

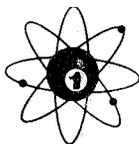
ManualsPlus.com
SENCORE

CR143

**CATHODE
RAY TUBE
TESTER**

497-0116

**SET-UP
CHART**



SENCORE

426 SO. WESTGATE • ADDISON, ILL. 60101

FORM 512

Test each gun of a color tube for emission as follows:

1. Set the FUNCTION switch to EMISSION and the G1 bias control to 50 volts.

2. Set the COLOR GUN switch to one of the guns and adjust the associated G2 SCREEN control until the meter reads at the cut off line. Note: If there is insufficient range of the G2 control with 50 volts bias on G1 reduce the bias until there is sufficient range — keep in mind that the other two guns will be checked at this same bias setting. If the G1 required is much less than 35 volts the tube is probably defective because of low emission.

Push the emission test button and read emission on the GOOD-BAD meter scale.

3. Perform step 2 above with the other two guns. If all three guns have good emission proceed with the tracking test.

Test for color Tracking as follows:

1. Leave all three G2 SCREEN controls left where they were set for the emission test.

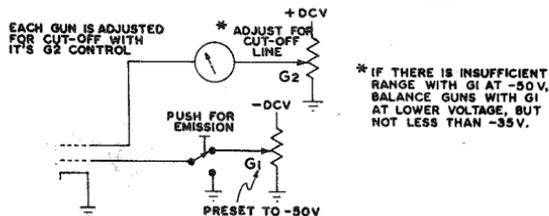
2. Push the COLOR TRACKING push button and adjust the COLOR CAL control so that the meter reads somewhere in the middle of the scale. Hold button down and switch the COLOR GUN switch to all three positions. Leave it set on the position that indicates highest on the meter.

3. Readjust the COLOR CAL control so that the meter reads at the color cal line.

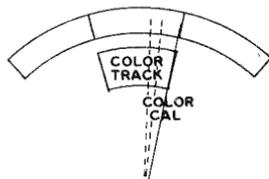
4. Switch the COLOR GUN switch to the other two guns. The meter readings should stay within the COLOR TRACK scale. If not the CRT is outside of the manufacturers limits. On some CRT's the meter indications do not settle down immediately, but decrease gradually for a few seconds before stabilizing. Use the stabilized meter indications for comparison. When all three guns indicate within the COLOR TRACK scale then the highest indicating gun is no more than 1.5 times the lower reading gun.

Some CRT manufacturers also require that the G2 voltage used on each screen stay within these limits, i.e., the highest G2 voltage required should not be any more than 1.5 times the lowest G2 voltage required. This is easily checked just by looking at the settings of the three G2 controls.

EMISSION TEST & BALANCING GUNS FOR TRACKING TEST



TRACKING TEST



USING COLOR TRACKING CONTROLS ADJUST GUN WITH HIGHEST EMISSION TO COLOR CAL LINE. OTHER TWO GUNS MUST FALL WITHIN THE COLOR TRACK RANGE.

COLOR CRT S

SEE PAGE 2 FOR TEST

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
*11SP22	12		
*(Use Color Special Socket)			
*11WP22	12		
*(Use Color Special Socket)			
12DCP22	6		
13GP22	6		
13JP22	6		
13LP22	6		
13MP22	6		
14BCP22	6		
15ABP22	6		
15ACP22	6		
15AEP22	6		
15AFP22	6		
15AGP22	6		
15GP22	6		
15HP22	6		
15KP22	6		
15LP22	6		
15NP22	6		
15RP22	6		
15SP22	6		
15TP22	6		
15WP22	6		
15YP22	6		

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
16CDP22	6		
16CSP22	6		
16CYP22	6		
16DAP22	6		
17EJP22	6		
17ENP22	6		
17EZP22	6		
17FBP22	6		
17FHP22	6		
19EXP22	6		
19EYP22	6		
19FMP22	6		
19FXP22	6		
19GLP22	6		
19GSP22	6		
19GVP22	6		
19GWP22	6		
19GXP22	6		
19GYP22	6		
19GZP22	6		
19HBP22	6		
19HCP22	6		
19HFP22	6		
19HJP22	6		
19HKP22	6		
19HLP22	6		
19HMP22	6		
19HNP22	6		
19HQP22	6		
19HRP22	6		

