

## DESCRIPTION AND RATING

### TEMPERATURE-CONTROLLED IGNITRON GL-6513

The GL-6513 ignitron is a sealed, stainless-steel-jacketed, water-cooled, mercury-pool tube designed for rectifier service in the 125-, 250-, 600-, and 900-volt d-c power fields. It is suitable for use in rectifiers rated up to 1000 kilowatts output, depending on the number of ignitrons used, the output voltage, and the circuit. Continuous average current rating is 200 amperes per tube in such service. The tube is also designed for 2400-volt a-c control service where it has a rating of 2400 kilovolt-amperes.

This tube is identical in ratings and characteristics to the GL-5555/FG-238-B. Mechanically, it has the additional feature of an integral temperature-control device with protective features. The control includes a switch which operates a solenoid valve in the water-supply line to the tube in response to increasing and decreasing tube temperature, thus maintaining the amount of cooling water to the minimum required by the operating conditions. It also includes an over-temperature switch which may be used to remove power from the ignitron when its temperature exceeds a safe value.

This new construction prevents excessive condensation over the external parts of the tube under conditions of high humidity. Another advantage is the appreciable saving in maintenance costs over tubes of the old design since this control feature, in addition to greatly reducing the amount of water required, eliminates the necessity for such safety devices as water-flow relays, water over-temperature relays, and water-pressure interlocks required with the older design tubes. In applications where the cooling water flows through two or three tubes in series this tube can be used with the GL-5555/FG-238-B since the GL-6513 in the position nearer the water drain where it receives the warmer water, can control the flow to all under normal conditions.

Like its prototype, the GL-6513 has an auxiliary anode and two ignitors. Excitation of the auxiliary anode permits stabilizing the cathode spot for very small anode currents. The two ignitors assure long life since only one is used at a time. Phase control of the ignitor impulses permits voltage control of the rectified output. In common with other ignitrons arc losses in the GL-6513 are low, and design and construction features inherent in the steel-jacketed construction assure ease of installation, economical use of space, and reliability of operation.

## TECHNICAL INFORMATION

### GENERAL

#### Electrical

Cathode Excitation - Cyclic  
Cathode Spot Starting ~ Ignitor  
Number of Electrodes  
Main Anodes  
Main Cathodes  
Auxiliary Anodes  
Ignitors

1  
1  
1  
2

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Electrical (Cont'd)

Arc Drop at 600 Peak Amperes	16.2 ± 0.5	Volts
Cathode Excitation Requirements		
Ignitor Voltage Required to Fire	450	Volts
Ignitor Current Required to Fire	45	Amperes
Starting Time at Required Voltage or Current	100	Microseconds

Mechanical

Envelope Material - Stainless Steel		
Net Weight	25	Pounds

Thermal

Type of Cooling - Water		
Inlet Water Temperature, minimum	-15°	C
Inlet Water Temperature*, maximum	0	C
Power-Rectifier Service		
Peak Inverse Anode Voltage = 900 Volts	50	C
Peak Inverse Anode Voltage = 2100 Volts	35	C
AC Control Service		
Voltage = 2400 Volts RMS	25	C
Water Flow, minimum		
At Continuous Rated Average Current	3	Gallons per Minute
Characteristics for Water Cooling at Rated Minimum Flow		
Water Temperature Rise, maximum	7	C
Pressure Drop at 3 Gallons per Minute, maximum	6	Pounds per Square Inch

MAXIMUM RATINGS AND TYPICAL OPERATION

Power-Rectifier Service, Continuous Duty  
Ratings are for Zero-Phase-Control

Maximum Peak Anode Voltage			
Inverse	900	2100	Volts
Forward	900	2100	Volts
Maximum Anode Current			
Peak	1800	1200	Amperes
Average			
Continuous	200	150	Amperes
Two-Hours - Averaged Over Any Two-Minute Interval	300	225	Amperes
One-Minute - Averaged Over Any One-Minute Interval	400	300	Amperes
Fault	12,000	9000	Amperes
Maximum Duration of Fault Current	0.15	0.15	Seconds
Frequency Range	25-60	25-60	Cycles per Second

## AC Control Service †

Two Tubes in Inverse Parallel, Ratings per Tube

Voltage	2400	Volts RMS
Maximum Demand	2400	Kilovolt-Amperes
Average Current at Maximum Demand	135	Amperes
Maximum Average Current	207	Amperes
Demand at Maximum Average Current	1105	Kilovolt-Amperes
Maximum Averaging Time at 2400 Volts RMS	1.66	Seconds
Maximum Peak Fault Current	<sup>6000</sup> <del>3000</del>	Amperes
Frequency Range	25-60	Cycles per Second

## Ignitor

Maximum Voltage		
Positive - Anode Voltage		
Negative	5	Volts
Maximum Current		
Peak	100	Amperes
Root Mean Square	15	Amperes
Average	2	Amperes
Maximum Averaging Time	10	Seconds

## Auxiliary-Anode

Maximum Peak Forward Voltage	160	Volts
Maximum Peak Inverse Voltage		
Main Anode Conducting	25	Volts
Main Anode Not Conducting	160	Volts
Maximum Current		
Peak	30	Amperes
Average	9	Amperes
Maximum Averaging Time	10	Seconds
Root Mean Square	15	Amperes

