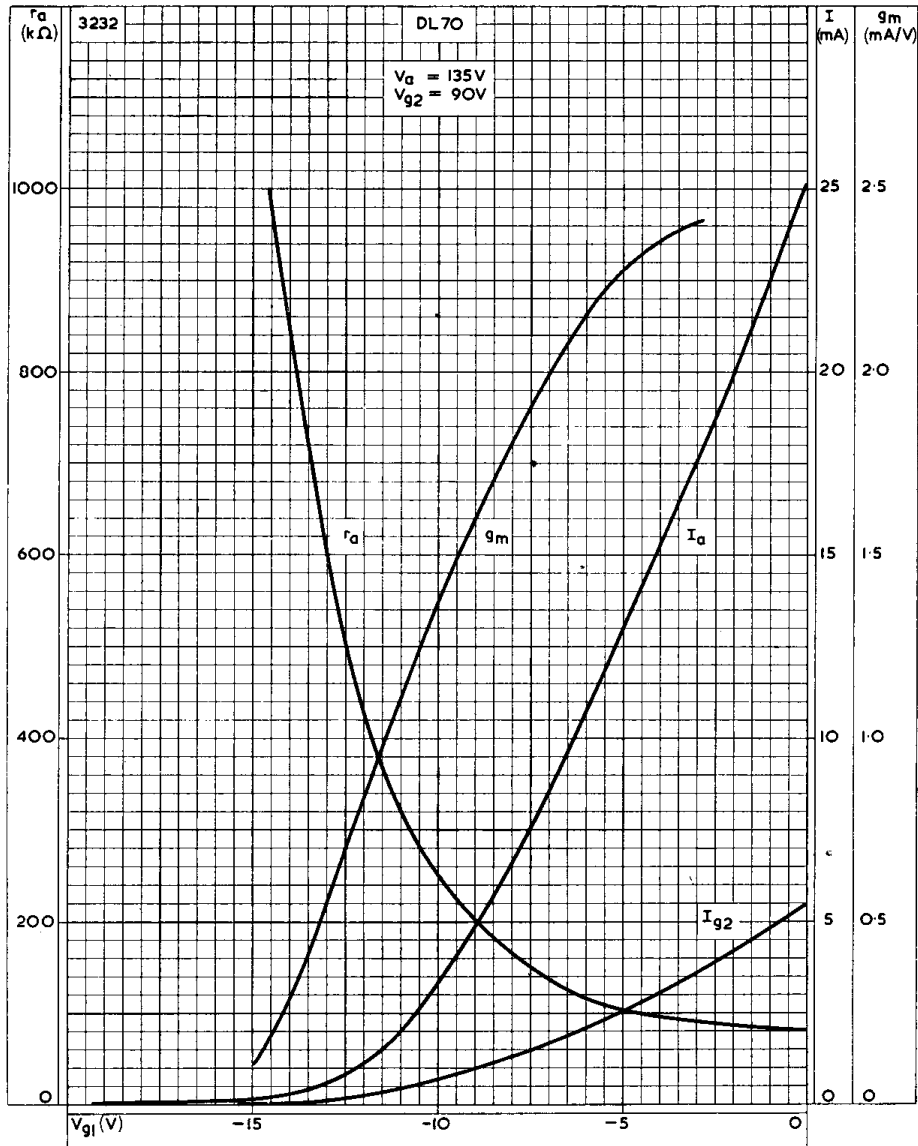


ANODE AND SCREEN-GRID CURRENTS PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER. $V_{g2} = 90V$