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
19HTP22	6		
19HVP22	6		
19HXP22	6		
19HYP22	6		
19JAP22	6		
19JBP22	6		
19JCP22	6		
19JDP22	6		
19JEP22	6		
19JFP22	6		
19JGP22	6		
19JHP22	6		
19JKP22	6		
19JLP22	6		
19VP22	6		
21AXP22,-A	6		
21CYP22,-A	6		
21FBP22	6		
21FJP22,-A	6		
21FKP22	6		
21GFP22	6		
21GLP22	6		
21GRP22	6		
21GUP22	6		
21GVP22	6		
21GWP22	6		
21GXP22	6		
21GYP22	6		
21YP22,-A	6		
22ACP22	6		

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
22ADP22	6		
22AEP22	6		
22AGP22	6		
22AHP22	6		
22EP22	6		
22JP22	6		
22KP22	6		
22LP22	6		
22QP22	6		
22RP33	6		
22SP22	6		
22VP22	6		
22XP22	6		
22WP22	6		
22YP22	6		
23EGP22	6		
25ABP22	6		
25ACP22	6		
25AEP22	6		
25AFP22	6		
25AGP22	6		
25AHP22	6		
25AJP22	6		
25AKP22	6		
25ALP22	6		
25AMP22	6		
25ANP22	6		
25AP22,-A	6		
25AQP22	6		
25ASP22	6		

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
25ATP22	6		
25AWP22	6		
25AXP22	6		
25AYP22	6		
25AZP22	6		
25BAP22	6		
25BCP22	6		
25BDP22	6		
25BP22,-A	6		
25CP22	6		
25FP22,-A	6		
25GP22,-A	6		
25RP22	6		
25SP22	6		
25UP22	6		
25VP22	6		
25WP22	6		
25XP22	6		
25YP22	6		
25ZP22	6		
370AB22	6		
400KB22	6		
400RB22	6		
400RB22-A	6		
430CB22	6		
490ACB22	6		
490AMB22	6		
490EB22	6		
490FB22	6		
490GB22	6		

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
490HB22	6		
490JB22	6		
490LB22	6		
490MB22	6		
490SB22	6		
490UB22	6		
490ZB22	6		
1828P22	6		
1830	6		

BLACK AND WHITE CRTS

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
*2EP4	6	300	15- 25
*USE SPECIAL SOCKET			
5AXP4	6	300	28- 72
5TP4	6	300	40-100
7DP4	6	250	25- 65
7HP4	6	250	33- 77
7RP4	6	250	27- 63
8AP4,-A	6	25	22- 58
8DP4	6	200	17- 46
8JP4	6	300	35- 72
8LP4	6	300	35- 72
8MP4	6	300	28- 72
8QP4	6	150	13- 25
8XP4	6	300	28- 72
8YP4	6	300	28- 72
9ACP4	12	100	30- 60
9AEP4	6	100	30- 50
9AGP4	12	100	30- 60
9TP4	6	50	37- 53
9UP4	12	100	35- 35
9VP4	12	100	30- 50
9WP4	12	90	24- 65
9QP4,-A	5	200	28- 52
9YP4,-A	12	100	30- 50
10ABP4,-A-B-C	6	300	38- 62
10ADP4	8.4	300	38- 72
10AEP4	6	300	38- 62
10AJP4	6	300	35- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
10ARP4	6	140	30- 49
10ASP4	6	100	33- 52
10BP4,-A-B-C-D	6	250	27- 63
10CP4	6	250	30- 66
10DP4	6	250	36- 84
10FDP4,-A	6	250	28- 72
10EP4	6	250	28- 72
10MP4-A	6	25	22- 58
10RP4	6	300	28- 72
10SP4	6	200	18- 48
11AP4	6	150	31- 49
11BP4	6	150	31- 49
11CP4	6	300	39- 94
11DP4	6	50	31- 49
11EP4	6	300	40- 95
11FP4	6	300	40- 95
11GP4	6	135	27- 43
11HP4-A	6	150	31- 49
11JP4	6	50	27- 45
11LP4	6	325	36- 94
11MP4	6	135	27- 43
11QP4	12	100	32- 50
11RP4	6	140	31- 49
11TP4	6	325	36- 78
11UP4	6	140	31- 49
12AYP4	6	300	40- 95
12AZP4	6	300	40- 95
12BAP4	6	300	40- 95
12BDP4	6	50	35- 55
12BEP4	6	30	25- 40

