



IGNITRON

TEMPERATURE CONTROLLED

FREQUENCY-CHANGER WELDING SERVICE

POWER-RECTIFIER SERVICE

The GL-6511 ignitron is a sealed, stainless-steel jacketed, water-cooled mercury-pool tube for control of frequency-changer resistance welders. This method of resistance welding converts three-phase 60-cycle power to single-phase power at four to twelve cycles per second. A particular advantage of this method is the appreciable reduction of kilovolt-ampere demand from that required in single-phase welding, with consequent saving in the amount of power required. In addition, the three-phase circuit balances the power load and makes possible improved results in welding aluminum, magnesium, and their alloys.

This tube is identical in ratings and characteristics to the GL-5822-A. Mechanically, it has the additional feature of an integral thermostatic arrangement with protective features. The arrangement includes a switch which controls a solenoid valve in the water-supply line to the tube in response to increasing and decreasing tube tem-

perature, 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 three tubes in series, this tube can be used with two GL-5822-A's since the GL-6511, in the position nearer the water drain where it receives the warmer water, can control the flow to all tubes under normal conditions.

GENERAL  ELECTRIC

Supersedes ET-T1142 dated 1-55

TECHNICAL INFORMATION

GENERAL

Electrical

Cathode Excitation—Cyclic	
Cathode Spot Starting—Ignitor	
Number of Electrodes	
Main Anodes	1
Main Cathodes	1
Ignitors	1
Arc Drop at 1500 Peak Amperes	25 Volts

Mechanical

Envelope Material—Stainless Steel	
Net Weight, approximate	8.4 Pounds

Thermal

Type of Cooling—Water	
Inlet Water Temperature, minimum	10 C
Inlet Water Temperature, maximum	30 C
Water Flow, minimum†	
At Continuous Rated Average Current	1.5 Gallons per Minute
Characteristics for Water Cooling at Rated Minimum Flow	
Water Temperature Rise, maximum	6 C
Pressure Drop at 1.5 Gallons per Minute, maximum	5 Pounds per Square Inch
☐ Working Water Pressure—Non-shock	100 Pounds per Square Inch

MAXIMUM RATINGS AND TYPICAL OPERATION

Frequency-Changer Resistance Welding Service or Power-Rectifier Service—Intermittent Duty

Ratings are for Zero-phase Control Angle—See curve K-69087-72A316 on page four for details.

Maximum Peak Anode Voltage			
Inverse	1200	1500	Volts
Forward	1200	1500	Volts
Maximum Anode Current*			
Peak	1500	1200	Amperes
Corresponding Average	20	16	Amperes
Average	70	56	Amperes
Corresponding Peak	420	336	Amperes
Maximum Averaging Time	6.25	6.25	Seconds
Ratio of Average to Peak Current	0.166	0.166	
Maximum Averaging Time	0.2	0.2	Seconds
Ratio of Fault to Peak Current	12.5	12.5	
Maximum Duration of Fault Current	0.15	0.15	Seconds
Frequency Range	50-60	50-60	Cycles per Second

☐ Ignitor Characteristics

Anode Firing	
Maximum Inverse Voltage	5 Volts
Maximum Positive Voltage—Anode Voltage	
Ignitor Voltage Required to Fire	200 Volts
Ignitor Current Required to Fire	30 Amperes
Starting Time at Required Voltage or Current	100 Microseconds
Separate Excitation	
Maximum Inverse Voltage	5 Volts
Recommended Pulse Length	500 Microseconds
Minimum Pulse Length, for average anode currents greater than 20 amperes	150 Microseconds
Maximum Pulse Length	4000 Microseconds
Volt-Ampere Characteristics—See Curve K-69087-72A741 on page three for details.	

Temperature-Control-Switch Ratings†

Maximum Voltage	575 Volts
Maximum Current	
Over-Temperature Switch	6 Amperes
Water-Control Switch	1.5 Amperes

TECHNICAL INFORMATION (CONT'D)

Temperature-Control-Switch Ratings† (Cont'd)

Maximum Peak Potential of Tube Water Cylinder

Above Switch Circuit 1500 Volts

Switch-Contact Arrangement

Over-Temperature-Switch—Normally Closed

(Contacts Open on Temperature Rise)

Water-Control Switch—Normally Open

(Contacts Close on Temperature Rise)

* Straight line interpolation on log-log paper is allowed between corresponding points.