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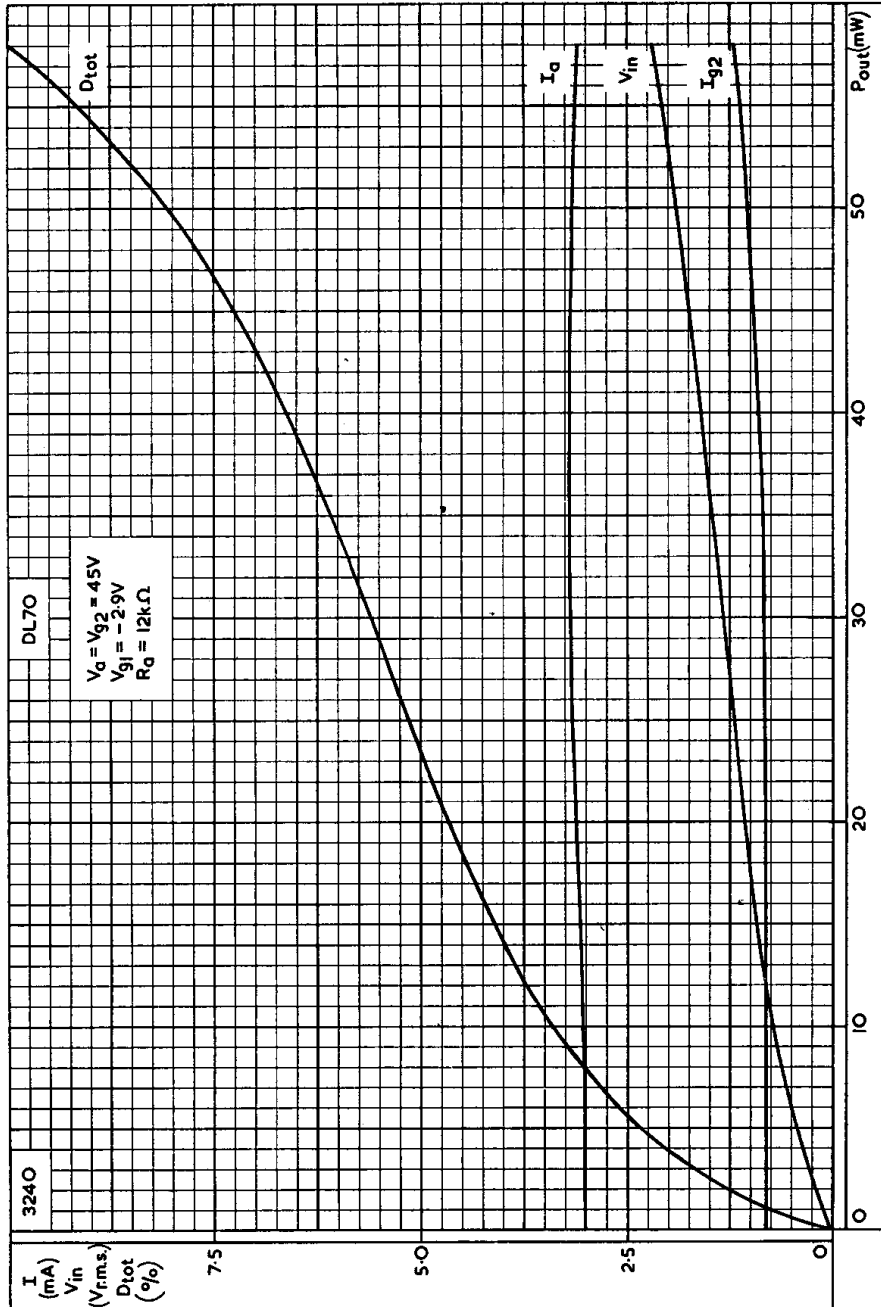


ANODE AND SCREEN-GRID CURRENTS, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE
 $V_a = 135V$, $V_{g2} = 90V$