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
12BFP4	4	200	27- 55
12BGP4	6	50	35- 55
12BHP4	6	180	32- 44
12BJP4	4	325	35- 70
12BKP4	6	50	35- 55
12BLP4	6	30	30- 45
12BMP4	6	140	31- 49
12BNP4,-A	6	250	35- 65
12BQP4	6	50	30- 50
12BSP4	6	325	36- 66
12BTP4	12	50	35- 55
12BUP4,-B	12	50	37- 49
12BVP4	12	50	37- 49
12BZP4	12	100	31- 49
12CBP4	6	50	30- 50
12CSP4	12	100	30- 50
12CDP4,-A	6	140	31- 49
12CEP4	12	100	30- 50
12CFP4	4	200	27- 57
12CHP4	6	300	30- 72
12CNP4	4	200	25- 55
12CQP4	6	40	30- 50
12CRP4	12	100	30- 50
12CSP4	12	100	30- 50
12CTP4,-A	6	100	30- 50
12CVP4	6	100	31- 49
12CWP4	6	140	31- 49
12CZP4,-A	12	100	33- 52
12DEP4	6	100	30- 50
12DFP4	6	200	30- 55

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
12DGP4	6	50	30- 50
12DHP4	6	50	30- 50
12DKP4	6	140	30- 50
12DMP4	6	300	35- 72
12DNP4	12	100	30- 50
12DQP4	6	50	35- 55
12JP4	6	250	22- 63
12KP4,-A	6	275	28- 72
12LP4,-A-C	6	250	28- 72
12QP4,-A	6	275	24- 62
12RP4	6	250	24- 62
12SP4	6	300	24- 62
12TP4	6	250	24- 62
12UP4,-A-B	6	250	24- 62
12VP4-A	6	25	28- 72
12XP4	6	250	24- 62
12YP4	6	250	33- 73
12ZP4,-A	6	250	28- 72
13AP4	6	50	35- 55
13DP4	6	50	25- 40
13HP4	6	50	35- 55
13KP4	6	50	35- 55
14ACP4	6	125	40- 80
14AEP4	6	110	32- 50
14AJP4	6	250	24- 64
14ARP4	6	50	35- 40
14ASP4	6	300	28- 72
14ATP4	8.4	300	28- 72
14AUP4	6	50	30- 50
14AVP4	6	300	28- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
14AWP4	6	50	32- 47
14AZP4	6	300	35- 72
14BP4,-A	6	300	24- 62
14AP4	6	300	28- 72
14BDP4	6	300	33- 77
14CP4,-A-B	6	300	33- 77
14DP4	6	250	24- 62
14EP4	6	300	28- 72
14GP4	6	300	28- 72
14HP4	6	300	28- 72
14KP4,-A	6	250	24- 62
14NP4,-A	6	300	28- 72
14QP4,-A-B	6	250	24- 64
14RP4,-A	6	300	26- 70
14SP4	6	300	28- 72
14UP4	6	300	28- 72
14WP4	6	300	28- 72
14XP4,-A	6	300	28- 72
14ZP4	6	300	28- 82
15ADP4	6	50	32- 50
15AP4	6	250	24- 62
15CP4	6	250	24- 62
15DP4,-A	6	250	24- 62
15EP4	6	300	24- 62
15JP4	6	50	35- 55
16AP4,-A-B	6	300	28- 72
16ABP4	6	300	28- 72
16ACP4	6	250	33- 68
16AEP4	6	300	28- 72
16AFP4	6	300	24- 62

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
16AGP4	6	300	35- 72
16ANP4	6	300	35- 72
16AQP4	6	300	33- 70
16ASP4	6	300	35- 72
16ATP4	6	50	35- 55
16AUP4	6	300	40- 95
16AVP4	6	35	25- 50
16AWP4	6	150	35- 65
16AXP4	6	300	35- 72
16AYP4	6	300	60- 80
16AZP4	6	150	35- 55
16BAP4	6	50	35- 65
16BCP4	6	30	25- 50
16BDP4	6	300	35- 72
16BEP4	6	50	35- 55
16BFP4	6	300	36- 94
16BGP4	6	300	35- 72
16BHP4	6	300	35- 72
16BJP4	6	300	35- 72
16BKP4	6	50	35- 55
16BLP4	6	50	35- 55
16BMP4	6	300	40- 95
16BNP4	6	50	40- 65
16BQP4	6	300	40- 95
16BRP4	6	300	40- 95
16BSP4	6	50	35- 66
16BUP4	6	100	31- 49
16BV4	6	300	43- 70
16BWP4	6	300	35- 72
16BXP4	6	30	25- 55