† Suitable fuses should be provided in the switch circuits to prevent a power arc, should a ground occur in the switch or wiring.

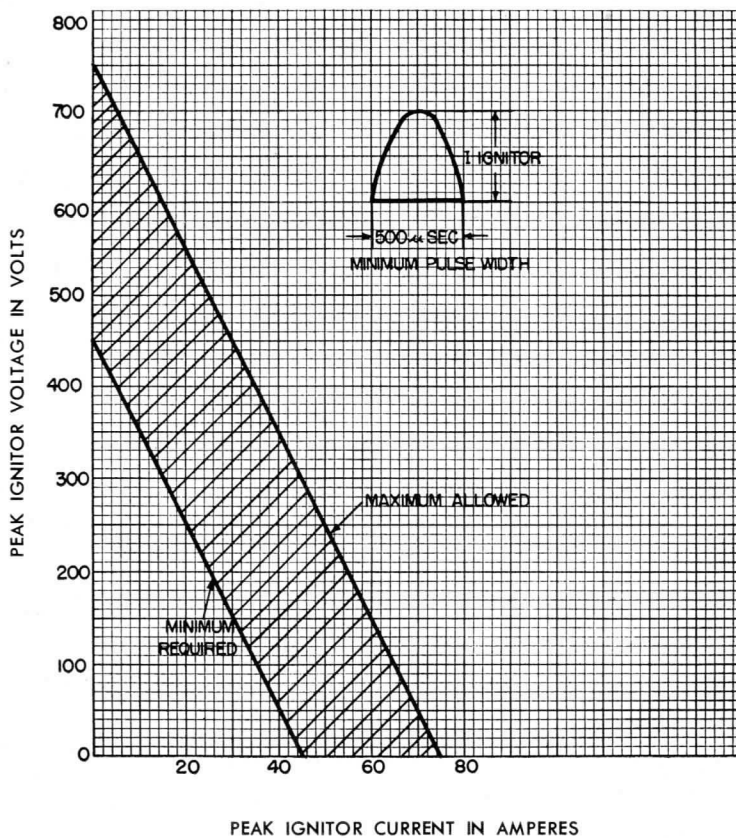
‡ Water flow should be continued for fifteen minutes after removal of anode power.

□ Denotes an addition.