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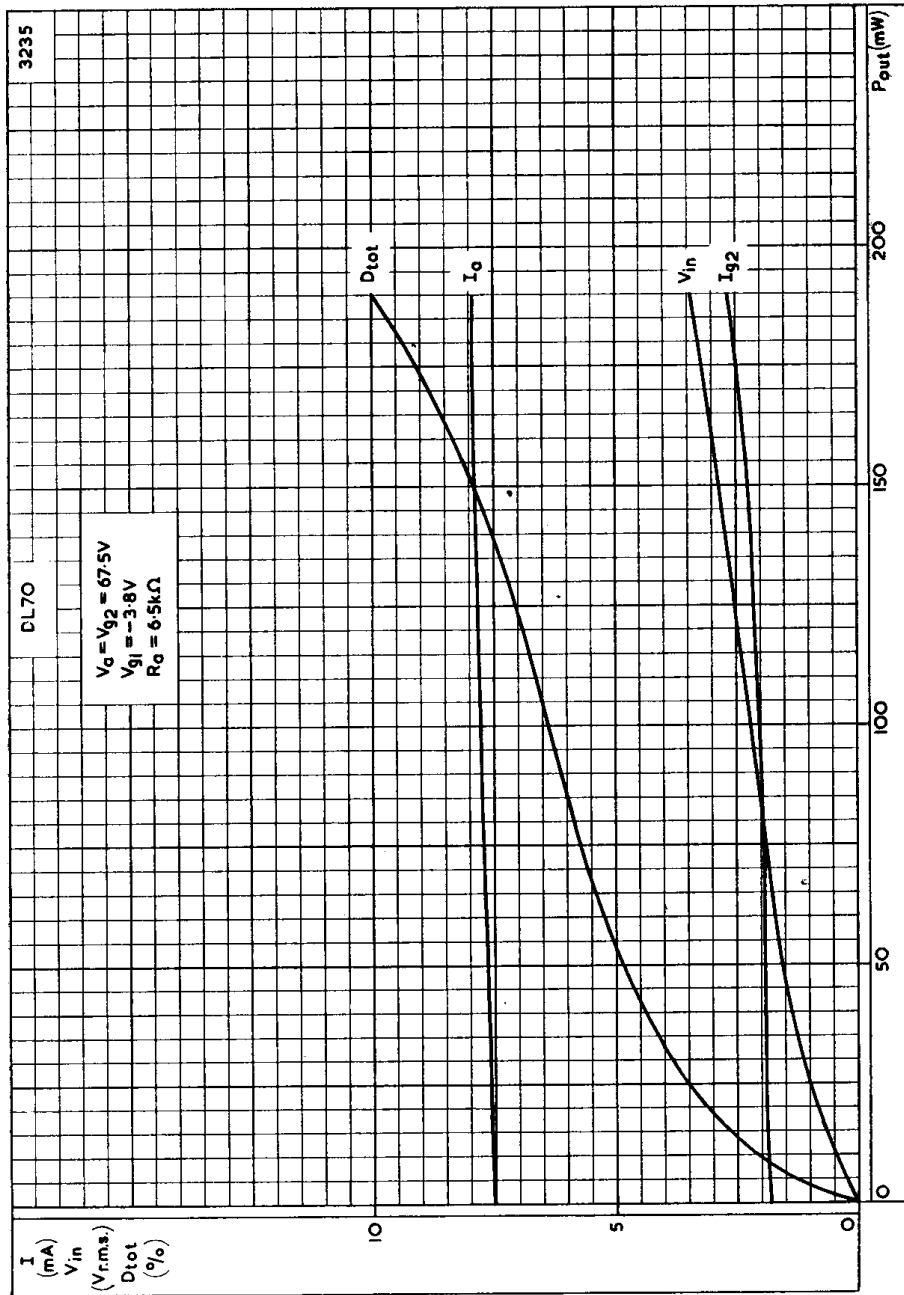