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
16BYP4	6	100	31- 49
16BZP4	6	50	35- 60
16CAP4	6	325	46- 94
16CEP4	6	325	46- 94
16CFP4	6	140	31- 49
16CHP4	6	30	30- 45
16CJP4	6	325	39- 94
16CKP4	6	300	40- 95
16CMP4	6	325	46- 94
16CNP4	12	100	31- 49
16CP4	6	250	24- 62
16CQP4	6	140	31- 40
16CTP4	6	325	36- 94
16CUP4	6	325	36- 94
16CWP4	6	140	31- 49
16CXP4	6	100	31- 49
16DCP4	6	140	31- 49
16DP4,-A	6	250	24- 62
16EP4,-A-B	6	300	28- 72
16FP4	6	300	24- 26
16GP4,-A-B-C	6	300	28- 72
16HP4,-A	6	300	28- 72
16JP4,-A	6	250	24- 62
16KP4,-A	6	300	28- 72
16TP4	6	300	28- 72
16UP4	6	250	28- 72
16VP4	6	250	24- 62
16WP4,-A-B	6	250	24- 62
16XP4	6	300	28- 72
16YP4	6	300	28- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
16ZP4	6	300	28- 72
17AP4	6	300	28- 72
17ATP4,-A	6	300	28- 72
17AVP4,-A	6	300	28- 72
17BP4-A-B-C-D	6	300	28- 72
17BJP4	6	300	28- 72
17BKP4,-A	6	300	28- 72
17BMP4	6	110	32- 50
17BNP4	6	110	32- 50
17BP4-A-B-C-D	6	300	28- 75
17BRP4	6	300	28- 72
17BSP4	6	300	28- 72
17BTP4	6	300	40- 80
17BUP4	6	300	35- 72
17BVP4	6	300	35- 72
17BWP4	6	300	35- 72
17BYP4	6	300	35- 72
17BZP4,-A	6	300	28- 72
17CP4,-A	6	300	28- 72
17CAP4	6	300	35- 72
17CBP4	6	300	28- 72
17CDP4	8	300	28- 72
17CEP4	6	300	28- 72
17CFP4	6	300	28- 72
17CGP4	6	300	28- 72
17CKP4	6	300	28- 72
17CLP4	6	300	28- 72
17CMP4	6	300	28- 72
17CNP4	6	50	35- 50
17CRP4	6	50	30- 50

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
17CSP4	6	300	35- 72
17CTP4	6	300	35- 72
17CUP4	6	300	35- 72
17CVP4	6	300	35- 72
17CWP4	6	325	36- 92
17CXP4	6	50	32- 47
17CYP4	6	325	29-100
17CZP4	6	325	29-100
*17DAP4	3	300	35- 72
*USE SPECIAL SOCKET			
17DBP4	6	300	35- 72
17DCP4	6	300	35- 72
*17DEP4	2	325	19-106
*USE SPECIAL SOCKET			
17DHP4	6	325	29-100
17DJP4	6	325	28- 72
17DKP4	6	300	35- 72
17DLP4	6	325	25- 95
17DQP4	6	50	31- 49
*17DRP4	3	300	35- 72
*USE SPECIAL SOCKET			
17DSP4	6	325	45- 90
17DTP4	6	300	28- 72
17DWP4	6	300	28- 72
17DXP4	6	325	43- 78
17DZP4	6	300	28- 72
17EAP4	6	300	28- 72
17EBP4	6	325	43- 72
17EFP4	6	325	45- 90
17EHP4	6	50	35- 55

