



5551-A

5551-A IGNITRON

WATER-COOLED, STEEL-JACKETED, MERCURY-POOL-CATHODE
TYPE HAVING MOUNTING PLATE FOR THERMOSTATIC CONTROL

For resistance-welding control

GENERAL DATA

Electrical:

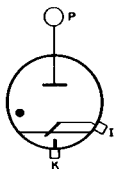
Cathode Excitation	Cyclic
Cathode-Spot Starting	By Ignitor
Minimum Requirements for Cathode Excitation:	
Peak ignitor voltage required to fire	200 volts
Peak ignitor current required to fire	30 amp
Starting time at required voltage or current	100 μ sec
Tube Voltage Drop:	
At peak anode current of 3400 amperes	26 volts
At peak anode current of 176 amperes	13 volts

Mechanical:

Operating Position	Vertical, flexible lead up
Maximum Overall Length (Including flexible lead)	23-1/4"
Maximum Radius (Including water connections)	2-7/8"
Weight	3.6 lbs
Terminal Connections (See Dimensional Outline):	

P - Anode
Terminal
(Flexible
lead)

K - Cathode
Terminal
(Bar oppo-
site anode
terminal)



I - Ignitor
Terminal
(Within
jacket
skirt at
cathode
end)

Cooling:

Type	Water
Minimum inlet water temperature	10 $^{\circ}$ C
Maximum outlet water temperature	40 $^{\circ}$ C
Minimum water flow	1 gpm
Maximum water-temperature rise	4 $^{\circ}$ C
Maximum pressure drop	2.5 psi

INTERMITTENT RECTIFIER SERVICE and FREQUENCY-CHANGER WELDER SERVICE

Maximum Ratings, Absolute-Maximum Values:

*For zero phase-control angle and
frequencies from 50 to 60 cps*

RATING I

PEAK ANODE VOLTAGE:

Forward	500 max. volts
Inverse	500 max. volts



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ANODE CURRENT:

Peak	700 max.	amp
Average (Averaged over any interval of 6 seconds maximum).	40 max.	amp
Fault, for duration of 0.15 second maximum.	8750 max.	amp

RATING II

PEAK ANODE VOLTAGE:

Forward.	1200 max.	1200 max.	volts
Inverse.	1200 max.	1200 max.	volts

ANODE CURRENT:

Peak	135 max.	600 max.	amp
Average (Averaged over any interval of 10 seconds maximum).	22.5 max.	5 max.	amp
Average (Averaged over any interval of 0.2 second maximum).	22.5 max.	100 max.	amp
Fault, for duration of 0.15 second maximum	7500 max.	7500 max.	amp

RATING III

PEAK ANODE VOLTAGE:

Forward.	1500 max.	1500 max.	volts
Inverse.	1500 max.	1500 max.	volts

ANODE CURRENT:

Peak	108 max.	480 max.	amp
Average (Averaged over any interval of 10 seconds maximum).	18 max.	4 max.	amp
Average (Averaged over any interval of 0.2 second maximum).	18 max.	80 max.	amp
Fault, for duration of 0.15 second maximum	6000 max.	6000 max.	amp

RESISTANCE-WELDING-CONTROL SERVICE[®]

Two Tubes in Inverse-Parallel Circuit

Maximum Ratings, Absolute-Maximum Values:

For frequencies from 25 to 60 cps

Ratings I-A and I-B Apply to Operation Either (1) Without Water-Saving Thermostat, or (2) With Water-Saving Thermostat Shunted by Auxiliary Contactor

RATING I-A

SUPPLY VOLTAGE (RMS)	250 max.	250 max.	volts
DEMAND POWER (During conduction)	200 max.	600 max.	kva

[®]: See next page.