PERFORMANCE OF SINGLE DL70 AS CLASS 'A' AMPLIFIER. $V_b = V_{g2} = 45V$

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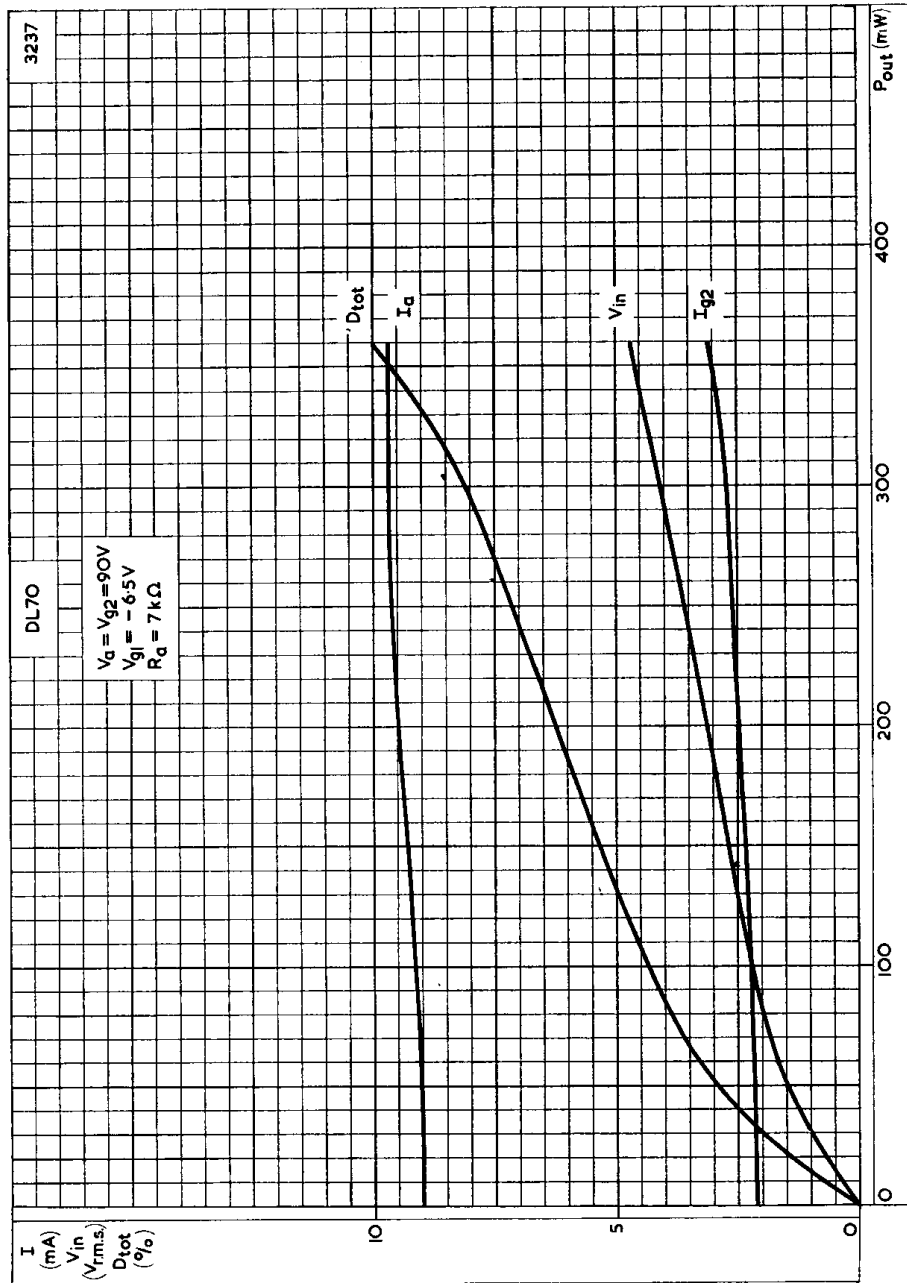


PERFORMANCE OF SINGLE DL70 AS CLASS 'A' AMPLIFIER. $V_g = V_{g2} = 67.5V$.