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
17EKP4	6	300	33- 77
17ELP4	6	50	35- 55
17EMP4	6	50	33- 45
17EQP4	6	325	35- 72
17ESP4	6	300	35- 72
17FCP4	6	325	35- 72
17FDP4	6	50	33- 52
17FP4,-A	6	300	28- 72
17GP4	6	300	38- 72
17HP4, A-B-C	6	300	28- 72
17JP4	6	300	28- 72
17KP4,-A	6	300	28- 72
17LP4,-A-B	6	300	28- 72
17QP4,-A-B	6	300	28- 72
17RP4,-A-B-C	6	300	28- 72
17SP4	6	250	28- 61
17TP4	6	300	28- 61
17UP4	6	250	28- 61
17VP4-B	6	300	28- 61
17YP4	6	300	28- 72
*19ABP4	2	300	28- 72
*USE SPECIAL SOCKET			
19ACP4	6	50	35- 50
19AEP4	12	100	32- 47
19AFP4	6	300	35- 72
19AHP4	6	325	40- 63
19AJP4	6	50	31- 49
19ALP4	6	325	45- 95
19ANP4	6	325	43- 78
19AP4,-A-B-C-D	6	300	28- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
19EAP4	6	50	32- 50
19EBP4	6	300	36- 94
19ECP4	6	150	35- 60
19EDP4	6	300	40- 95
19EFP4	6	50	35- 60
19EGP4	6	30	25- 50
19EHP4,-A	6	300	35- 75
19EJP4	6	30	35- 50
19EKP4	6	45	35- 50
19ELP4	6	300	36- 74
19ENP4,-A	6	50	35- 55
19EP4	6	250	21- 58
19ERP4	6	300	35- 75
19ESP4	6	50	35- 55
19ETP4	6	50	35- 55
19EUP4	6	300	40- 95
19EVP4	6	300	35- 75
19EWP4	6	300	40- 95
19EZP4	6	45	35- 50
19FBP4	6	50	25- 55
19FCP4	6	325	32- 78
19FEP4-A-B	6	30	30- 45
19FGP4	6	325	43- 78
19FHP4	6	325	32- 78
19FJP4	6	300	35- 72
19FKP4	6	300	35- 72
19FLP4	6	300	28- 62
19FNP4	6	300	28- 62
19FP4	6	250	24- 62
19FRP4	6	300	28- 62

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
19FTP4	6	325	39- 94
19FWP4	4	325	40- 77
19FZP4	6	325	42- 78
19GAP4	6	325	35- 72
19GBP4	6	325	45- 70
19GFP4	6	325	39- 94
19GHP4	6	50	33- 45
19GJP4	6	325	50- 95
19GKP4	6	300	28- 62
19GMP4	6	50	32- 50
19GP4	6	325	45- 70
19HAP4	6	30	25- 50
19HGP4	6	150	38- 62
19JP4	6	300	28- 72
19QP4	6	300	28- 72
19XP4	6	325	36- 94
19YP4	6	325	43- 78
19ZP4	6	325	28- 72
20ABP4	6	50	32- 52
20ACP4	6	325	34- 73
20ADP4	6	35	30- 42
20AEP4	6	30	30- 45
20AFP4-A	6	50	35- 55
20AGP4	6	50	35- 55
20AHP4	6	150	36- 54
20AJP4	6	50	33- 55
20BP4	6	300	24- 62
20CP4,-A-B-C-D	6	300	28- 72
20DP4-A-B-C-D	6	300	28- 72
20EP4	6	300	35- 75

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
20FP4	6	300	28- 72
20GP4	6	300	28- 72
20HP4,-A-B-C-D-E	6	300	28- 72
20JP4	6	300	28- 72
20LP4	6	300	28- 72
20MP4	6	300	28- 72
20RP4	6	50	33- 55
20SP4	6	30	22- 40
20TP4	6	300	28- 62
20UP4	6	325	35- 72
20VP4	6	300	40- 95
20WP4	6	325	32- 68
20XP4	6	325	44- 78
20YP4	6	50	32- 50
20ZP4	6	50	32- 52
21AP4	6	300	28- 72
21ACP4,-A	6	300	28- 72
21AFP4	6	300	33- 77
21ALP4,-A-B	6	300	28- 72
21AMP4,-A-B	6	300	28- 72
21AMP23A	6	300	28- 72
21ANP4,-A	6	300	28- 72
21AQP4,-A	6	300	28- 72
21ARP4,-A	6	300	28- 72
21ASP4	6	300	28- 72
21ATP4,-A-B	6	300	28- 72
21AUP4-A-B-C	6	300	28- 72
21AVP4-A-B-C	6	300	28- 72
21AWP4,-A	6	300	28- 72
21AYP4	6	300	28- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
21BAP4	6	300	28- 72
21BCP4	6	300	28- 72
21BDP4	6	300	28- 72
21CGP4	6	110	32- 50
21BNP4	6	300	28- 72
21BSP4	6	300	28- 72
21BTP4	6	300	28- 72
21CBP4,-A-B	6	300	28- 72
21CDP4,-A	6	300	28- 72
21CEP4,-A	6	300	28- 72
21CHP4	6	110	32- 50
21CKP4	6	300	28- 72
21CLP4	6	300	35- 75
21CMP4	6	300	28- 72
21CQP4	6	300	35- 72
21CSP4	6	300	35- 72
21CUP4	6	300	28- 72
21CVP4	6	300	28- 72
21CWP4	6	300	28- 72
21CXP4	6	50	35- 70
21CZP4	6	300	28- 72
21DP4	6	300	28- 72
21DAP4	6	300	36- 94
21DEP4,-A	6	300	28- 72
21DFP4	6	300	28- 72
21DHP4	6	300	35- 72
21DJP4	6	300	35- 72
21DKP4,-A	6	300	35- 72
21DLP4	6	300	28- 72
21DMP4	6	325	36- 92

