

RCA THYRATRON, GLOW-DISCHARGE, IGNITRON, & VACUUM-GAUGE TUBE GUIDE

THYRATRONS

Triodes

MAXIMUM RATINGS							RCA Type
Anode Current		Temperature Range °C	Peak Inverse Anode Volts	Filament-F or Heater-H			
Av Amp	Peak Amp			Volts	Amp		
Mercury-Vapor Types							
0.5	2	40 to 80	5000	2.5 F	5	5557	
0.64	2.5	25 to 70	2500	2.5 F	6	627	
1.8	10	25 to 55	15000	5.0 F	10	5563A	
2.5	15	40 to 80	1000	5.0 H	4.5	5559	
4	16	30 to 50	10000	5.0 H	10	677	
6.4	40	40 to 80	2500	5.0 H	10	676	
Gas Types							
0.04	0.2	-40 to +70	350	2.5 H	2.6	692	
0.045	35	-50 to +90	3000	6.3 H	2.3	6130/3C45	
0.075	0.3	-75 to +90	350	6.3 H	0.6	884	
0.075	0.3	-75 to +90	350	2.5 H	1.5	885	
1	8	-55 to +75	1250	2.5 F	6.3	C1K/6014	
2.5	30	-55 to +75	1250	2.5 F	9	C3J/5632	
2.5	30	-55 to +75	1250	2.5 F	9	C3JA/5684	
2.5	30	-55 to +75	1250	2.5 F	9	C3JL	
6.4	77	-55 to +75	1250	2.5 F	21	C6J/5C21	
6.4	77	-55 to +75	1250	2.5 F	21	C6JA/5685	
18	100	-55 to +75	1250	2.5 F	31	C16J/5665	
Gas and Mercury-Vapor Types							
1	3	-40 to +80	1250	2.5 F	5	714/7021	
1	8	-40 to +80	1250	2.5 F	6.3	716/6855	
1.5	6	-40 to +80	1250	2.5 F	7	3C23	
2.5	30	-40 to +80	1500	2.5 F	9	710/6011	
6.4	77	-40 to +80	1500	2.5 F	21	760/6858	

Tetrodes

Mercury-Vapor Types						
2.5	15	40 to 80	1000	5 H	4.5	5560
2.5	30	40 to 80	1500	5 H	5	632B
3.2	40	40 to 80	2500	5 H	5	672A
6.4	40	40 to 80	2000	5 H	10	172
6.4	40	40 to 80	2500	5 H	10	105
Gas Types						
0.025	0.1	-55 to +90	500	6.3 H	0.15	5696 ^a
0.1	0.5	-75 to +90	1300	6.3 H	0.6	2D21 ^a
0.1	0.5	-75 to +150	1300	6.3 H	0.6	5727 ^a
0.1	1	-55 to +90	1300	6.3 H	0.6	502A



RADIO CORPORATION OF AMERICA
Electronic Components and Devices

Harrison, N. J.

THY, GLOW-DIS,
IGN, & VAC-GA
TUBE GUIDE I

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Tetrodes (Cont'd)

MAXIMUM RATINGS						
Anode Current		Temperature Range °C	Peak Inverse Anode Volts	Filament-F or Heater-H		RCA Type
Av Amp	Peak Amp			Volts	Amp	
Gas Types (Cont'd)						
0.1	1	-75 to +90	1300	6.3 H	0.6	2050
0.1	1	-75 to +90	1300	6.3 H	0.6	2050A
0.5	5	-75 to +90	1300	6.3 H	2.6	6012
0.8	8	-75 to +90	1500	6.3 H	2.6	3D22A

GLOW-DISCHARGE TUBES

Average DC Operating Volts	DC Operating Current Range Milliamperes	Average DC Starting Volts	RCA Type
Voltage-Regulator Types			
59	0.4 to 2	67	991
75	5 to 30	105	0C2 ^a
75	5 to 40	100	0A3
78	5 to 40	100	0A3A
108	5 to 30	115	0B2 ^a
108	5 to 30	115	6074 ^{a,b}
110	5 to 40	115	0C3A
150	5 to 40	160	0D3A
151	5 to 30	156	0A2 ^a
151	5 to 30	156	6073 ^c
153	5 to 40	160	0D3
Voltage-Reference Types			
86.5	1.5 to 3.5	107	5651A ^{a,d}
87	1.5 to 3.5	107	5651 ^a
Relay Types			
Maximum Peak Inverse Anode Volts	Maximum Cathode Milliamperes		RCA Type
	Peak	Average	
180	100	25	1C21 ^e
200	100	25	5823 ^{a,f}
225	100	25	0A4G ^f



