



DUOTRIODE PULSE AMPLIFIER

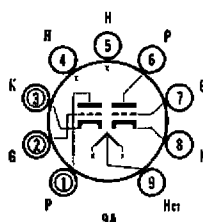
7318

Reliable pulse tube with extremely fast
cathode warm-up



HEATER CHARACTERISTICS

	Series	Parallel
Voltage, a-c	12.6±12%	6.3±12% volts
Current	175	350 ma
Peak heater-cathode voltage, max.		
Heater negative to cathode	100	100 volts
Heater positive to cathode	100	100 volts



ELECTRICAL DATA

DIRECT INTERELECTRODE CAPACITANCES, No Shield

	Section 1	Section 2	
Grid to plate: g1 to p	1.4	1.4	μmf
Input: g1 to k + h	1.5	1.5	μmf
Output: p to k + h	0.5	0.5	μmf
Coupling: plate 1 to plate 2		0.8	μmf

MAXIMUM RATINGS (Absolute Maximum Values)+

Pulse Modulator*

Plate supply voltage, d-c	400	volts
Grid 1 voltage, negative d-c	-50	volts
Grid 1 voltage, positive d-c	0	volts
Peak positive grid voltage, d-c	200	volts
Peak grid current	0.9	amp
Peak plate current	1.25	amp
Peak cathode current	2.2	amp
Grid dissipation	0.60	watts
Plate dissipation	1.35	watts
Altitude	60,000	feet

MAXIMUM RATINGS (Absolute Maximum Values)+

Class A Amplifier

Plate voltage	330	volts
Plate dissipation	3.0	watts
Cathode current	22	ma
Control-grid circuit resistance		
Fixed bias	0.5	meg
Self bias	1.0	meg
Bulb temperature	165	°C
Altitude	60,000	feet

CHARACTERISTICS AND TYPICAL OPERATION+

Pulse Modulator

Plate supply voltage, d-c	300	volts
Grid supply voltage, d-c	-25	volts
Peak positive grid voltage	150	volts
Peak plate current	0.9	amp
Peak grid current	0.7	amp
Plate load resistance (noninductive)	75	ohms
Grid resistance (noninductive)	2400	ohms
Minimum cathode preheating	10	sec

NOTES:

*Duty factor = .0035; pulse width = 1.5 microseconds; pulse repetition rate = 2300 pps.
+Each section.

ENGINEERING DESIGN DATA

7318

SEPTEMBER 18, 1958

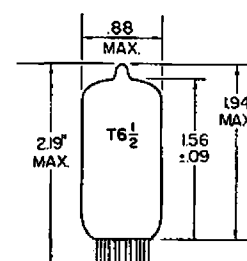
Pulse duotriode

CHARACTERISTIC CURVES

Plate	2004A
Plate; Peak Ib & Ia	2004B
Transfer; Ib	2004C
Characteristics; Gm, μ	2004D

MECHANICAL DATA

Cathode, coated unipotential	
Bulb	T-6½
Outline	JETEC 6-2
Maximum over-all-height	2.19 inches
Maximum seated height	1.94 inches
Maximum diameter	.88 inch
Base	(E9-1)
Basing	9A
Mounting position	Any



PIN CONNECTIONS

Pin 1	Plate (Section 2)
Pin 2	Grid (Section 2)
Pin 3	Cathode (Section 2)
Pin 4	Heater
Pin 5	Heater
Pin 6	Plate (Section 1)
Pin 7	Grid (Section 1)
Pin 8	Cathode (Section 1)
Pin 9	Heater (Center tap)

CBS-HYTRON, Danvers, Massachusetts
A Division of Columbia Broadcasting System, Inc.

APPLICATION

The CBS-Hytron 7318 is a medium- μ duotriode reliable pulse-tube with an extremely fast cathode warm-up time capable of providing 80% emission in 10 seconds. It is designed in particular for high peak-pulse blocking oscillators, square-wave modulators, multivibrators and other uses requiring a substantial plate current. Reliability and high cathode current, being of prime importance, are ensured by testing for vibration, fatigue, and pulse emission. Reliability under unfavorable environmental conditions is also enhanced by the 7318's ambient temperature operating range of -60°C to $+100^{\circ}\text{C}$.

This tube contains a cathode-heater assembly that is designed and processed to give the high emission required for pulse service. It will furnish rectangular pulses up to 55 microseconds width.

Life tests for the 7318 include environmental and pulse evaluation. They are on-off cycled for 12 minute periods with a 500 hour "on" time and pulse life tested for 500 hours for not more than 20% change in pulse emission.