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
21DNP4	6	300	35- 72
21DQP4	6	300	35- 72
21DRP4	6	300	28- 72
21DSP4	6	50	32- 47
21DVP4	6	300	28- 72
21DWP4	6	325	50-100
*21EAP4	2	300	35- 72
*USE SPECIAL SOCKET			
21ELP4	6	325	45-100
21EMP4	6	325	45-100
21ENP4	6	300	35- 72
21EP4,-A-B-C	6	300	28- 72
21EQP4	6	325	43- 78
21ERP4	6	325	43- 72
21ESP4	6	325	28- 72
*21EVP4	3	300	35- 72
*USE SPECIAL SOCKET			
21EWP4	6	300	28- 72
21EXP4	6	325	43- 78
21EYP4	6	300	28- 72
21EZP4	6	325	41- 69
21FAP4	6	325	43- 78
21FCP4	6	300	34- 63
*21FDP4	6	300	35- 72
*USE SPECIAL SOCKET			
21FLP4	6	300	28- 72
21FMP4	6	50	31- 49
21FP4,-A-C-D	6	300	28- 72
21FUP4	6	38	25- 50
21FVP4	6	325	36- 78

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
21FWP4	6	325	32- 72
21FXP4	6	325	35- 72
21FYP4	6	50	33- 45
21FZP4	6	325	39- 93
21GAP4-A	6	30	30- 45
21GBP4	6	50	36- 54
21GCP4	6	325	39- 93
21GHP4	6	30	30- 45
21GJP4	6	325	36- 94
21GKP4	6	50	35- 55
21GSP4	6	50	35- 55
21GTP4	6	38	25- 50
21JP4,-A	6	300	28- 72
21KP4,-A	6	300	28- 72
21MP4	6	300	28- 72
21WP4,-A-B	6	300	28- 72
21XP4,-A-B	6	300	28- 72
21YP4,-A-B	6	300	28- 72
21ZP4,-A-B-C	6	300	28- 72
22AFP4	6	325	48- 82
22AP4,-A	6	300	28- 72
22TP4	6	325	35- 72
22ZP4	6	325	44- 78
23ACP4	6	300	35- 72
23AFP4	6	300	35- 72
23AHP4	6	325	38- 78
23AKP4	6	325	43- 78
23ALP4	6	325	36- 94
23AMP4	6	325	36- 94
23ANP4	6	50	35- 40

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
23AQP4	6	325	44- 94
23ARP4	6	325	35- 72
23ASP4	6	325	36- 94
23ATP4	6	50	35- 50
23AUP4	6	325	36- 94
*23AVP4	2	300	35- 72
*USE SPECIAL SOCKET			
23AWP4	6	50	35- 51
23AXP4	6	325	42- 78
23AYP4	6	300	35- 72
23AZP4	6	325	36- 94
23BP4	6	325	45-100
23BAP4	6	325	45-100
23BCP4	6	300	34- 72
23BDP4	6	325	45- 95
23BEP4,-A	6	300	35- 72
23BGP4	6	50	32- 50
23BHP4	6	50	32- 50
23BJP4	6	50	36- 54
23BKP4	6	50	36- 54
23BLP4	6	50	36- 54
23BMP4	6	300	35- 72
23BNP4	6	325	60-100
23BQP4	6	300	35- 72
23BRP4	6	325	43- 78
23BSP4	6	300	35- 72
23BTP4	6	300	43- 78
23BVP4	6	300	35- 72
23BXP4	6	300	35- 72
23BYP4	6	325	43- 78

