



ELECTRON TUBE DEPARTMENT ■ **COMPONENTS DIVISION**
INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION, CLIFTON, NEW JERSEY

KUTHE
5948
HYDROGEN
THYRATRON

DESCRIPTION:

THE 5948 IS A UNIPOTENTIAL CATHODE, THREE ELEMENT HYDROGEN FILLED THYRATRON DESIGNED FOR NETWORK DISCHARGE SERVICE. IN SUCH SERVICE, IT IS SUITABLE FOR PRODUCING PULSE OUTPUTS OF MORE THAN 12 MEGAWATTS AT AN AVERAGE POWER LEVEL OF MORE THAN 12 KW.

THE SPECIAL FEATURES OF THE 5948 INCLUDE AN INTERNAL HYDROGEN-RESERVOIR CAPABLE OF PRODUCING A WIDE RANGE OF HYDROGEN PRESSURE AND MAINTAINING THIS PRESSURE AT THE DESIRED VALUE THROUGHOUT ITS USEFUL LIFE. FURTHER FEATURES ARE THE HIGH PEAK VOLTAGE AND CURRENT RATINGS.

ELECTRICAL DATA, GENERAL:

	<u>NOM.</u>	<u>MIN.</u>	<u>MAX.</u>	
HEATER VOLTAGE	6.3	5.9	6.7	VOLTS A.C.
HEATER CURRENT (AT 6.3 VOLTS)		25.0	33.0	AMPERES
HEATER (NOTE 1)				
RESERVOIR VOLTAGE (NOTE 2)		2.5	5.5	VOLTS
RESERVOIR CURRENT AT 4.5 VOLTS		3.0	6.0	AMPERES
MINIMUM HEATING TIME				15 MINUTES

MECHANICAL DATA, GENERAL:

MOUNTING POSITION	VERTICAL ONLY, BASE DOWN
BASE	PER OUTLINE
ANODE CAP	PER OUTLINE
COOLING (NOTE 3)	
NET WEIGHT	4-1/2 POUNDS
DIMENSIONS	PER OUTLINE

RATINGS:

MAX. PEAK ANODE VOLTAGE, FORWARD	25	KILOVOLTS
MAX. PEAK ANODE VOLTAGE, INVERSE (NOTE 4)	25	KILOVOLTS
MIN. ANODE SUPPLY VOLTAGE	5.0	KILOVOLTS D.C.
MAX. PEAK ANODE CURRENT	1000	AMPERES
MAX. AVERAGE ANODE CURRENT	1.0	AMPERES
MAX. RMS ANODE CURRENT (NOTE 5)	31.8	AMPERES A.C.
MAX. EPY X IB X PRR	9.0 X 10 ⁹	
MAX. ANODE CURRENT RATE OF RISE	5000	AMPERES/USECOND
PEAK TRIGGER VOLTAGE (NOTE 6)		
MAX. PEAK INVERSE TRIGGER VOLTAGE	650	VOLTS
MAX. ANODE DELAY TIME (NOTE 7)	1.0	MICROSECOND
MAX. ANODE DELAY TIME DRIFT	0.25	MICROSECOND
MAX. TIME JITTER (NOTE 8)	0.01	MICROSECOND (INITIAL)
	0.02	USECOND (END OF LIFE)
AMBIENT TEMPERATURE	-55° TO 75°	CENT.

TYPICAL OPERATION AS PULSE MODULATOR, DC RESONANT CHARGING:

PEAK NETWORK VOLTAGE	25.0	15.0	KILOVOLTS
PULSE REPETITION RATE	360	1500	PULSES/SECOND
PULSE LENGTH	2.5	1.25	MICROSECOND
PULSE FORMING NETWORK IMPEDANCE	13	15.6	OHMS
TRIGGER VOLTAGE	800	800	VOLTS
PEAK POWER OUTPUT (RESISTIVE LOAD 92% ZN)	11.7	3.6	MEGAWATT
PEAK ANODE CURRENT	1000	500	AMPERES
AVERAGE ANODE CURRENT	0.90	0.94	AMPERES D.C.

NOTE 1:

CATHODE CONNECTED TO CENTER OF CATHODE HEATER.

NOTE 2:

RESERVOIR VOLTAGE IS MARKED ON THE BASE OF EACH 5948.