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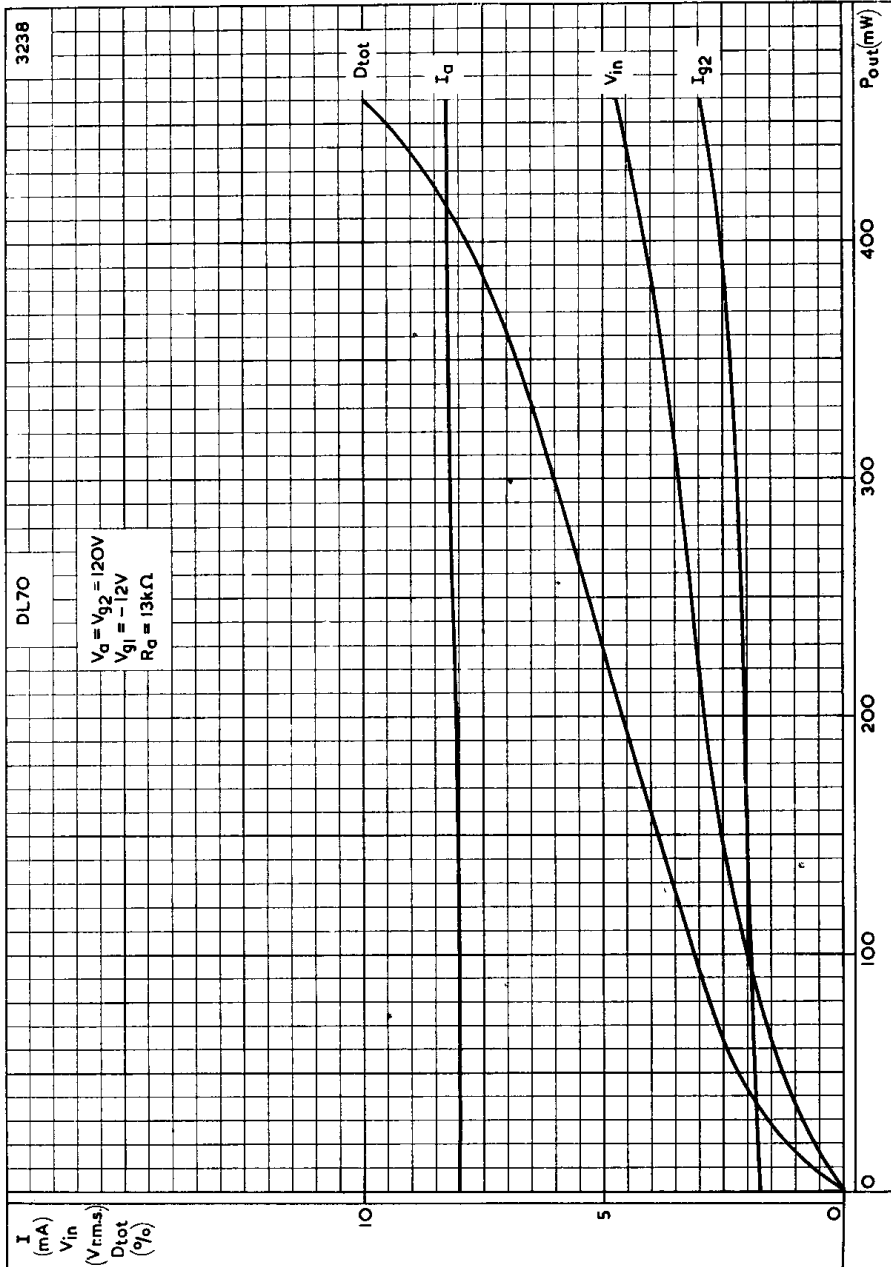
PERFORMANCE OF SINGLE DL70 AS CLASS 'A' AMPLIFIER. $V_a = V_{g2} = 90V$