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
23BZP4	8	325	36- 94
23CAP4	8	300	35- 72
23CBP4	6	300	35- 72
23CDP4	6	300	35- 72
23CEP4	6	300	35- 72
23CGP4	6	325	40- 92
23CMP4	6	300	35- 72
23CP4,-A	6	300	35- 72
23CQP4	6	325	45-100
23CSP4	6	325	43- 78
23CTP4	6	300	35- 72
23CUP4	6	300	43- 78
23CVP4	6	300	43- 78
23CWP4	6	300	43- 78
23CXP4	6	300	43- 78
23CZP4	6	300	43- 78
23DAP4	6	30	23- 50
23DBP4	6	50	31- 49
23DCP4	6	50	35- 50
23DEP4	6	325	42- 78
23DFP4	6	325	42- 78
23DGP4	6	300	36- 94
23DHP4	6	300	35- 72
23DJP4	6	300	36- 94
23DKP4	6	300	43- 78
23DLP4,-A	6	30	35- 50
23DNP4	6	30	25- 50
23DP4,-A	6	325	43- 78
23DQP4	6	65	41- 56
23DRP4	6	300	43- 78

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
23DSP4-A	6	30	35- 50
23DTP4	6	300	43- 78
23DVP4,-A	6	300	36- 94
23DWP4	6	300	36- 94
23DXP4	6	300	36- 94
23DYP4	6	300	36- 94
23DZP4	6	300	36- 94
23EAP4	6	300	43- 78
23EBP4	6	300	36- 94
23ECP4	6	30	25- 50
23EDP4	6	300	35- 72
23EFP4	6	30	25- 50
23EHP4	8	300	43- 78
23EJP4	6	300	36- 94
23EKP4	6	300	43- 78
23ELP4	6	300	43- 78
23EMP4	6	300	43- 78
23ENP4	6	30	35- 50
23EQP4	6	300	43- 78
23ERP4	6	300	43- 78
23ESP4	6	300	36- 94
23ETP4	6	300	28- 62
23EWP4,-A	6	300	36- 94
23EYP4	6	50	25- 50
23EZP4	6	30	25- 50
23FAP4	6	300	36- 94
23FBP4	6	30	35- 50
23FCP4	6	30	25- 50
23FDP4	6	30	25- 50
23FEP4	6	50	36- 54

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
23FGP4	6	300	36- 94
23FHP4	6	50	32- 50
23FJP4	6	300	36- 94
23FKP4	6	300	35- 72
23FLP4	6	325	50- 80
23FMP4	6	300	35- 72
23FNP4	6	300	43- 78
23FP4,-A	6	300	45-100
23FRP4	6	50	35- 50
23FSP4	6	300	35- 72
23FTP4	6	50	35- 50
23FUP4	6	300	35- 72
23FVP4,-A	6	300	36- 94
23FWP4,-A	6	50	36- 54
23FXP4	6	300	43- 78
23FYP4	6	50	35- 55
23FZP4	6	300	40- 95
23GP4	6	300	28- 72
23GAP4	6	300	36- 94
23GBP4	6	300	40- 95
23GCP4	6	50	35- 55
23GDP4	6	300	40- 95
23GFP4	6	300	40- 95
23GHP4	6	200	31- 49
23GJP4,-A	6	50	35- 55
23GKP4	6	300	35- 72
23GMP4	6	300	35- 72
23GNP4	6	300	35- 72
23GQP4	6	300	31- 61
23GRP4	6	300	35- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
23GSP4	6	300	28- 62
23GTP4	6	300	35- 72
23GVP4	6	50	35- 55
23GWP	6	50	33- 45
23GXP4	6	300	35- 72
23HBP4	6	300	35- 72
23HFP4	6	325	45- 92
23HFP4,-A	6	300	28- 62
23HGP4	6	300	28- 62
23HKP4	6	150	36- 54
23HMP4	6	300	28- 62
23HP4	6	300	28- 62
23HQP4	6	300	28- 62
23HRP4	6	30	30- 45
23HSP4	6	30	30- 45
23HTP4	6	325	42- 78
23HUP4-A	6	30	22- 45
23HWP4	6	50	35- 55
23HXP4	6	300	35- 72
23HZP4	6	300	28- 62
23JAP4	6	50	32- 50
23JBP4	6	325	38- 92
23JEP4	6	300	28- 62
23JFP4	6	50	35- 50
23JGP4	6	30	22- 45
23JHP4	6	300	40- 90
23JLP4	6	30	22- 45
23JNP4	6	150	36- 54
23JP4	6	50	35- 50
23JQP4	6	300	35- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
23JRP4	6	30	22- 40
23KP4,-A	6	325	28- 72
23MP4,-A	6	325	36- 94
23NP4	6	50	28- 49
23RP4	6	325	42- 78
23SP4	6	300	35- 72
23TP4	6	300	28- 72
23UP4	6	300	35- 72
23VP4	6	325	45-100
23WP4	6	300	35- 72
23XP4	6	300	35- 72
23YP4	6	300	35- 72
23ZP4	6	50	35- 50
24ADP4,-A	6	300	28- 72
24AEP4	6	300	28- 72
24AHP4	6	300	28- 72
24AJP4	6	50	35- 50
24ALP4	6	300	28- 72
24AMP4	6	300	35- 72
24ANP4	6	300	35- 72
24AP4,-A-B	6	300	28- 72
24AQP4	6	300	35- 72
24ASP4	6	300	35- 72
24ATP4	6	50	34- 49
24AUP4	6	300	35- 72
*24AVP4,-A	2	300	35- 72
*USE SPECIAL SOCKET			
24AWP4	6	300	28- 72
24AXP4	6	300	35- 72
24BAP4	6	50	32- 47