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IGNITRONS

MAXIMUM RATINGS						
<i>For power-supply frequencies of 25 to 60 Hz</i>						
Anode Current			Demand Power	RMS Supply	Peak Anode Inverse or Forward Volts	RCA Type
Av for	Time Inter- vals	Peak				
Amp	Sec	Amp	KVA	Volts		
Resistance-Welding Control Service^h						
4.86	27.8	846	150	250	—	5550
4.86	11.6	354	150	600	—	
12.1	22	1692	300	250	—	
12.1	9.2	708	300	600	—	
30.2	18	3400	600	250	—	5551A
30.2	7.5	1410	600	600	—	
56	18	1130	200	250	—	
56	7.5	466	200	600	—	
75.6	14	6800	1200	250	—	5552A
75.6	5.8	2830	1200	600	—	
140	14	2260	400	250	—	
140	5.8	945	400	600	—	
Intermittent Rectifier Service and Frequency-Changer Welder Service						
4	10	480	—	—	1500	5551A
5	10	600	—	—	1200	
40	6	700	—	—	500	
100	6	1600	—	—	500	5552A ^j
Resistance-Welding-Capacitor Discharge Service						
8	1.25	500	60 dischgs/sec		k	5550
15	0.66	500	60 dischgs/sec		3000	

VACUUM-GAUGE TUBES

Gas Pressure Range		Gauge Type	RCA Type
in mm of Hg (Torr)	in microns		
1 to 0.0001 1 to 0.001 ^m	1000 to 0.1 1000 to 1 ^m	Thermo- couple	1946
1.5 to below 0.01 0.5 to 0.01 ^m	1500 to below 10 500 to 10 ^m	Pirani	1947
0.001 to below 0.0001 0.001 and below ^m	1 to below 0.1 0.1 and below ^m	Ionization (Hard Glass)	1949



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- a Miniature.
- b "Premium" version of OB2 intended for applications critical to shock and vibration.
- c "Premium" version of OA2 intended for applications critical to shock and vibration.
- d Like the 5651 but has greater voltage stability.
- e For operation from a dc supply.
- f For operation from an ac supply.
- g Per tube.
- h Two tubes in inverse-parallel circuit.
- j Intermittent Rectifier Service only.
- k Forward volts = 6000, inverse volts = 3000.
- m Range of greatest sensitivity.





GRID-CONTROLLED RECTIFIER CIRCUITS

Numerical Relationships Among Electrical Quantities

E = Trans. Sec. Voltage (RMS)	I_{av} = Average DC Output Current
E_{av} = Average DC Output Voltage	I_b = Average Anode Current
E_{bmi} = Peak Inverse Anode Voltage	I_p = Anode Current (RMS)
E_m = Peak DC Output Voltage	I_{pm} = Peak Anode Current
E_r = Major Ripple Voltage (RMS)	P_{al} = Line Volt-Amperes
f = Supply Frequency	P_{ap} = Trans. Pri. Volt-Amperes
f_r = Major Ripple Frequency	P_{as} = Trans. Sec. Volt-Amperes
P_{dc} = DC Power ($E_{av} \times I_{av}$)	

Note: Conditions assumed involve sine-wave supply; zero voltage drop in tubes; no losses in transformer and circuit; no back emf in the load circuit; and no phase-back.

RATIO	Fig. 1	Fig. 2	Fig. 3	Fig. 4	Fig. 5*	Fig. 6	Fig. 7	Fig. 8
Voltage Ratios								
E/E_{av}	2.22	1.11	1.11	0.854	0.854	0.427	0.785	0.74
E_{bmi}/E	1.41	2.83	1.41	2.45	2.45	2.45	2.83	2.83
E_{bmi}/E_{av}	3.14	3.14	1.57	2.09	2.09	1.05	2.22	2.09
E_m/E_{av}	3.14	1.57	1.57	1.21	1.05	1.05	1.11	1.05
E_r/E_{av}	1.11	0.472	0.472	0.177	0.04	0.04	0.106	0.04
Frequency Ratio								
f_r/f	1	2	2	3	6	6	4	6
Current Ratios								
I_p/I_{av}	1.57	0.785	0.785	0.578	0.289	0.578	0.5	0.408
I_b/I_{av}	1	0.5	0.5	0.33	0.167	0.33	0.25	0.167
<i>Resistive Load</i>								
I_{pm}/I_{av}	3.14	1.57	1.57	1.21	0.52	1.05	1.11	1.05
I_{pm}/I_b	3.14	3.14	3.14	3.63	3.14	3.14	4.5	6.3
<i>Inductive Load[■]</i>								
I_{pm}/I_{av}	—	1	1	1	0.5	1	1	1
Power Ratios								
<i>Resistive Load</i>								
P_{as}/P_{dc}	3.49	1.74	1.24	—	—	—	—	—
P_{ap}/P_{dc}	2.69	1.23	1.24	—	—	—	—	—
P_{al}/P_{dc}	2.69	1.23	1.24	—	—	—	—	—
<i>Inductive Load[■]</i>								
P_{as}/P_{dc}	—	1.57	1.11	1.71	1.48	1.05	1.57	1.81
P_{ap}/P_{dc}	—	1.11	1.11	1.21	1.05	1.05	1.11	1.29
P_{al}/P_{dc}	—	1.11	1.11	1.21	1.05	1.05	1.11	1.05