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DUTY [†]	15 max.	2.8 max.	%
ANODE CURRENT (Per tube):			
Peak	1130 max.	3400 max.	amp
Demand (RMS, during con- duction) [#]	800 max.	2400 max.	amp
Average (Averaged over any interval of 18 sec- onds maximum) [#]	56 max.	30.2 max.	amp
Fault, for duration of 0.15 second maximum	6720 max.	6720 max.	amp

RATING I-B

SUPPLY VOLTAGE (RMS)	600 max.	600 max.	volts
DEMAND POWER (During con- duction)	200 max.	600 max.	kva
DUTY [†]	37 max.	6.7 max.	%
ANODE CURRENT (Per tube):			
Peak	466 max.	1410 max.	amp
Demand (RMS, during con- duction) [#]	333 max.	1000 max.	amp
Average (Averaged over any interval of 7.5 sec- onds maximum) [#]	56 max.	30.2 max.	amp
Fault, for duration of 0.15 second maximum	2800 max.	2800 max.	amp

Ratings II-A and II-B Apply to Operation with Water-Saving Thermostat Not Shunted by Auxiliary Contactor

RATING II-A

SUPPLY VOLTAGE (RMS)	250 max.	250 max.	volts
DEMAND POWER (During con- duction)	200 max.	600 max.	kva
DUTY [†]	9.7 max.	1.9 max.	%
ANODE CURRENT (Per tube):			
Peak	1130 max.	3400 max.	amp
Demand (RMS, during con- duction) [#]	800 max.	2400 max.	amp
Average (Averaged over any interval of 25.6 sec- onds maximum) [#]	36 max.	21 max.	amp
Fault, for duration of 0.15 second maximum	6720 max.	6720 max.	amp

RATING II-B

SUPPLY VOLTAGE (RMS)	600 max.	600 max.	volts
DEMAND POWER (During con- duction)	200 max.	600 max.	kva
DUTY [†]	23 max.	4.7 max.	%

•, †, #: See next page.

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ANODE CURRENT (Per tube):

Peak	466 max.	1410 max.	amp
Demand (RMS, during con- duction)*.	333 max.	1000 max.	amp
Average (Averaged over any interval of 10.7 sec- onds maximum)*.	36 max.	21 max.	amp
Fault, for duration of 0.15 second maximum	925 max.	2800 max.	amp

IGNITOR

Maximum Ratings, Absolute-Maximum Values:

PEAK IGNITOR VOLTAGE:

Positive	Equal to anode volts
Negative	5 max. volts

IGNITOR CURRENT:

Peak	100 max.	amp
Average (Averaged over any interval of 5 seconds maximum).	1 max.	amp
RMS.	10 max.	amp

● RMS voltage, current, and demand kva are on the basis of full-cycle conduction (no phase delay) regardless of whether or not phase control is used.

▲ Defined as (cycles "on")/(cycles "on" + cycles "off") during the specified averaging time.

† For supply voltages between 250 volts and 600 volts, duty is proportional to supply voltage. For supply voltages lower than 250 volts, the values for 250 volts apply.

* For supply voltages between 250 volts and 600 volts, demand anode current and averaging time are each inversely proportional to supply voltage. For supply voltages lower than 250 volts, the values for 250 volts apply.

OPERATING CONSIDERATIONS

The 5551-A is equipped for mounting a thermostatic control with a mounting plate calibrated either for controlling the flow of cooling water through the water jacket, or for protection of the ignitron against overheating.

When the cooling water is circulated successively through the water jackets of two or more ignitrons, the *water-saving thermostat*, if used should be mounted on the ignitron connected directly to the water supply.

The water-saving thermostat, which has normally open contacts, is calibrated to close a circuit energizing a solenoid valve in the water-supply line and thus permit water flow to start when the temperature of the thermostat mounting plate exceeds approximately 35° C. Because of the lag between the heating of the ignitron envelope and the functioning of the water-saving thermostat to start water flow through the water jackets, the ignitron may overheat before the flow of cooling water starts.



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Such overheating can be prevented by the use of an auxiliary contactor shunted across the contacts of the water-saving thermostat and actuated by the welding-control switch. The contactor causes the solenoid valve in the water-supply line to open as soon as welding current flows.

If the water-saving thermostat is not shunted by an auxiliary contactor, it will be necessary to use a lower value of maximum average current than that which is specified when the auxiliary contactor is employed. The lower average current value is achieved by increasing the maximum averaging time and decreasing the maximum duty. Although the same maximum conduction time is permitted for both of these operating conditions, the use of the water-saving thermostat alone, without the auxiliary contactor requires a longer interval between successive welds than when the thermostat is shunted by the contactor.