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
24BCP4	6	325	36- 94
24BEP4	6	300	60- 80
24BP4-A	6	300	28- 72
24CP4,-A-B	6	300	28- 72
24DP4,-A	6	300	28- 72
24QP4	6	300	28- 72
24TP4	6	300	28- 72
24VP4,-A	6	300	28- 72
24XP4	6	300	28- 72
24YP4	6	300	28- 72
24ZP4	6	300	28- 72
25EP4	6	300	35- 72
25DP4	6	300	35- 72
25HP4	6	50	35- 55
25JP4	6	300	35- 72
25KP4	6	300	35- 72
25LP4	6	325	36- 94
25TP4	6	325	36- 78
27ABP4	6	300	35- 72
27ACP4	6	325	48- 96
27ADP4	6	300	37- 74
27AEP4	6	300	35- 72
27AFP4	6	300	37- 74
27AGP4	6	300	35- 72
27AP4	6	300	28- 72
27EP4	6	300	28- 72
27GP4	6	300	28- 72
27LP4	6	300	28- 72
27MP4	6	300	28- 72
27NP4	6	300	28- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
27RP4,-A	6	300	28- 72
27SP4	6	300	28- 72
27UP4	6	300	28- 72
27VP4	6	300	28- 72
27WP4	6	300	40- 80
27XP4	6	325	36- 94
27YP4	6	300	28- 72
27ZP4	6	300	35- 72
30BP4	6	300	28- 72
140DB4	12	100	40- 84
150HB4	12	300	12- 42
230DB4	12	100	40- 84
230WB4	2	100	25- 55
230ZB4	12	100	30- 60
280MB4	6	325	35- 80
310AB4	6	325	32- 84
310ADB4	12	300	28- 72
310AKB4	12	300	28- 72
310AUB4	12	300	28- 72
310AVB4	4	200	25- 55
310BKB4	6	325	32- 84
310CDB4-A	6	150	30- 55
310DFB4	12	300	28- 72
310DGB4	12	300	22- 72
310DKB4	6	325	32- 90
310DLB4	12	300	28- 72
310TB4	3	300	28- 72
310WB4	12	300	28- 72
310XBA	4	200	25- 55
310YB4	4	300	28- 72

TUBE TYPE	Filament Voltage	G2	Grid Bias Range
400ACB4	12	140	20- 80
400AGB4	6	325	32- 42
400AHB4	6	300	45-100
400ATB4	6	325	32- 84
400BAB4	6	325	32- 90
400CB4	6	300	40- 95
400TB4	6	300	60- 80
400VB4	6	325	32- 84
440AB4	6	300	28- 72
440HB4	6	300	28- 72
440MB4	6	300	28- 72
470ATB4	6	325	32- 90
470HB4	6	325	32- 84
470JB4	6	325	32- 84
470UB4	6	325	32- 84
470VB4	6	325	32- 90
470WB4	6	325	32- 90
470XB4	6	325	32- 84
590JB4	6	325	32- 84
590KB4	6	325	32- 84
590LB4	6	325	32- 90
590SB4	6	325	32- 90
A31-12W	6	325	35- 70