HY-5948A
Hydrogen Triode Thyratron

Description

The HY-5948A is a hydrogen-filled, triode thyratron. The hydrogen gas fill facilitates reliable operation at moderately-high pulse repetition rates when compared to similar deuterium filled thyratrons. The reservoir is designed to be operated at a nominal setting of 4.0 Vac. High pulse currents are achievable using only free or forced air convection cooling. The tube may be mounted by its mounting flange in any position.

Specifications

Absolute Ratings
(Maximum)(Non-Simultaneous)

epy, Peak Forward Anode Voltage *(Notes 1, 2, 3)*........ 25 kV
ib, Peak Forward Anode Current *(Notes 4, 5)*........ 5 Ka
ibx, Peak Reverse Anode Current *(Note 6)*........ .1 ib
epx, Peak Reverse Anode Voltage *(Note 6)*........ 25 kV
epy, Min, Minimum Anode Supply Voltage........ 1 k Vdc
tp, Anode Current Pulse Duration *(Note 5)*........ 10µsec
Ib, Average Anode Current........ 2.2 Adc
Ip, RMS Average Current *(Note 9)*........ 47.5 Aac
Pb, Anode Dissipation Factor (V x A x pps)........ $50x10^9$
tr, Maximum Anode Current Rise Rate *(Note 14)*........ $1x10^{11}$a/sec

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General Electrical Data

	MIN	NOM	MAX
Ef, Cathode Heater Voltage, Vac	5.8	6.3	6.8
If, Cathode Heater Current @ Ef=6.3 Vac, Aac	11	12.5	18
Er, Reservoir Heater Voltage, Vac *(Note 10)*	2.5	4.0	5.5
Ir, Reservoir Heater Current @ Er=4.0 Vac, Aac	3.0	4.5	6.0
Tk, Minimum Tube Warm-up Time, Minutes	5	---	---

Note: For center tap filament transformer applications, see Page 4.

Trigger Driver Requirements

	MIN	NOM	MAX
Egy, Peak Open Circuit Grid Driver Voltage	500	750	2500
Zg, Driver Circuit Output Impedance, Ohms	---	100	400
Driver Pulse Rise Time, ns	70	100	350
Driver Pulse Width, µs	1	2	---
Bias Voltage, Negative, V	---	---	(-)200

Triggering Characteristics

	MIN	NOM	MAX
Anode Delay Time, ns *(Notes 12, 13)*	---	---	500
Anode Delay Time Drift, ns *(Note 13)*	---	---	150
Time jitter, ns *(Note 13)*	---	---	5

Triggering Characteristics

Peak Network Voltage	15kV	25kV
Pulse Repetition Rate	1500Hz	360Hz
Anode Current Pulse Duration *(Note 5)*	1.25µsec	2.5µsec
PFN Impedance	15.6 Ohm	13 Ohm
Trigger Voltage	800 V	800V
Peak Power Output	3.6 MW	11.7 MW
ib, Peak Forward Anode Current *(Notes 4, 5, 6)*	0.5 KA	1.0 kA
Ib, Average Anode Current	0.94 Adc	0.9 Adc

Notes

1. The dwell time at the peak anode voltage should be minimized in order to minimize pre-firing. For operation at the rate epy, the dwell time must not exceed 10 milliseconds.

2. After thyratron anode current stops flowing and before voltage is reapplied to the anode, the anode voltage must stay between 0 and –500 volts for at least 100 µs to allow the gas to deionize.

3. This tube may be operated in air at up to 25 kV. Some of the more important de-rating factors that determine the safe operating voltage in air are the cleanliness of the tube's ceramic insulators, the rate of rise of anode voltage, the dwell time at the operating peak anode voltage, the pulse repetition rate, and ambient pressure, temperature, humidity and contaminant level. This tube may also be operated while immersed in an insulating gas or liquid.

4. The peak current capability of 5,000 amperes applies to low duty, short discharge duration (shorter than 300 nanoseconds) applications.

5. The pulse width is measured on the discharge current waveform at the half peak current level.

6. The reverse anode voltage shown applies for a previously non-conducting tube. Exclusively only of a spike not longer than 25 nanoseconds, the peak reverse anode voltage must not exceed 1kv during the first 50 microseconds after conduction.

Notes: (cont.)