## Temperature-Control-Switch Ratings †

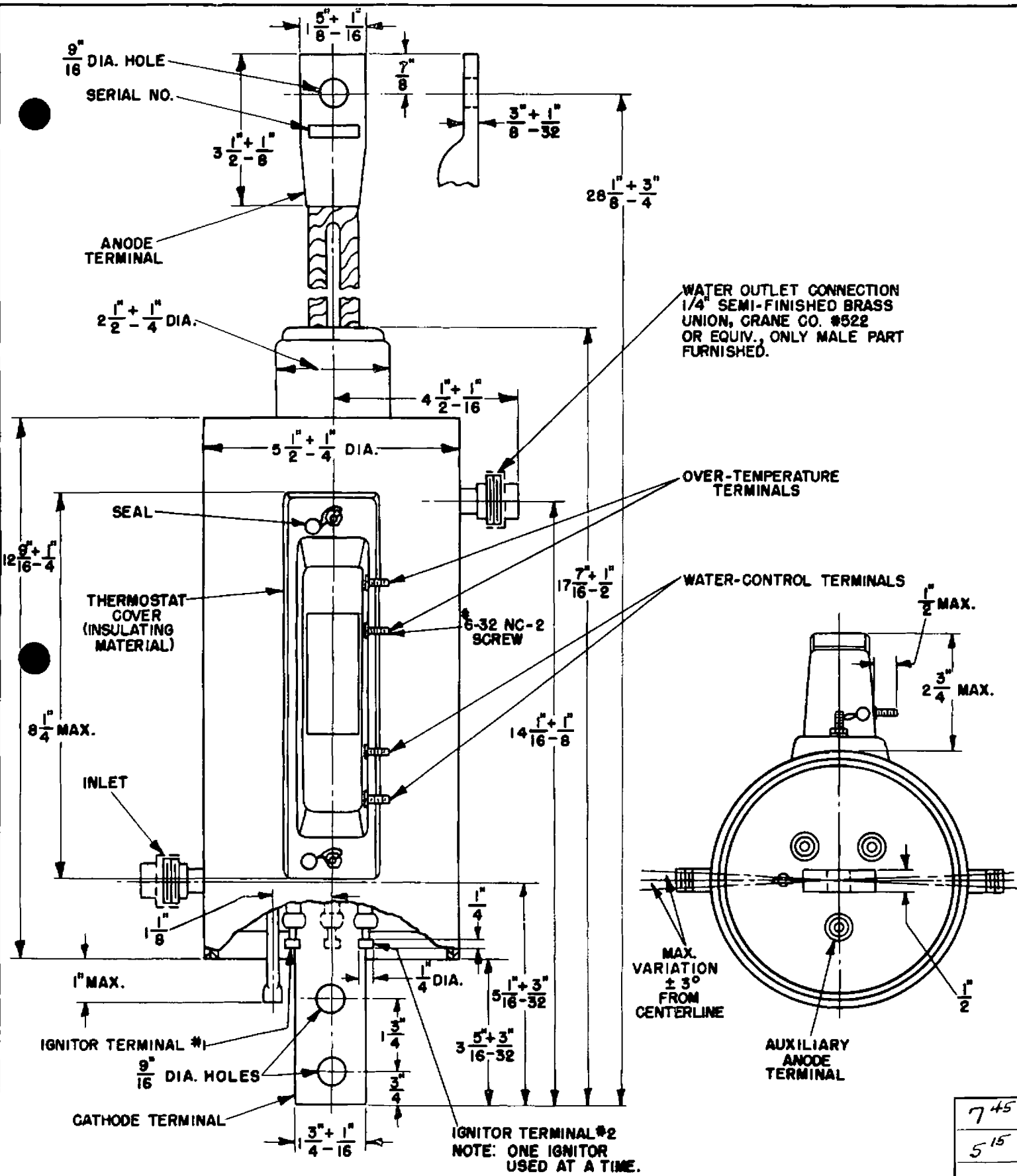
Maximum Voltage	575	Volts
Maximum Current		
Over-Temperature Switch	6	Amperes
Water-Control Switch	1.5	Amperes
Maximum Peak Potential of Tube Water Cylinder Above Ground	1500	Volts
Switch-Contact Arrangement		
Over-Temperature Switch - Normally Closed (Contact Open on Temperature Rise)		
Water-Control Switch - Normally Open (Contact Close on Temperature Rise)		

- \* No more than three tubes should be connected in series for water flow. When the series connection is used the temperature of the incoming water must be within the rated limit for the warmest tubes in the series.
- † RMS demand voltage, current, and kilovolt-ampere demand are all on the basis of full-cycle conduction (no phase delay) regardless of whether or not phase control is used.
- ‡ Suitable fuses should be provided in the switch circuits to prevent a power arc should a ground occur in the switch or wiring.

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TUBE DEPARTMENT  
GENERAL ELECTRIC COMPANY  
SCHEMECTADY 5, NEW YORK

N22023AZ



OUTLINE  
GL-6513

OCT 19 1954 A. Castle, JA-18488
REVISIONS

MADE BY *E. J. SEMIZORZAN Dec 13 1954* RE-INSPECTED BY *Oct 19 54* 14-18485  
**GENERAL ELECTRIC**  
 ELECTRONICS DIVISION TUBE DEPARTMENT  
**N22023AZ**  
 SHEET No.....CONT. ON SHEET.....

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PRINTS TO