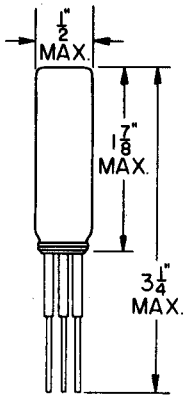
TUNG-SOL

THYRATRON

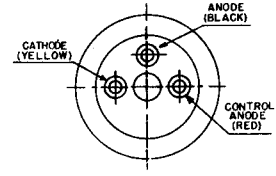
SELF INDICATING*

COLD CATHODE

ANY MOUNTING POSITION



GLASS VIEW



BOTTOM VIEW

COLORS INDICATED FOR TUBE LEADS ARE THE COLORS OF THE INSULATION SLEEVES.

THE 7400 IS A SMALL, LIGHT WEIGHT, COLD CATHODE THYRATRON FOR RELAY SERVICE. WHEN THE TUBE IS CONDUCTING, THE DISK SHAPED CATHODE GLOWS BRIGHTLY WITH THE CHARACTERISTIC NEON COLOR. THE TUBE IS DESIGNED FOR END ON VIEWING.

THE 7400 HAS "REFERENCE TUBE" CONSTRUCTION AND PROCESSING TO KEEP ITS FIRING CHARACTERISTICS CONSTANT DURING LIFE. THIS FEATURE, COUPLED WITH THE LOW LEVEL OF TRIGGER PULSE VOLTAGE, MAKES THE 7400 PARTICULARLY ADAPTABLE TO TRANSISTOR CIRCUITS.

THIS TUBE TYPE WAS DESIGNED INTO SOME CIRCUITS UNDER THE ORIGINAL DEVELOPMENT TYPE DESIGNATION, CH1116.

ELECTRICAL DATA
(TYPICAL VALUES)

ANODE VOLTAGE DROP @ 1 MA.	102	VDC
ANODE VOLTAGE DROP @ 10 MA.	117	VDC
GRID VOLTAGE DROP @ 1 MA.	88	VDC
ANODE IONIZATION VOLTAGE	210	VOLTS
GRID IONIZATION VOLTAGE	109	VOLTS
MINIMUM ANODE CURRENT FOR BRIGHT READ OUT INDICATION	250	μAMPS

MECHANICAL DATA

MOUNTING POSITION	ANY	
BULB	FLAT END VIAL	
DIAMETER (MAX.)	0.50	INCHES
LENGTH (WITHOUT LEADS) (MAX.)	1.88	INCHES
CONNECTIONS	COLOR CODED FLEXIBLE LEADS	
WEIGHT (APPROX.)	0.17	OZ.

* INDICATES AN ADDITION.

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RATINGS
ABSOLUTE VALUES

POSITIVE ANODE VOLTAGE (MAX.)	180	VDC
NEGATIVE ANODE VOLTAGE (WITHOUT DISCHARGE TO A POSITIVE GRID) (MAX.)	100	VDC
POSITIVE GRID BIAS VOLTAGE (WITHOUT GRID IONIZATION) (MAX.)	102	VDC
TRANSFER CURRENT @ E_b = 150 VDC (MAX.)	15	μAMPS
CATHODE CURRENT (MAX.)	12	MA DC

TYPICAL OPERATING CONDITIONS

ANODE SUPPLY VOLTAGE	150	VDC
ANODE CIRCUIT RESISTANCE	5,000	OHMS
ANODE CURRENT	7	MA.
POSITIVE GRID BIAS	102	VDC
GRID TRIGGER SIGNAL	5	VOLTS
GRID TRANSFER CURRENT	7	μAMPS
CURRENT AMPLIFICATION	1,000	

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APPLICATION NOTES

IT IS OFTEN NECESSARY TO PROVIDE A RELAY DEVICE FOR CIRCUITRY OPERATING * AT LOW POWER LEVEL, LOW VOLTAGE PULSES. THE 7400 SELF INDICATING THYRATRON PERFORMS THIS CIRCUIT FUNCTION AS WELL AS PROVIDING A BRILLIANT, VISUAL READOUT INDICATOR. NO HEATER POWER IS REQUIRED FOR ITS OPERATION.