7. The root mean square anode current shall be computed as the square root of the product of the peak current and the absolute average current when the reverse current is negligible.

8. Forced air or liquid immersion cooling should always be used in any situation where cooling by natural convection is insufficient to keep the temperature of the tube's envelope below 200°C.

9. Ip is the true root mean square (RMS) current. For relatively rectangular shaped current pulses without a reverse current, the RMS anode current may be approximated as the square root of the product of the peak current and the average current.

10. The optimum reservoir heater voltage is that which provides the best overall compromise among anode heating, anode voltage hold-off and hold-off recovery, anode current rise rate, and the tube's overall triggering characteristics. For the most applications, the optimum reservoir heater voltage lies between 90% and 110% of the nominal value. Operation at voltages below 90% of nominal can result in permanent damage from anode overheating; operation at high reservoir heater voltages degrades anode hold-off and hold-off recovery, and can permanently damage the reservoir itself.

11. For applications that have a center tap heater filament transformer, see the special instructions on page 4.

12. The anode delay time is measured from the 25% point on the rise of the unloaded grid voltage pulse to the 10% point on the rise of the anode current pulse.

13. Delay time, delay time drift and time jitter may be simultaneously minimized by applying the maximum driver voltage (egy) from a source of low impedance (Zg).

14. The current rise time is a function of the discharge circuit impedance. If care is exercised to reduce the inductance in the circuit, a typical rise time on the order of that shown may be expected when using this thyratron.

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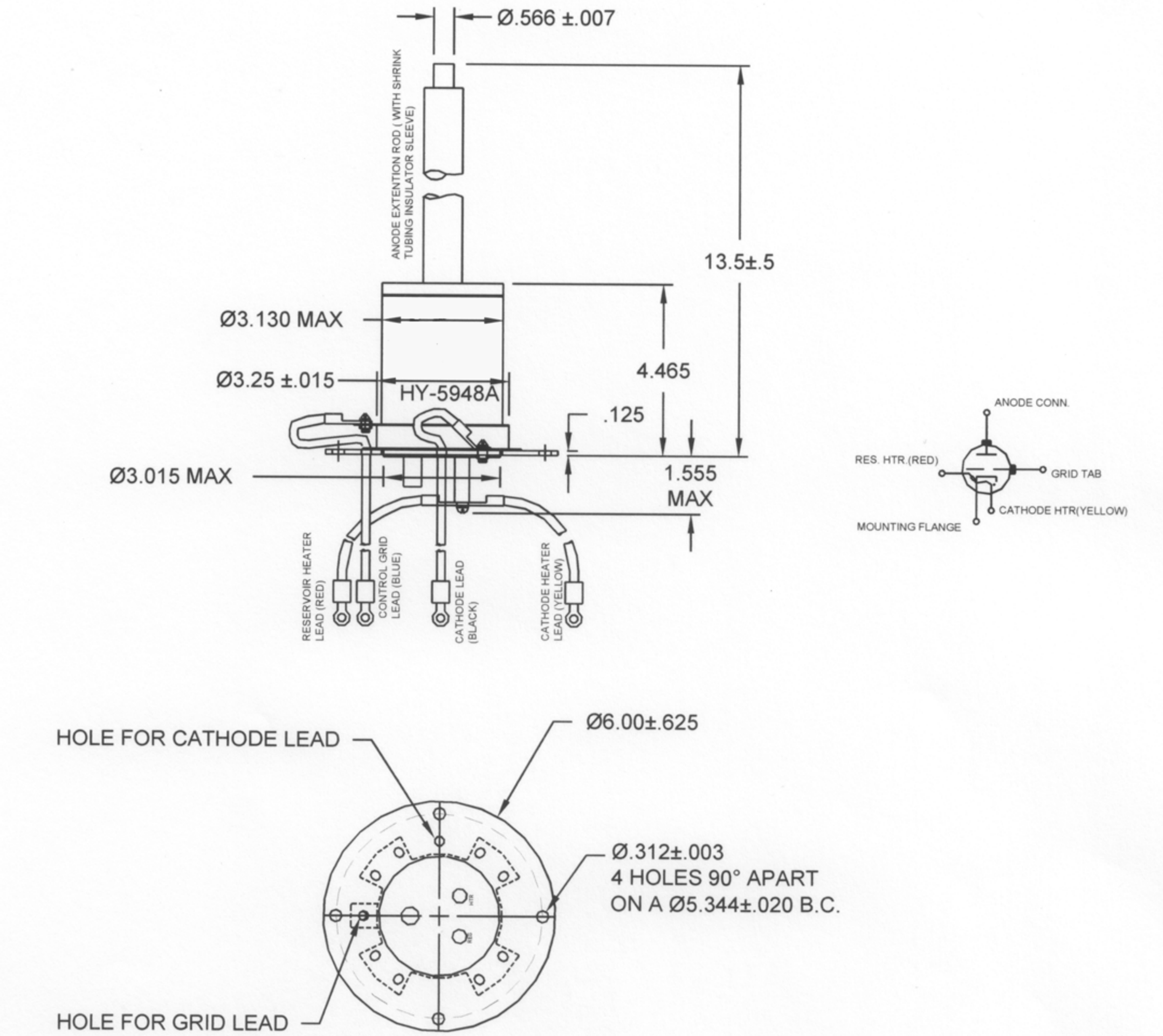
FIGURE 1 Schematic