IGNITOR VOLT-AMPERE REQUIREMENTS FOR SEPARATE EXCITATION

SEALED-IGNITRON RECTIFIERS

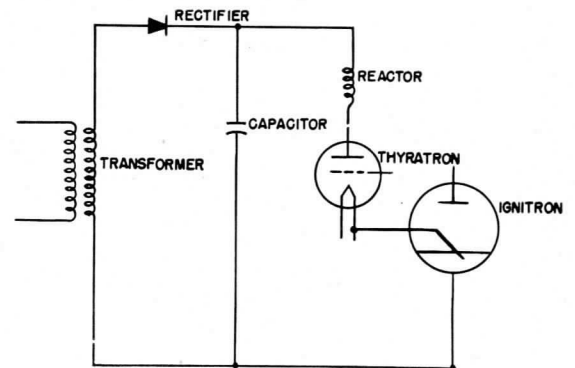
THE IGNITOR FIRING CIRCUIT SHOULD BE DESIGNED
TO OPERATE WITHIN THE SHADED AREA



K-69087-72A741

12-9-55

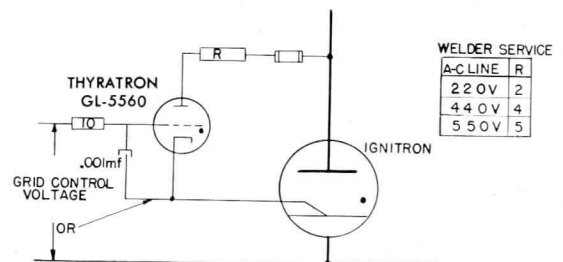
ELEMENTARY CIRCUIT FOR CAPACITOR FIRING



K-9033525

5-25-54

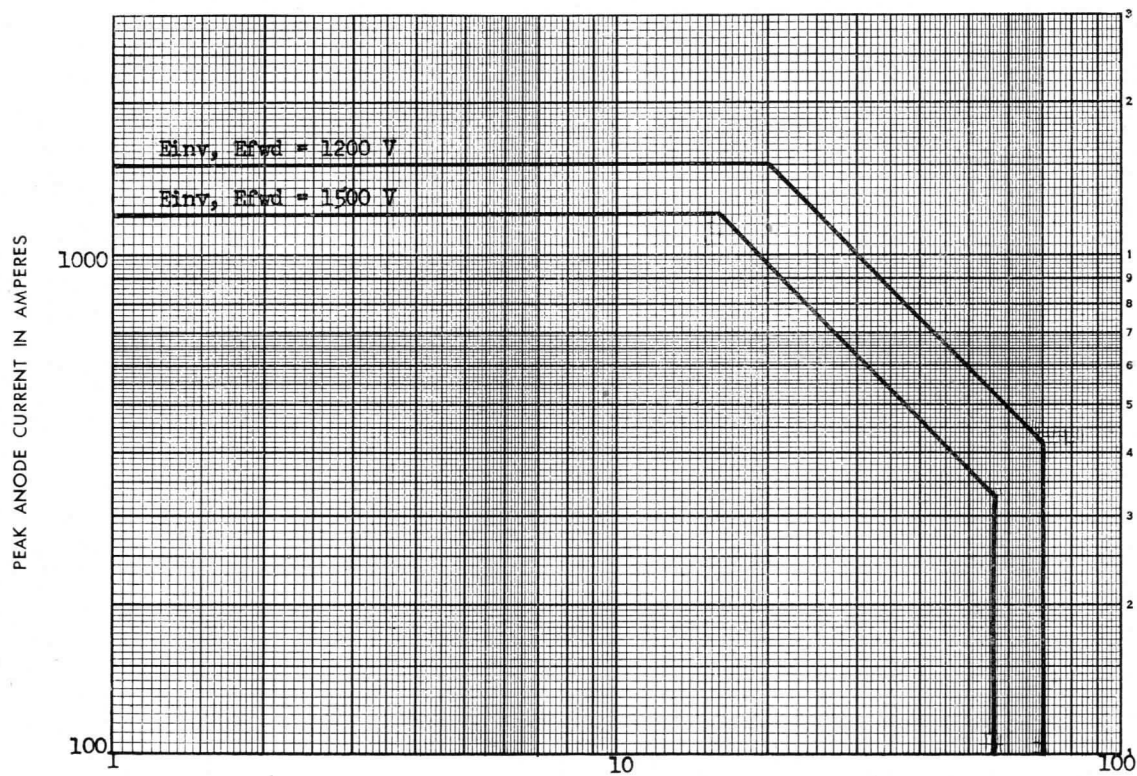
SELF OR ANODE EXCITATION IN WHICH A PART OF THE
LOAD CURRENT IS DIVERTED THROUGH THE IGNITOR