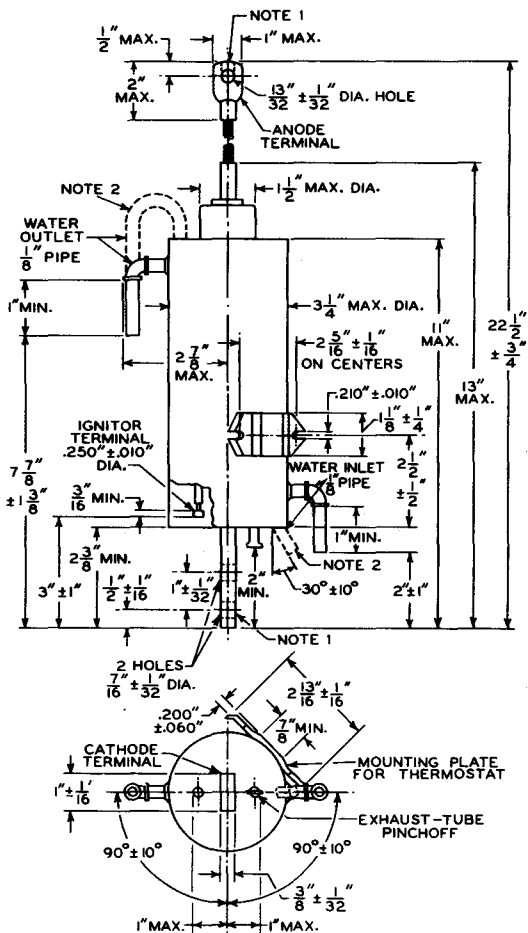
When a *protective thermostat* is used, it should be mounted on an ignitron from which the cooling water discharges into the drain. The protective thermostat is calibrated to open a set of normally closed contacts at a jacket temperature of approximately 52° C. The opening of these contacts causes a protective device to function. This device may be a relay opening the ignitor firing controls, or preferably, a circuit breaker which removes power from the ignitrons.

Care must be taken to insure that the water jacket of each ignitron is completely filled before power is applied. Tube operation with a partially filled water jacket may cause abnormal heating of the tube envelope, with resultant arc-back which impairs tube life. It is also necessary to arrange the cooling system so as to prevent any draining of the water jackets when the flow of water ceases.

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NOTE 1: MAY BE SLOTTED.

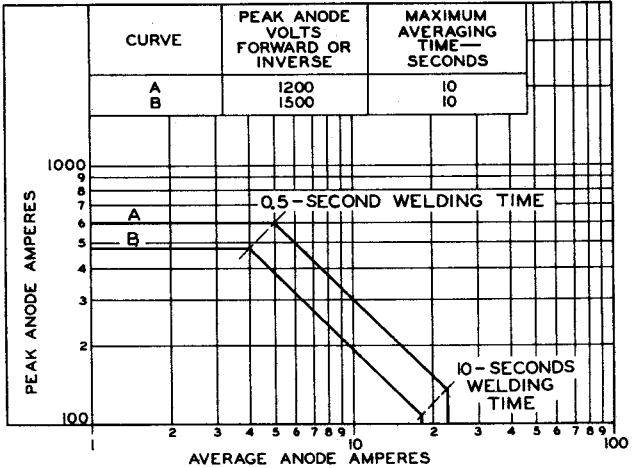
NOTE 2: DASHED POSITION MANUFACTURER'S OPTION.



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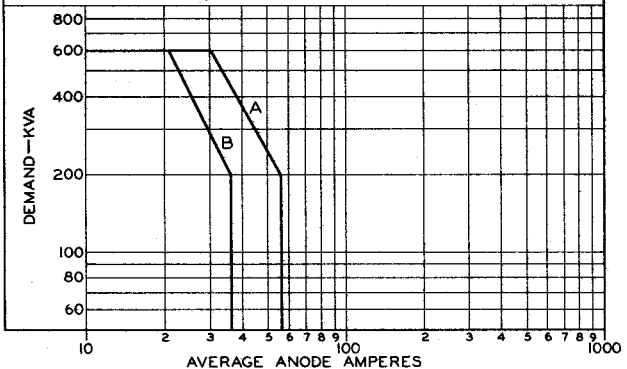
RATING CHARTS FREQUENCY-CHANGER-WELDER SERVICE



92CS-9695

RESISTANCE-WELDING-CONTROL SERVICE

TWO TUBES CONNECTED IN INVERSE PARALLEL.
 RMS ANODE-SUPPLY VOLTS = 250 TO 600
 CURVE A: NO WATER-SAVING THERMOSTAT, OR WATER-SAVING THERMOSTAT SHUNTED BY AUXILIARY CONTACTOR.
 CURVE B: WATER-SAVING THERMOSTAT WITHOUT AUXILIARY CONTACTOR.