NOTES:

1. LEAD LENGTHS ARE 9" MIN, 11" MAX.

2. DO NOT CARRY THIS THYRATRON BY THE ANODE EXTENSION. DOING SO MAY CAUSE MECHANICAL FAILURE.

FIGURE 2 Electrical Connections

PLEASE TAKE NOTE!

There are some differences in electrical connections between the HY5948A and the original 5948A. The most notable is that the 5948A (FIG. 'B') has a filament center tap connection and the HY5948A (FIG 'A') doesn't. If the equipment using the 5948A uses a center tap filament transformer, you will need to take the appropriate steps to insure that the HY5948A receives the required filament voltage of 6.3 volts across the yellow & black leads.

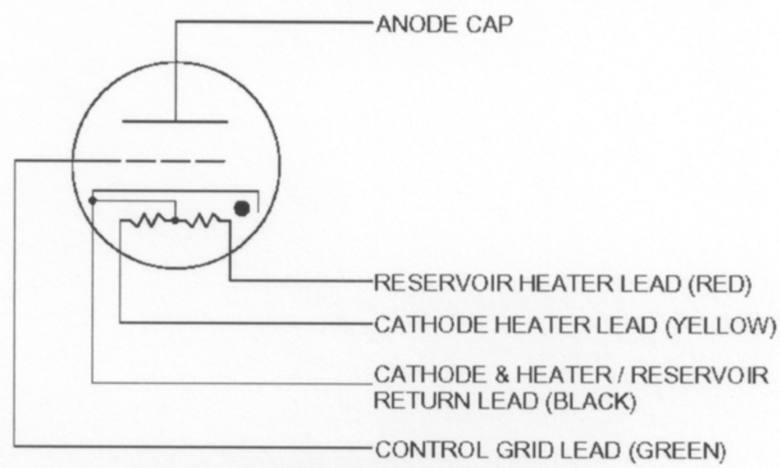


FIG. 'A' (HY5948A-REPLACEMENT)

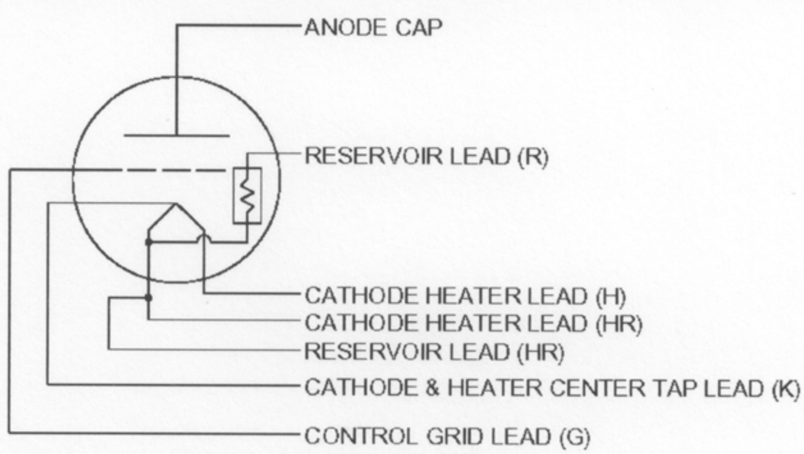


FIG. 'B' (ORIGINAL 5948A)

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