K-9033542

12-6-44

FREQUENCY-CHANGER RESISTANCE WELDING SERVICE
OR
POWER RECTIFIER RATING—INTERMITTENT SERVICE



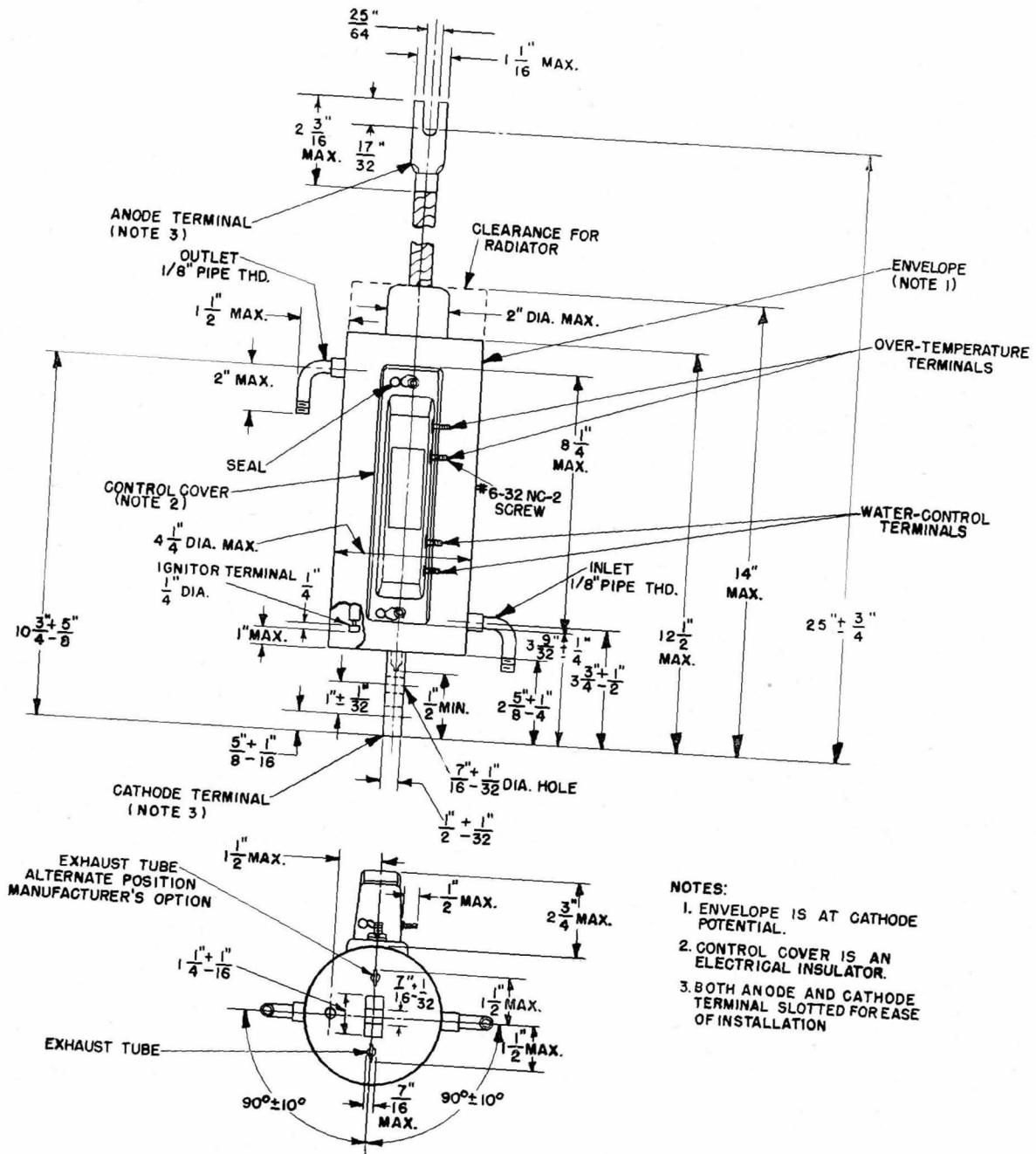
K-69087-72A316

11-3-54

MAXIMUM AVERAGING TIME = 6.25 SECONDS

$$\frac{I_{\text{AVERAGE}}}{I_{\text{PEAK}}} \text{ MAXIMUM AVERAGING TIME } 0.2 \text{ SECOND} = 0.166 \text{ MAXIMUM}$$

$$\frac{I_{\text{FAULT}}}{I_{\text{PEAK MAX.}}} \text{ MAXIMUM DURATION OF FAULT CURRENT } 0.15 \text{ SECOND} = 12.5 \text{ MAXIMUM}$$



NOTES:

1. ENVELOPE IS AT CATHODE POTENTIAL.
2. CONTROL COVER IS AN ELECTRICAL INSULATOR.
3. BOTH ANODE AND CATHODE TERMINAL SLOTTED FOR EASE OF INSTALLATION

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