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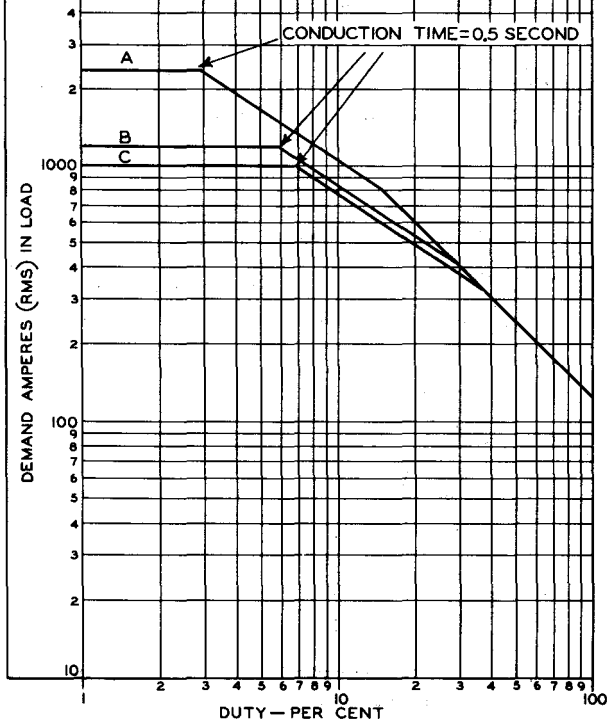


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RATING CHART
RESISTANCE-WELDING-CONTROL SERVICE

TWO TUBES CONNECTED IN INVERSE PARALLEL
NO WATER-SAVING THERMOSTAT, OR WATER-SAVING THERMOSTAT SHUNTED BY AUXILIARY CONTACTOR.
PROTECTIVE THERMOSTAT OPTIONAL.

CURVE	RMS ANODE-SUPPLY VOLTS	MAXIMUM AVERAGING TIME—SECONDS
A	250	18
B	500	9
C	600	7.5



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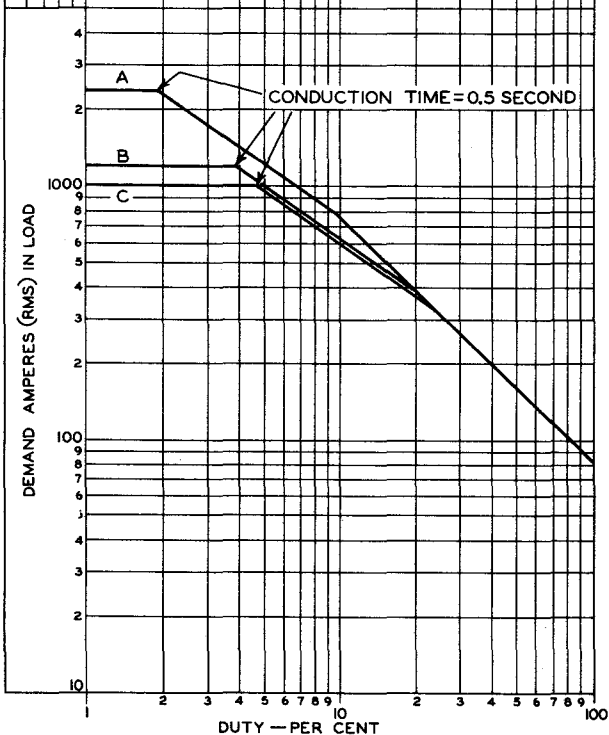
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RATING CHART RESISTANCE-WELDING-CONTROL SERVICE

TWO TUBES CONNECTED IN INVERSE PARALLEL.
WATER-SAVING THERMOSTAT WITHOUT
AUXILIARY CONTACTOR.
PROTECTIVE THERMOSTAT OPTIONAL.

CURVE	RMS ANODE-SUPPLY VOLTS	MAXIMUM AVERAGING TIME—SECONDS
A	250	25.6
B	500	12.8
C	600	10.7



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92CM-9692

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