CERAMIC
HYDROGEN
THYRATRON
KUTHE
7890

TENTATIVE

DESCRIPTION

The 7890 is a 40 megawatt peak tetrode type ceramic envelope hydrogen thyratron. Great care has been exercised in the design of the Kuthe tube in order to insure an equal distribution of capacity across the gaps. This makes the use of compensating capacitors unnecessary. Provision for liquid cooling of the anode is provided for operation at Heat Factors above 40 x 10^9.

GENERAL CHARACTERISTICS

Electrical Data	Nom.	Min.	Max.	
Heater Voltage	6.3	6.0	6.6	Volts AC
Heater Current (at 6.3 volts)		25.0	35.0	Amperes
Heater (Note 1)				
Reservoir Voltage (Note 2)		2.5	5.5	Volts
Reservoir Current at 4.5 Volts		8.0	14.0	Amperes
Heating Time		15		Minutes

Mechanical Data

Mounting Position	Vertical only, Base Down	
Base (Per Outline)		
Cooling (Note 3)		
Net Weight	15	Pounds
Dimensions (See Outline Drawing)		

MAXIMUM RATINGS

Max. Peak Anode Voltage, Forward	40.0	Kilovolts
Max. Peak Anode Voltage, Inverse (Note 4)	40.0	Kilovolts
Min. Anode Supply Voltage (Note 5)	3.5	Kilovolts
Max. Peak Anode Current	2400	Amperes
Max. Average Anode Current	2.6	Amperes
Max. RMS Anode Current (Note 6)	75	Amperes AC
Max. epy x ib x prr	55 x 10^9	
Max. Anode Current Rate of Rise	10,000	Amps./ u sec
Peak Trigger Voltage (Note 7)		
Max. Peak Inverse Trigger Voltage	650	Volts
Max. Anode Delay Time (Note 8)	1.0	Microseconds
Max. Anode Delay Time Drift	0.1	Microseconds
Max. Time Jitter (Note 9)	.005	Microseconds
Ambient Temperature	-55° to +90°	C

Note 1: Cathode connected to center of cathode heater.

Note 2: Reservoir voltage is marked on the base of each tube. 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 the thyratron to deionize between pulses (continuous conduction). Insufficient reservoir voltage will result in excess anode dissipation as indicated by heating of the anode. The anode dissipation must not be permitted to exceed 1500 watts as measured in the cooling water. A useful formula for this determination follows:

$$P = 264\ Qw\ (T_2 - T_1)$$

P = power in watts
Qw = flow in gallons-minute
$T_2 - T_1$ = outlet and inlet water temperatures in degrees Kelvin, respectively

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 is required for operation at heat factors above 30×10^9. Above this value, forced cooling is necessary. This may be accomplished by airblast into the anode cup for modest requirements (10 CFMO, by compressed air directed through the cooling chamber, any by liquid coolants circulated through the cooling chamber). A minimum flow of 1 gallon per minute of water is required. The water inlet temperature shall not be less than 5°C, nor the outlet temperature higher than 95°C.

Note 4: During the first 25 microseconds after conduction, the peak inverse anode voltage shall not exceed 10 KV.

Note 5: A resistance divider of 40 megohms shall be connected between anode and cathode. The center top of this divider will be connected to the second or gradient grid of the tube. It is recommended that this arrangement be employed whether low voltage operation is required or not. This divider is a necessity for keyed grid operation.

Note 6: The root mean square anode current shall be computed as the square root of the product of peak current and the average current.

Note 7: The pulse produced by the driver circuit shall have the following characteristics when viewed at the socket with the tube removed.

A. Amplitude	750 - 2500 Volts
B. Duration	2 Microseconds (at 70% points)
C. Time of Rise	0.35 Microseconds (min.)
D. Impedance	10 - 25 Ohms