Class A Amplifier

Plate voltage	100	250	volts
Control-grid voltage	0	-8.5	volts
Plate resistance (approx.)	5800	7000	ohms
Transconductance	3500	2350	μmhos
Amplification factor	21.3	16.5	
Plate current	13.0	11.5	ma
Control-grid voltage (approx.) for $I_b = 10 \mu\text{a}$		-22	volts

SPECIAL RATINGS AND PERFORMANCE DATA

Interelectrode Leakage Resistance Each section

$E_r = 12.6/6.3 \text{ Vrms}$	
Grid to all other elements with 100 Vdc applied	500 meg min
Plate to all other elements with 300 Vdc applied	500 meg min

Heater to Cathode Leakage Current, Sections tied together

$E_r = 12.6/6.3 \text{ Vrms}$, $E_{b1} = 100 \text{ Vdc}$	
Heater positive with respect to cathode	10 $\mu\text{Adc max}$
Heater negative with respect to cathode	10 $\mu\text{Adc max}$

Transconductance at Low Heater Voltage Each section with other section grounded

$E_r = 11/5.5 \text{ Vrms}$, $E_b = 100 \text{ Vdc}$, $E_c = 0 \text{ Vdc}$	2500 $\mu\text{mhos min}$
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Cathode Warm-up Rating Each section with heater in parallel

$E_b = 250 \text{ V}$, $E_c = -8.5 \text{ V}$ (Instantaneous test)	
80% of stabilized plate current	10 sec max

Pulse Emission Slump Each section

$E_r = 12.6 \text{ V}$, $E_{b1} = 300 \text{ Vdc}$, $R_L = 75 \Omega$, $t_p = 10 \mu\text{sec}$, $prr = 200 \text{ pps}$, $E_{gr}/I_b = 1.8 \text{ amp min}$, $E_c = -25 \text{ Vdc}$, $R_k = 1 \Omega$, Limit of $E_{gr} = 200 \text{ v max}$	
Ratio of trailing edge to leading edge	80% min

ENVIRONMENTAL TESTS AND RATINGS

Ambient Temperature Range

(Operation within ratings)	-60° to $+100^{\circ}\text{C}$
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Shock Rating

(1) Impact acceleration for .001 sec. duration (MIL-E-1D4.9.20.5)	450 g max
(2) Impact acceleration for .011 sec. duration (Drawing JAN S-44)	150 g max

Fatigue Rating (MIL-E-1D 4.9.20.6)

Acceleration at 25 cps vibration	2.5 g
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Resonance Frequency Vibration Sections tied together

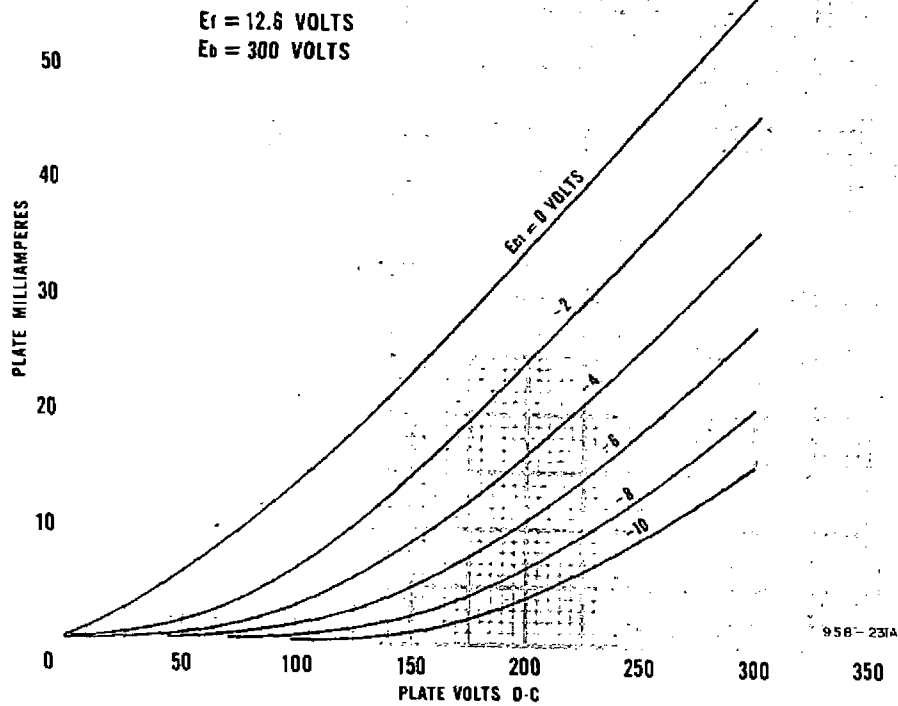
$E_r = 12.6 \text{ Vdc}$, $E_b = 250 \text{ Vdc}$, $E_c = -8.5 \text{ Vdc}$, acceleration = 10 g	
Noise output at 60 cps (peak)	80 mVac max
Noise output at 370 cps (peak)	100 mVac max
High Frequency Fatigue Sections tied together	
Constant acceleration at 10 to 500 cps (two hours in each of 3 mutually perpendicular positions)	10 g max

Test End Points (Post shock and fatigue)

Pulse emission change	20% max
Heater to cathode leakage current	
Heater positive with respect to cathode	30 $\mu\text{Adc max}$
Heater negative with respect to cathode	30 $\mu\text{Adc max}$
Grid 1 current	-1.5 $\mu\text{Adc max}$
Vibration Noise output voltage, (peak) (conditions of shock rating test (1) and (2), fatigue rating test (MIL-E-1D 4.9.20.6) and high frequency fatigue test, initially and until completion).	150 mVac
Linear acceleration, 5 seconds in any plane (must meet shock and fatigue test end points after completion of test).	200 g