* Bleeder current of 2% full-load current will provide exciting current for balance coil and thus avoid poor regulation at light loading.

■ The use of a large filter-input choke is assumed.



GRID-CONTROLLED RECTIFIER CIRCUITS

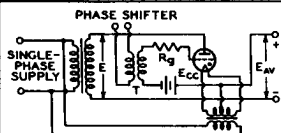


FIG. 1 HALF-WAVE SINGLE-PHASE

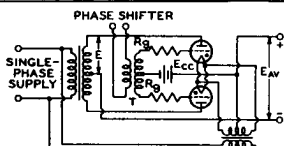


FIG. 2 FULL-WAVE SINGLE-PHASE

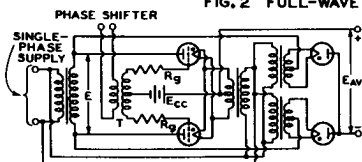


FIG. 3 SERIES SINGLE-PHASE

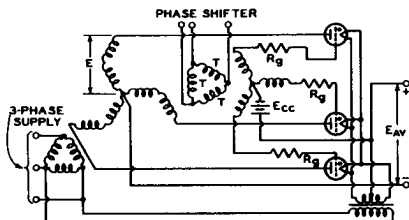


FIG. 4 HALF-WAVE THREE-PHASE

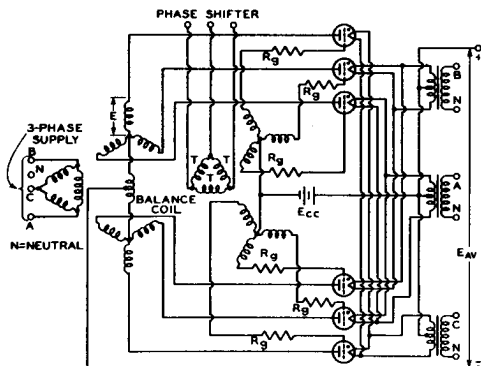


FIG. 5 PARALLEL THREE-PHASE (QUADRATURE OPERATION)

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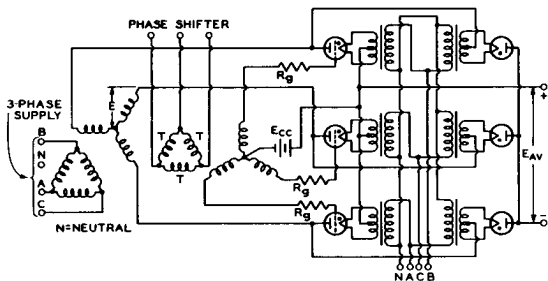


FIG. 6 SERIES THREE-PHASE (QUADRATURE OPERATION)

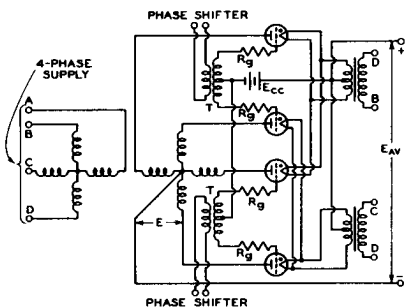


FIG. 7 HALF-WAVE FOUR-PHASE (QUADRATURE OPERATION)

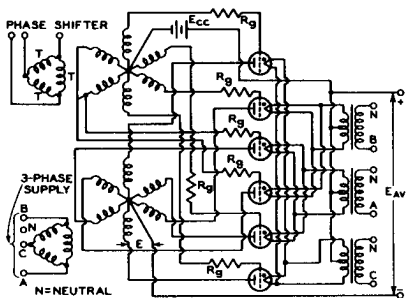


FIG. 8 HALF-WAVE SIX-PHASE (QUADRATURE OPERATION)

NOTE
T = PEAKING TRANSFORMER