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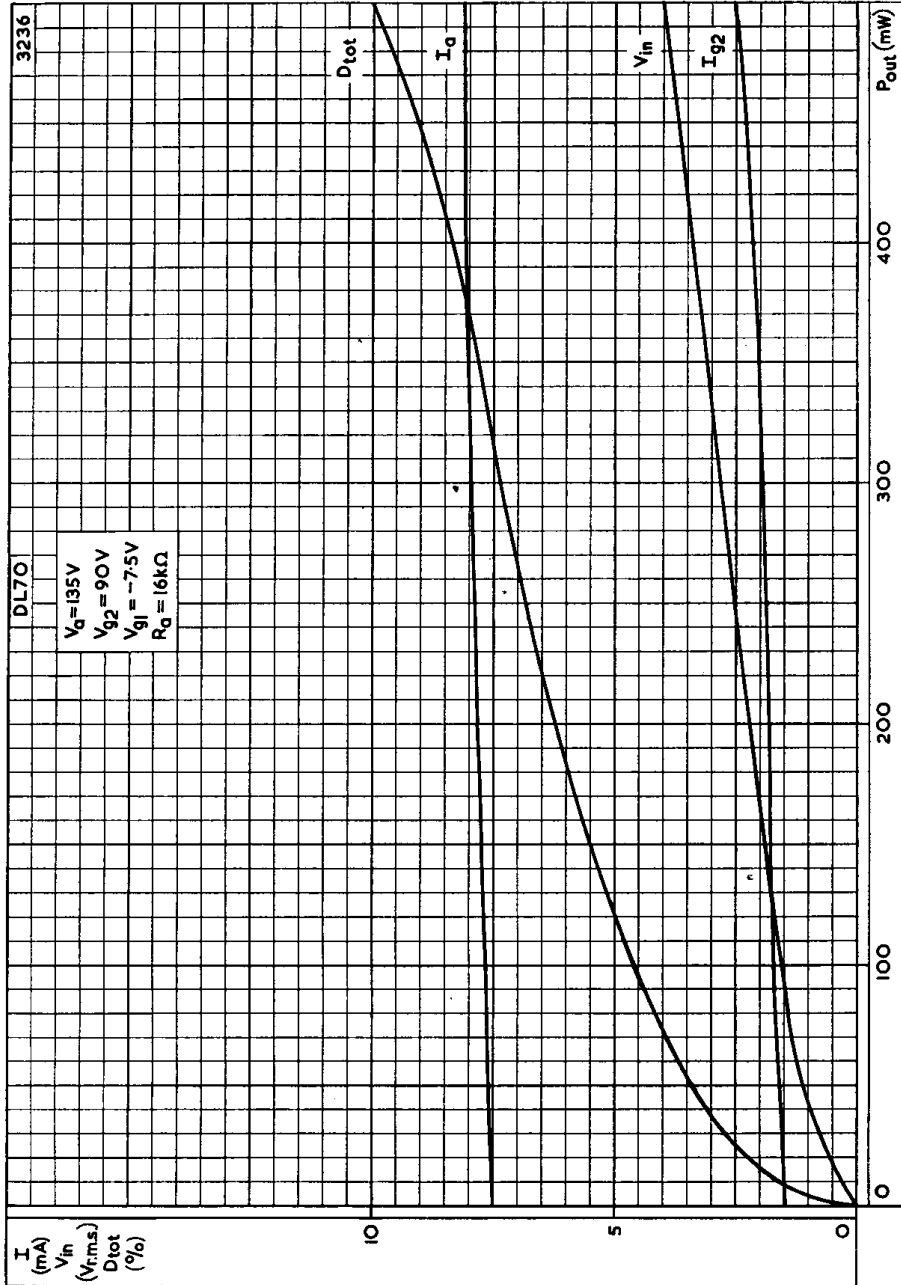