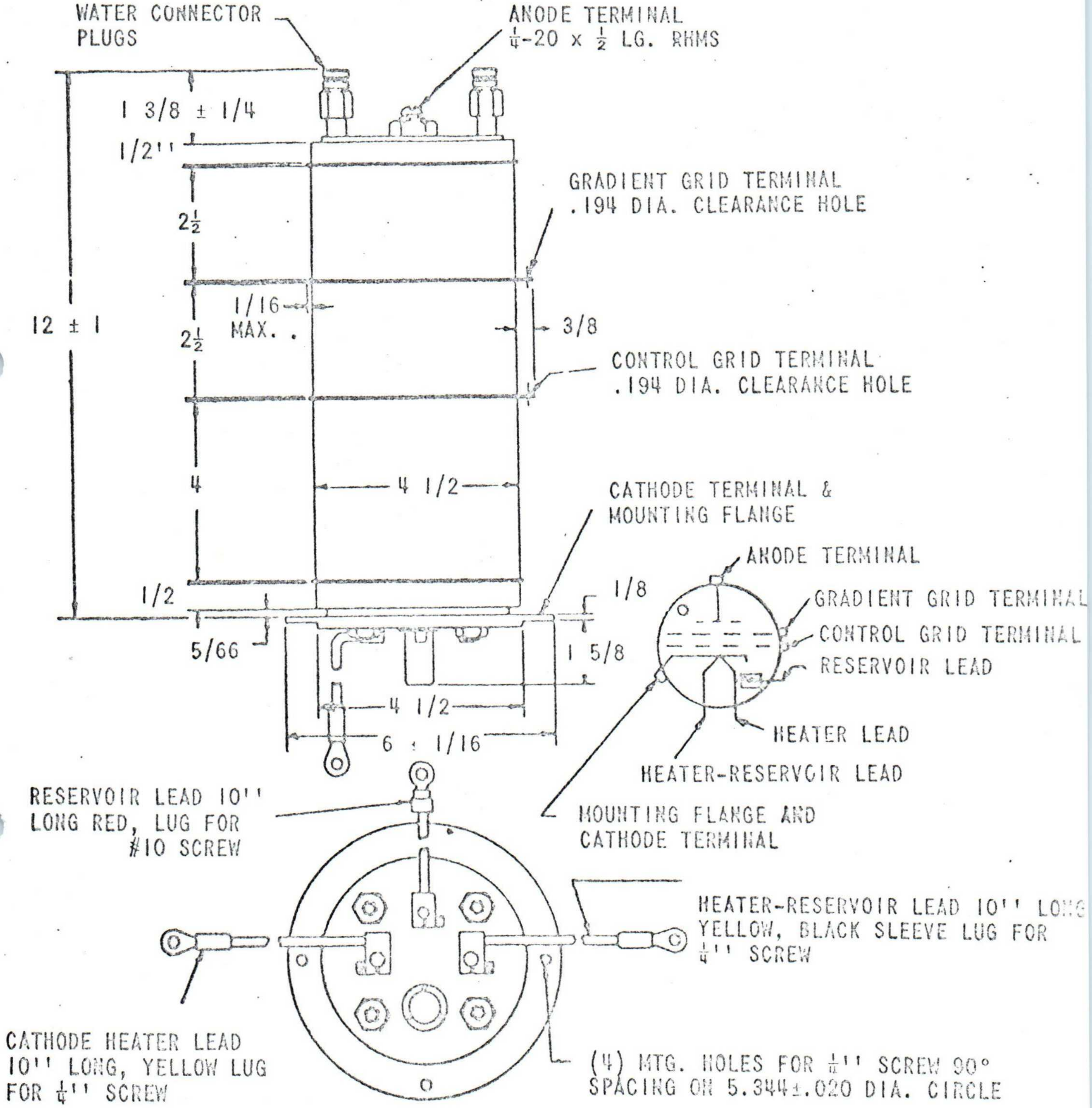
The limits of anode time delay and anode time jitter are based on the minimum trigger. Using the highest permissible trigger voltage and lowest trigger source impedance materially reduces these values below the limits specified.

Note 8: The time of anode delay is measured between the 26 per cent 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 9: Time jitter is measured at the 50% point on the anode current pulse.

Additional information for specific applications can be obtained from the

ITT Electron Tube Division
Applications Section
P. O. Box 100
Easton, Pennsylvania


WATER CONNECTOR PLUGS
ANODE TERMINAL ¼-20 x ½ LG. RHMS
1 3/8 ± 1/4
1/2''
2½
2½
12 ± 1
1/16 MAX.
3/8
GRADIENT GRID TERMINAL .194 DIA. CLEARANCE HOLE
CONTROL GRID TERMINAL .194 DIA. CLEARANCE HOLE
4
4 1/2
CATHODE TERMINAL & MOUNTING FLANGE
1/2
1/8
5/66
1 5/8
4 1/2
6 ± 1/16
ANODE TERMINAL
GRADIENT GRID TERMINAL
CONTROL GRID TERMINAL
RESERVOIR LEAD
HEATER LEAD
HEATER-RESERVOIR LEAD
MOUNTING FLANGE AND CATHODE TERMINAL
RESERVOIR LEAD 10'' LONG RED, LUG FOR #10 SCREW
HEATER-RESERVOIR LEAD 10'' LONG YELLOW, BLACK SLEEVE LUG FOR ¼'' SCREW
CATHODE HEATER LEAD 10'' LONG, YELLOW LUG FOR ¼'' SCREW
(4) MTG. HOLES FOR ¼'' SCREW 90° SPACING ON 5.344±.020 DIA. CIRCLE