



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

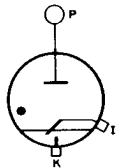
#### Electrical:

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 $\mu$ 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



# 5551-A IGNITRON

## 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 Auxillary Contactor

## RATING I-A

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

®: See next page.



# 555I-A IGNITRON

555I-A

DUTY <sup>†</sup> . . . . .	15 max.	2.8 max.	%
ANODE CURRENT (Per tube):			
Peak . . . . .	1130 max.	3400 max.	amp
Demand (RMS, during con- duction) <sup>#</sup> . . . . .	800 max.	2400 max.	amp
Average (Averaged over any interval of 18 sec- onds maximum) <sup>#</sup> . . . . .	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 <sup>†</sup> . . . . .	37 max.	6.7 max.	%
ANODE CURRENT (Per tube):			
Peak . . . . .	466 max.	1410 max.	amp
Demand (RMS, during con- duction) <sup>#</sup> . . . . .	333 max.	1000 max.	amp
Average (Averaged over any interval of 7.5 sec- onds maximum) <sup>#</sup> . . . . .	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 <sup>†</sup> . . . . .	9.7 max.	1.9 max.	%
ANODE CURRENT (Per tube):			
Peak . . . . .	1130 max.	3400 max.	amp
Demand (RMS, during con- duction) <sup>#</sup> . . . . .	800 max.	2400 max.	amp
Average (Averaged over any interval of 25.6 sec- onds maximum) <sup>#</sup> . . . . .	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 <sup>†</sup> . . . . .	23 max.	4.7 max.	%

⊙, ▲, †, #: See next page.



5551-A

## IGNITRON

## 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.



555I-A

## IGNITRON

555I-A

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.

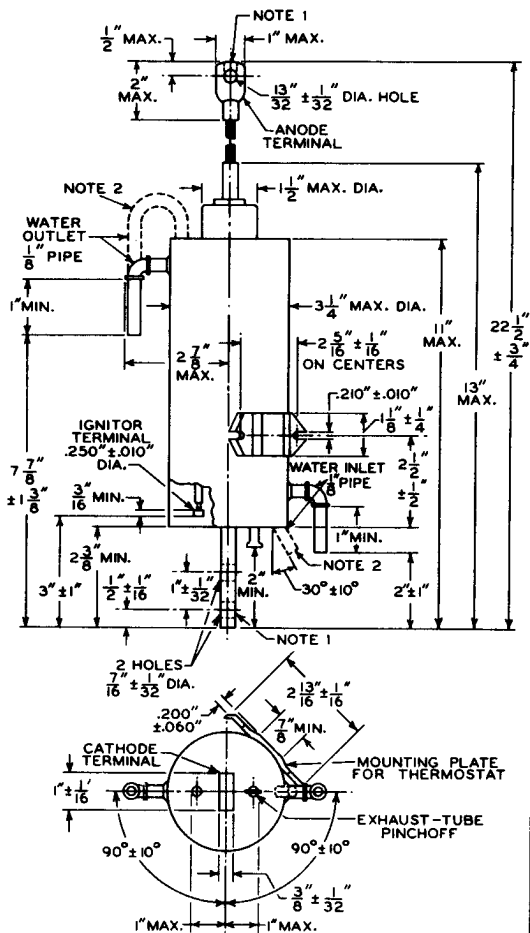
If the water-saving thermostat is not shunted by an auxiliary contactor, it will be necessary to use a lower value of maximum average current than that which is specified when the auxiliary contactor is employed. The lower average current value is achieved by increasing the maximum averaging time and 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.



# 5551-A IGNITRON



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NOTE 1: MAY BE SLOTTED.

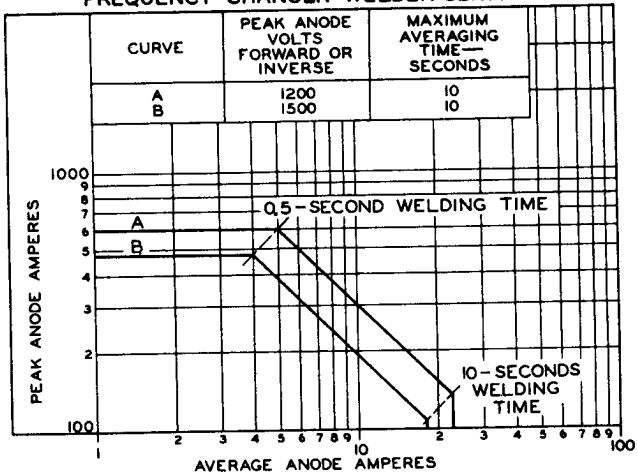
NOTE 2: DASHED POSITION MANUFACTURER'S OPTION.



5551-A

5551-A

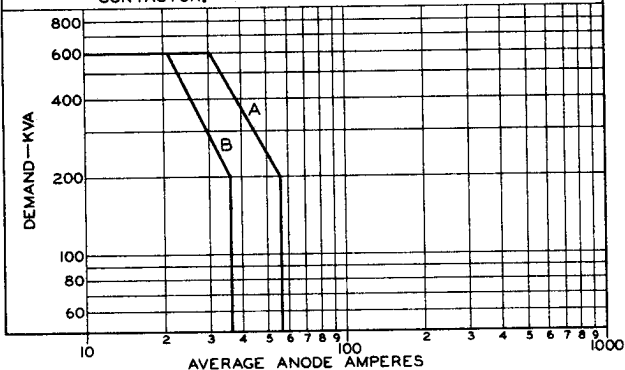
### RATING CHARTS FREQUENCY-CHANGER-WELDER SERVICE



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.



92CS-9698

5551-A



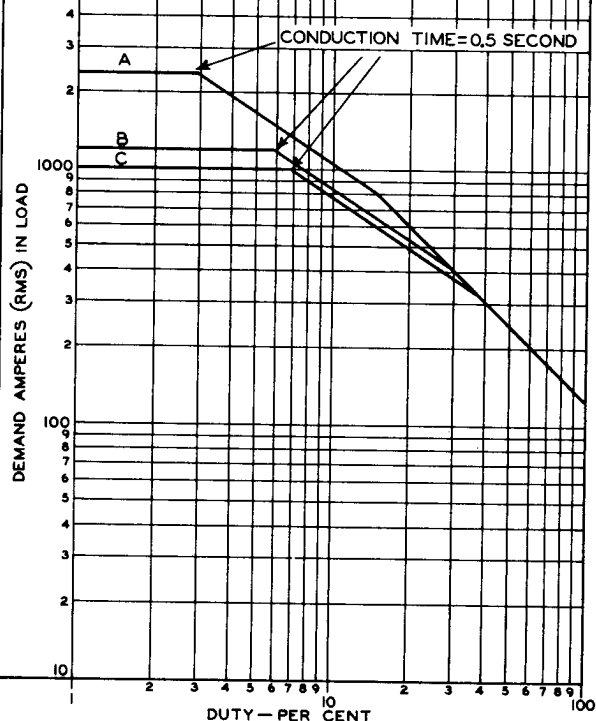
5551-A

**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



ELECTRON TUBE DIVISION

92CM-9696

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY





5551-A

5551-A

### 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