THIS IS THE CORRECT VOLTAGE FOR ONE TYPICAL OPERATING CONDITION BUT IS NOT THE OPTIMUM VALUE FOR ALL TYPES OF OPERATION. THIS VALUE MAY BE USED INITIALLY IN NEW APPLICATIONS AND THE OPTIMUM VALUE MAY THEN BE OBTAINED BY EXPLORING THE RANGE OF VOLTAGE ON EITHER SIDE OF THAT MARKED ON THE TUBE. EXCESS-RESERVOIR VOLTAGE WILL RESULT IN A FAILURE OF THIS THYRATRON TO DEIONIZE BETWEEN PULSES (CONTINUOUS CONDUCTION). INSUFFICIENT RESERVOIR VOLTAGE WILL RESULT IN EXCESS ANODE DISSIPATION AS INDICATED BY VISIBLE HEATING OF THE ANODE. THE OPTIMUM RESERVOIR VOLTAGE IS THE MIDPOINT BETWEEN THESE TWO EXTREMES. IN CERTAIN APPLICATIONS IT MAY BE NECESSARY TO PROVIDE A REGULATED SOURCE TO ASSURE OPERATION WITHIN THE PERMISSIBLE RANGE OF RESERVOIR VOLTAGES.

NOTE 3:

COOLING OF THE ANODE LEAD IS PERMISSIBLE, BUT THERE SHALL BE NO AIR BLAST DIRECTLY ON THE BULB.

NOTE 4:

DURING THE FIRST 25 MICROSECONDS AFTER CONDUCTION, THE PEAK INVERSE ANODE VOLTAGE SHALL NOT EXCEED 5 KV.

NOTE 5:

THE ROOT MEAN SQUARE ANODE CURRENT SHALL BE COMPUTED AS THE SQUARE ROOT OF THE PRODUCT OF PEAK CURRENT AND THE AVERAGE CURRENT.

NOTE 6:

THE PULSE PRODUCED BY THE DRIVER CIRCUIT SHALL HAVE THE FOLLOWING CHARACTERISTICS WHEN VIEWED AT THE 5948 SOCKET WITH THE TUBE REMOVED:

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|-----------------|--------------------------------|
| A. AMPLITUDE | 700-1000 VOLTS |
| B. DURATION | 2 MICROSECONDS (AT 70% POINTS) |
| C. RATE OF RISE | 1000 VOLTS/MICROSECOND (MIN.) |
| D. IMPEDANCE | 50-200 OHMS |

THE LIMITS OF ANODE TIME DELAY AND ANODE TIME JITTER ARE BASED ON THE MINIMUM TRIGGER. USING THE HIGHEST PERMISSIBLE TRIGGER VOLTAGE AND LOWEST TRIGGER SOURCE IMPEDANCE WILL MATERIALLY REDUCE THESE VALUES BELOW THE LIMITS SPECIFIED.

NOTE 7:

THE TIME OF ANODE DELAY IS MEASURED BETWEEN THE 26 PERCENT POINT ON THE RISING PORTION OF THE UNLOADED GRID VOLTAGE PULSE AND THE POINT AT WHICH ANODE CONDUCTION FIRST EVIDENCES ITSELF ON THE LOADED GRID PULSE.

NOTE 8:

TIME JITTER IS MEASURED AT THE 50 PERCENT POINT ON THE ANODE CURRENT PULSE.

ADDITIONAL INFORMATION FOR SPECIFIC APPLICATIONS CAN BE OBTAINED FROM THE:

ELECTRON TUBE APPLICATIONS SECTION
ITT COMPONENTS DIVISION
Post Office Box 412
CLIFTON, NEW JERSEY



ELECTRON TUBE DEPARTMENT ■ COMPONENTS DIVISION
INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION, CLIFTON, NEW JERSEY



1. CATHODE & CATHODE HEATER CENTER TAP — BLACK LEAD — LUG FOR $\frac{1}{4}$ SCREW
 2. RESERVOIR — READ LEAD WITH YELLOW BAND * LUG FOR #10 SCREW
 3. CATHODE HEATER — YELLOW LEAD WITH BLACK BAND * LUG FOR $\frac{1}{4}$ SCREW
 4. GRID — GREEN LEAD — LUG FOR #10 SCREW
 5. HEATER — YELLOW LEAD — LUG FOR $\frac{1}{4}$ SCREW
 6. RESERVOIR — RED LEAD WITH YELLOW BAND — LUG FOR #10 SCREW
- * INTERNALLY CONNECTED IN BASE