PERFORMANCE OF SINGLE DL70 AS CLASS 'A' AMPLIFIER. $V_a = V_{g2} = 120V$

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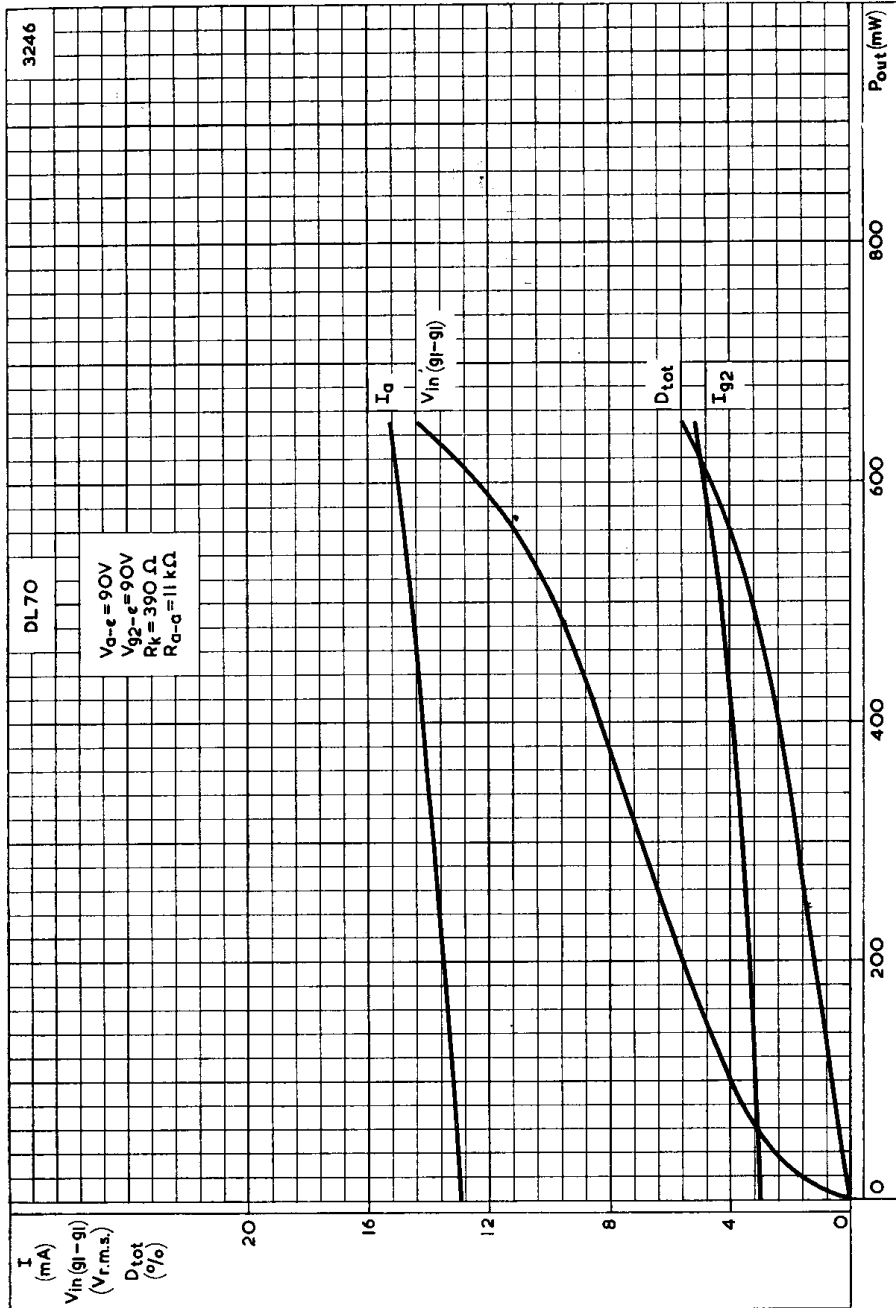