THE 7400 THYRATRON CONTAINS A CATHODE, A TRIGGER GRID AND AN ANODE WITHIN A GASEOUS ATMOSPHERE. IF AN INCREASING POSITIVE VOLTAGE IS APPLIED TO THE GRID, A MINUTE PRE-IONIZATION CURRENT WILL FLOW UNTIL THE CRITICAL GRID CURRENT OF ABOUT SEVEN MICROAMPERES IS REACHED. AT THIS POINT THE REGION BETWEEN THE GRID AND CATHODE "BREAKS DOWN" OR IONIZES. IF THE APPLIED ANODE VOLTAGE IS EQUAL TO OR GREATER THAN THE GRID VOLTAGE, THE GLOW WILL THEN TRANSFER TO THE CATHODE-ANODE REGION. THUS, A VERY LOW ENERGY SIGNAL IN THE GRID CIRCUIT CAN CONTROL MUCH HIGHER ENERGY IN THE ANODE CIRCUIT. IF, IN THIS ILLUSTRATION AN ANODE CURRENT OF 7 MILLIAMPERES WERE TO FLOW; THE TUBE HAS PROVIDED CURRENT AMPLIFICATION OF 1,000.

AS WITH ANY GAS TUBE, ONCE THE TUBE CONDUCTS, THE TUBE VOLTAGE DROP REMAINS VIRTUALLY CONSTANT AND THE CURRENT THROUGH THE TUBE IS LIMITED BY THE CIRCUIT RESISTANCE. IN THE ANODE CIRCUIT THIS MAY BE THE RESISTANCE OF THE LOAD ITSELF, OR, THE LOAD PLUS ADDITIONAL LIMITING RESISTANCE. THE GRID CIRCUIT SHOULD CONTAIN A 5,000 OHM SERIES RESISTANCE IF THE SOURCE RESISTANCE IS LOWER THAN THIS FIGURE. IF THE GRID CIRCUIT RESISTANCE IS ABOVE 10 MEGOHMS, HOWEVER, IT MAY BE NECESSARY TO CONNECT A SMALL CAPACITANCE BETWEEN THE GRID AND CATHODE. THIS IS TO STORE ENOUGH ENERGY TO INSURE GRID IONIZATION.

RADIOACTIVE DOSING IS USED TO ELIMINATE ANY CHANGE OF FIRING CHARACTERISTICS DUE TO ILLUMINATION. THE MAGNITUDE OF ACTIVITY IS NOT GREAT ENOUGH TO INSTITUTE A PERSONAL HAZARD. HOWEVER, PERSONS ARE CAUTIONED NOT TO HANDLE BROKEN TUBES TO AVOID GETTING THE ACTIVE MATERIAL DIRECTLY INTO THE BLOODSTREAM THROUGH CUTS. IF A PERSON CUTS HIMSELF ON A BROKEN TUBE THE CUT SHOULD BE CLEANSED IMMEDIATELY. AN OPEN CUT CAN BE CLEANSED BY HOLDING IT IN RUNNING WATER.

THE 7400 IS DESIGNED FOR END ON VIEWING AND WILL PROVIDE A BRILLIANT SURFACE GLOW PATTERN WHEN CONDUCTING ONLY A FRACTION OF A MILLIAMPERE. THE TUBE IS NORMALLY MOUNTED BEHIND A METAL PANEL WITH THE FLAT END OF THE BULB FLUSH WITH THE PANEL SURFACE. IF IT IS NOT SO MOUNTED, THE BULB SIDES SHOULD BE SHIELDED (eg: COPPER MESH) TO PREVENT HAND CAPACITY OR STRONG ELECTRIC FIELDS FROM ALTERING FIRING POTENTIALS. A HEAT DISSIPATING TYPE OF TUBE CLAMP PROVIDES A CONVENIENT METHOD OF TUBE MOUNTING THAT REQUIRES NO FURTHER SHIELDING.

