engineering
TUBE DATA

Components Division

from JEDEC release #4011,
Dec. 10, 1962

CERAMIC HYDROGEN THYRATRON

DESCRIPTION:

* THE 7866/KU-274 IS A 60 MEGAWATT PEAK TETRODE TYPE CERAMIC ENVELOPE HYDROGEN THYRATRON. GREAT CARE HAS BEEN EXERCISED IN THE DESIGN OF THIS 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 40×10^9.

ELECTRICAL DATA, GENERAL:

	NOM.	MIN.	MAX.	
HEATER VOLTAGE	6.3	5.8	6.8	VOLTS AC
HEATER CURRENT (AT 6.3 VOLTS)		25.0	35.0	AMPERES
HEATER (NOTE 1)				
RESERVOIR VOLTAGE (NOTE 2)		3.5	5.5	VOLTS
* RESERVOIR CURRENT AT 4.5 VOLTS		8.0	20.0	AMPERES
MINIMUM HEATING TIME			10	MINUTES

MECHANICAL DATA, GENERAL:

MOUNTING POSITION	VERTICAL ONLY, BASE DOWN
BASE (PER OUTLINE)	
COOLING (NOTE 3)	
NET WEIGHT	15 POUNDS
DIMENSIONS (SEE OUTLINE DRAWING)	

RATINGS:

MAX. PEAK ANODE VOLTAGE, FORWARD	50.0	KILOVOLTS
MAX. PEAK ANODE VOLTAGE, INVERSE (NOTE 4)	50.0	KILOVOLTS
MIN. ANODE SUPPLY VOLTAGE (NOTE 5)	2.5	KILOVOLTS
MAX. PEAK ANODE CURRENT	2400	AMPERES
MAX. AVERAGE ANODE CURRENT	4.0	AMPERES
MAX. RMS ANODE CURRENT (NOTE 6)	90	AMPERES AC
MAX. EPY X IB X PRR	55×10^9	
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)	0.4	MICROSECOND
MAX. ANODE DELAY TIME DRIFT	* 0.1	MICROSECOND
MAX. TIME JITTER (NOTE 9)	.005	MICROSECOND
AMBIENT TEMPERATURE	$-55°$ TO $\neq 150°$	C

* INDICATES CHANGES FROM DATA SHEET DATED 6-61

** THIS TUBE WAS PREVIOUSLY DESIGNATED BY THE TYPE NUMBER KU-274.

NOTE 1:

CATHODE CONNECTED TO CENTER OF CATHODE HEATER.

NOTE 2:

RESERVOIR VOLTAGE IS MARKED ON THE BASE OF EACH 7866/KU-274. 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:

$$P = 264 \, Q_w \, (T_2 - T_1)$$

P	=	POWER IN WATTS
Q_w	=	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.
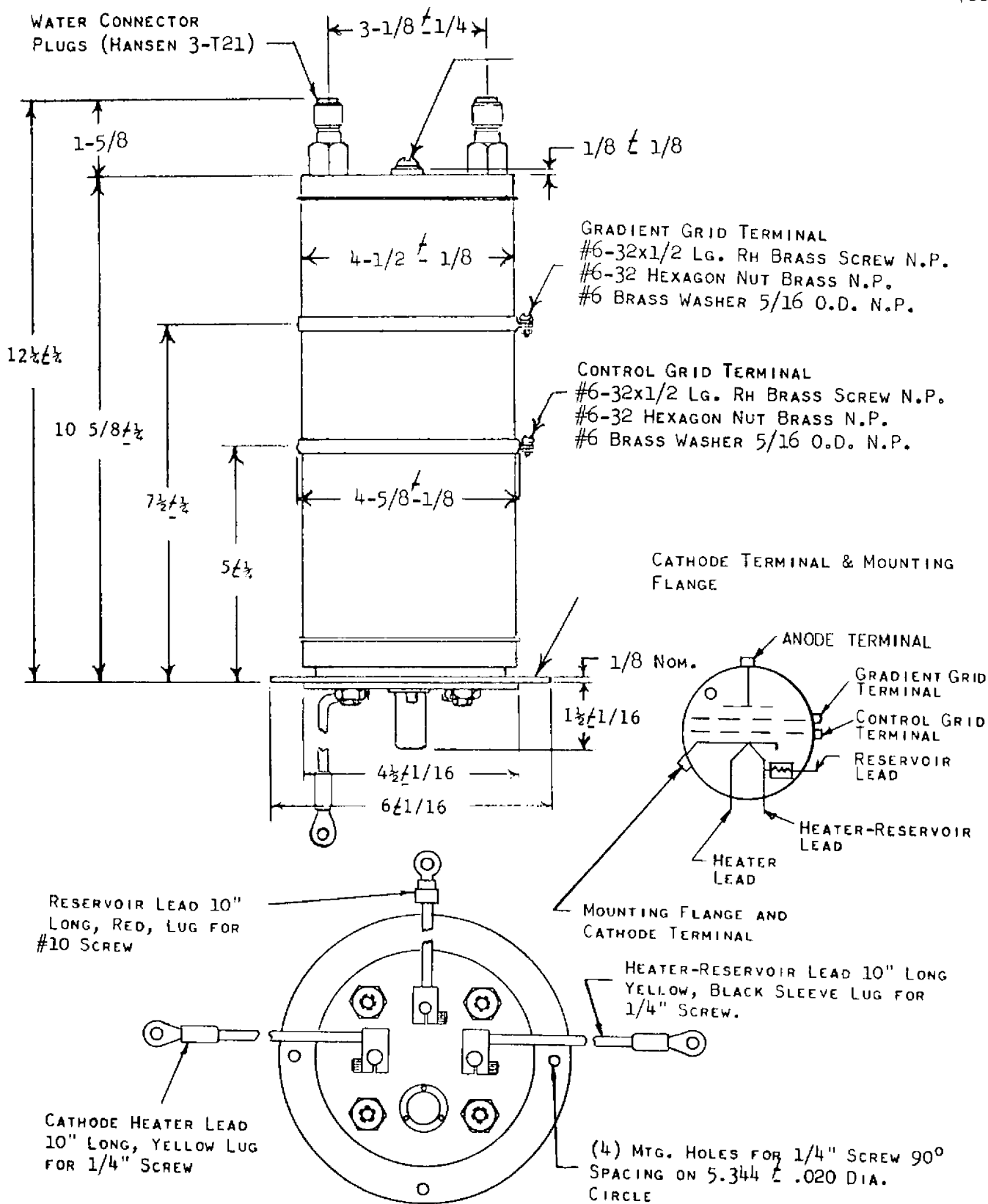
NOTE 3:

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 CFM), BY COMPRESSED AIR DIRECTED THROUGH THE COOLING CHAMBER, AND 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 $5^\circ C$, NOR THE OUTLET TEMPERATURE HIGHER THAN $95^\circ C$. MAXIMUM WATER PRESSURE UNDER A NORMAL CONDITION IS 50 PSI (100 PSI MAY BE TOLERATED FOR SHORT PERIODS). PRESSURE DROP IS APPROXIMATELY 1 PSI.

NOTE 4:

DURING THE FIRST 25 MICROSECONDS AFTER CONDUCTION, THE PEAK INVERSE ANODE VOLTAGE SHALL NOT EXCEED 10 KV.

ANODE TERMINAL
1/4-20x1/2 LG. RH BRASS SCREW N.P.   <u>OUTLINE</u>
1/4 BRASS WASHER 1/2 O.D. N.P.
                                        7866

WATER CONNECTOR
PLUGS (HANSEN 3-T21)   ← 3-1/8 ±1/4 →

1-5/8   — 1/8 ± 1/8

                    ← 4-1/2 ± 1/8 →

GRADIENT GRID TERMINAL
#6-32x1/2 LG. RH BRASS SCREW N.P.
#6-32 HEXAGON NUT BRASS N.P.
#6 BRASS WASHER 5/16 O.D. N.P.

CONTROL GRID TERMINAL
#6-32x1/2 LG. RH BRASS SCREW N.P.
#6-32 HEXAGON NUT BRASS N.P.
#6 BRASS WASHER 5/16 O.D. N.P.

12½±¼

10 5/8±¼

7½±½   ← 4-5/8 ±1/8 →

5±½

CATHODE TERMINAL & MOUNTING
FLANGE

                    ⌐ 1/8 NOM.

                    1½±1/16

                    ← 4½±1/16 →
                    ← 6±1/16 →

ANODE TERMINAL
GRADIENT GRID TERMINAL
CONTROL GRID TERMINAL
RESERVOIR LEAD
HEATER-RESERVOIR LEAD
HEATER 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
1/4" SCREW.

CATHODE HEATER LEAD
10" LONG, YELLOW LUG
FOR 1/4" SCREW

(4) MTG. HOLES FOR 1/4" SCREW 90°
SPACING ON 5.344 ± .020 DIA.
CIRCLE

<u>OUTLINE - 7866</u>

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 7866. 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 7667/KU-74 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

ELECTRON TUBE APPLICATIONS SECTION
ITT COMPONENTS DIVISION
POST OFFICE BOX 412
CLIFTON, NEW JERSEY