PERFORMANCE OF SINGLE DL70 AS CLASS 'A' AMPLIFIER. $V_a = 135V$, $V_{g2} = 90V$

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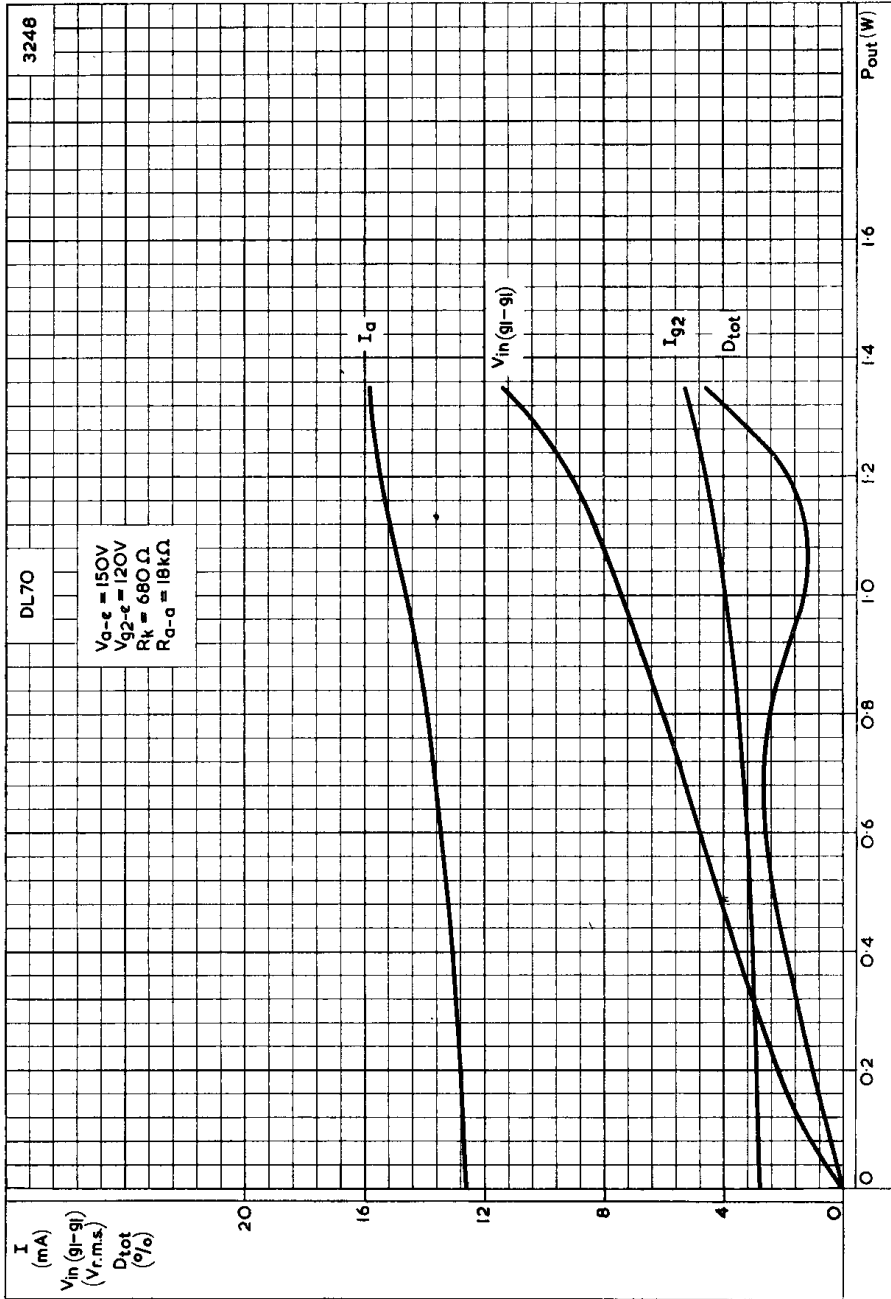


PERFORMANCE OF TWO DL70 IN CLASS 'AB' PUSH-PULL
 $V_{a-e} = V_{g2-e} = 90V$

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PERFORMANCE OF TWO DL70 IN CLASS 'AB' PUSH-PULL
 $V_{a-e} = 150V$, $V_{g2-e} = 120V$