TYPICAL CIRCUIT CONFIGURATIONS ARE ILLUSTRATED ABOVE. AS WITH ANY THYRATRON CIRCUIT, ONCE THE TUBE CONDUCTS, THE GRID WILL NOT REGAIN CONTROL UNTIL THE ANODE VOLTAGE FALLS LOW ENOUGH TO EXTINGUISH THE CATHODE-ANODE GLOW. THIS IS USUALLY ACCOMPLISHED BY BREAKING THE ANODE CIRCUIT. HOWEVER, IT CAN ALSO BE DONE UNDER D.C. OPERATION, BY CAUSING THE ANODE CURRENT TO FLOW IN SAW TOOTH STEPS. THE SAW TOOTH IS GENERATED BY RUNNING THE TUBE AS A RELAXATION OSCILLATOR BY INSERTING SUFFICIENT CAPACITY BETWEEN THE CATHODE AND ANODE. FIGURE 3 ILLUSTRATES AN APPLICATION OF THIS IDEA. THE 7400 WILL ALSO REGAIN GRID CONTROL ON EACH CYCLE IF IT IS RUN FROM HALF WAVE RECTIFIED A.C. FIGURE 4 ILLUSTRATES AN APPLICATION OF THE TUBE ON A.C. OPERATION OF THE TUBE ON A.C. WITHOUT THE SERIES DIODE IS NOT RECOMMENDED.

*INDICATES AN ADDITION.

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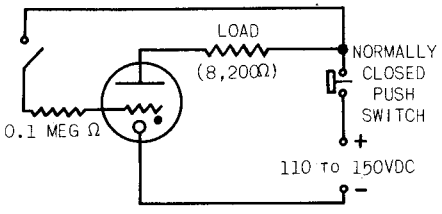
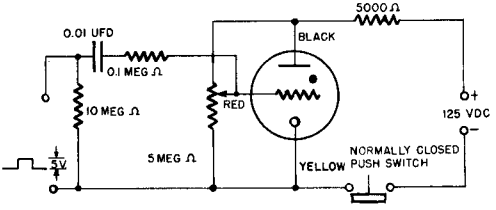
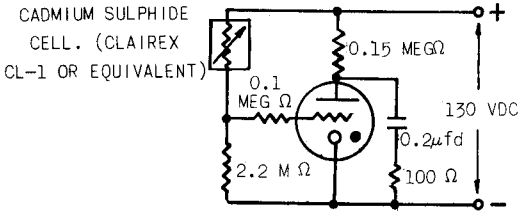


7400 USED AS A MECHANICALLY OPERATED RELAY

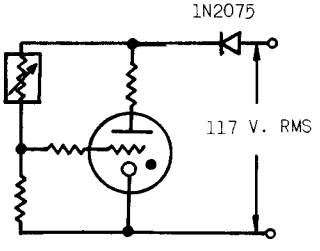
FIG. 1





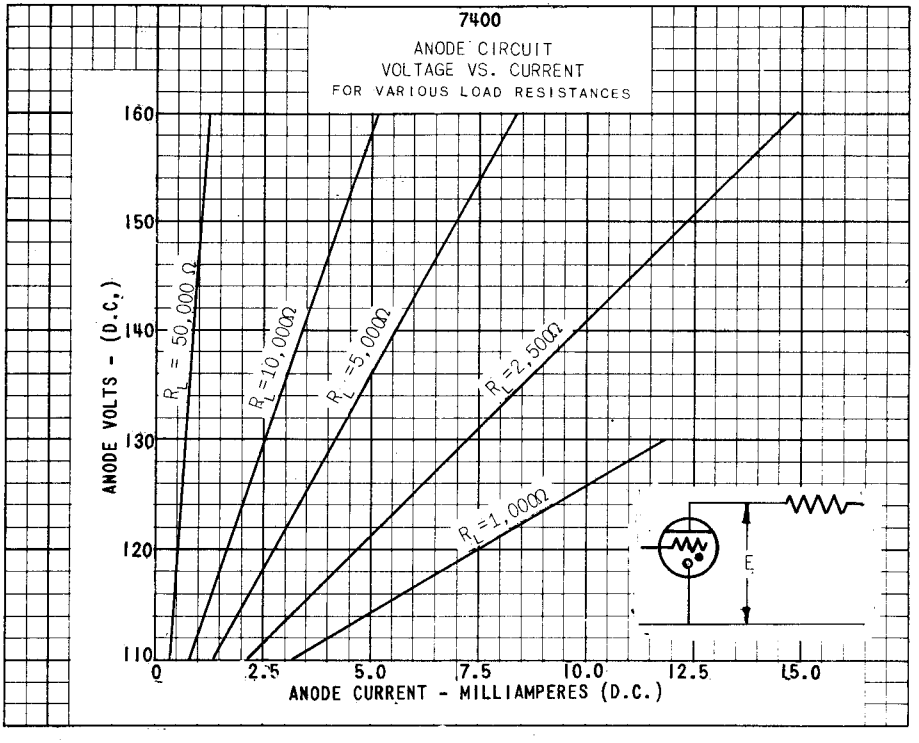
7400 ACTING AS A RELAY FOR A CADMIUM SULPHIDE PHOTO CELL