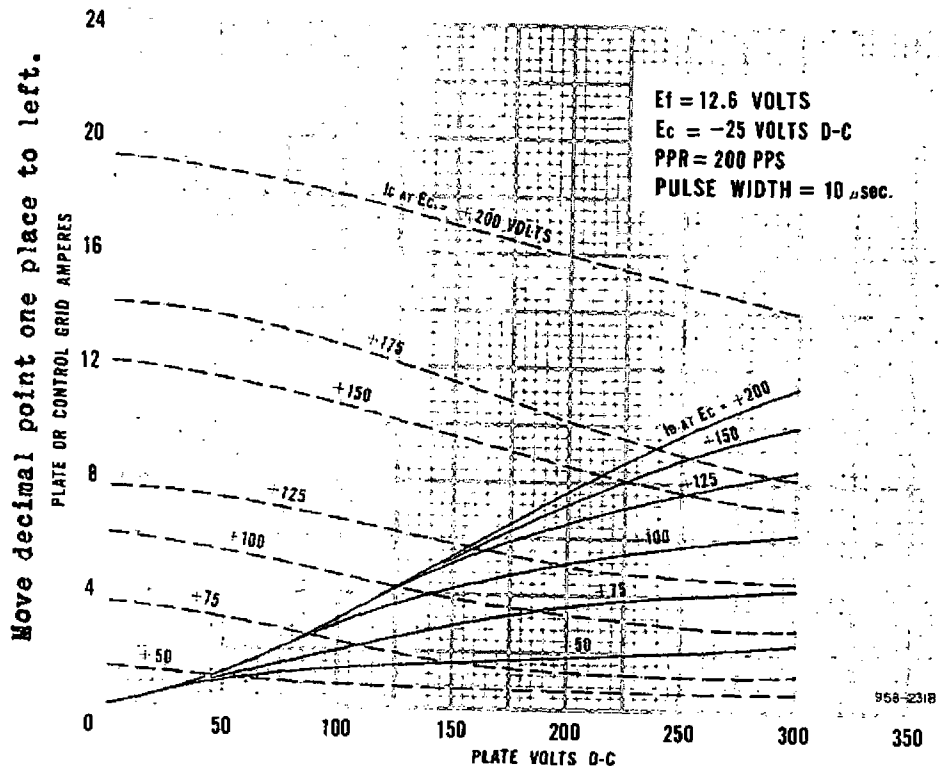
AVERAGE PLATE CHARACTERISTICS

2004A

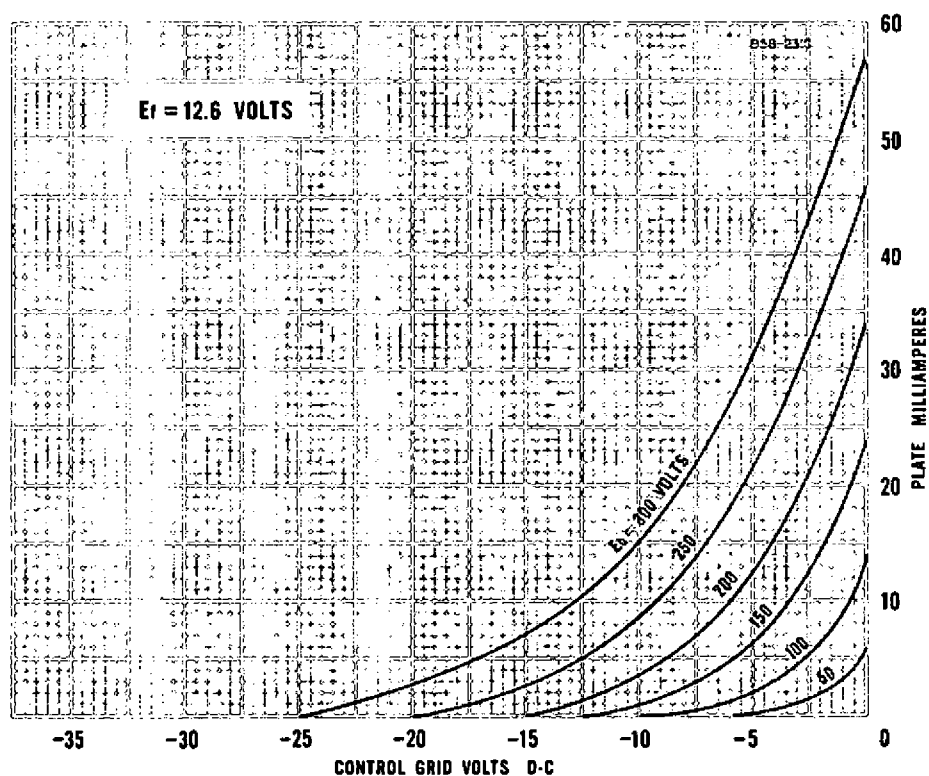


AVERAGE PLATE CHARACTERISTICS

2004B



AVERAGE TRANSFER CHARACTERISTICS



AVERAGE CHARACTERISTICS