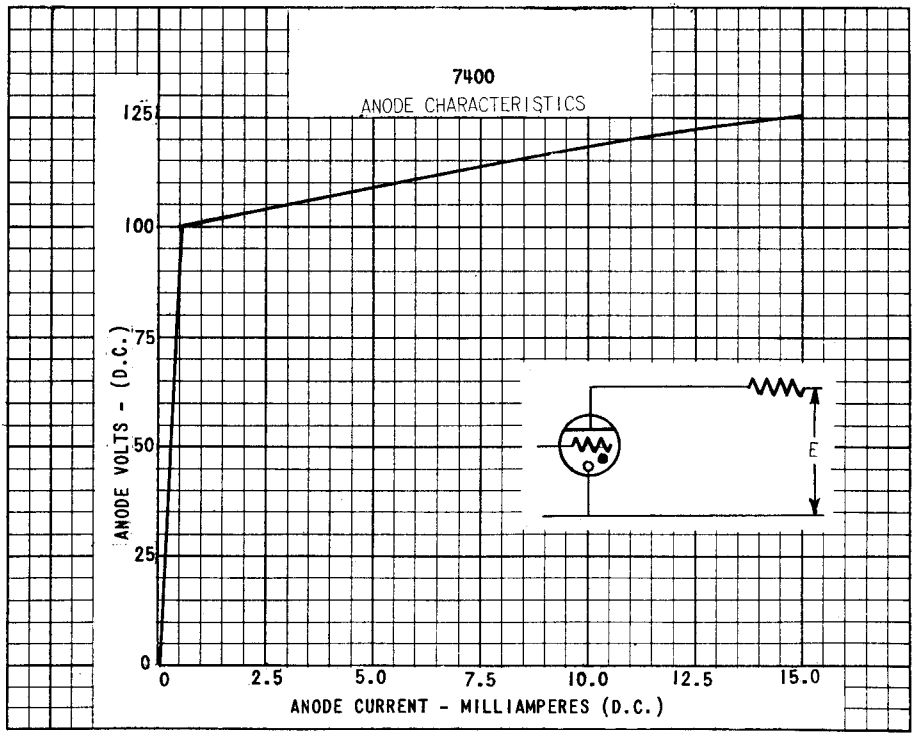
FIG. 3



SAME AS FIGURE 3 BUT OPERATED FROM A.C. LINE

FIG. 4


7400
ANODE CIRCUIT
VOLTAGE VS. CURRENT
FOR VARIOUS LOAD RESISTANCES
ANODE VOLTS - (D.C.)
160
150
140
130
120
110
R_L = 50,000 Ω
R_L = 10,000Ω
R_L = 5,000Ω
R_L = 2,500Ω
R_L = 1,000Ω
E
0
2.5
5.0
7.5
10.0
12.5
15.0
ANODE CURRENT - MILLIAMPERES (D.C.)


7400
ANODE CHARACTERISTICS
ANODE VOLTS - (D.C.)
125
100
75
50
25
0
E
0
2.5
5.0
7.5
10.0
12.5
15.0
ANODE CURRENT - MILLIAMPERES (D.C.)